

National Park Service
U.S. Department of the Interior



Grand Teton National Park

Transportation Plan Final Environmental Impact Statement

September 2006







IN REPLY REFER TO:

United States Department of the Interior
NATIONAL PARK SERVICE
GRAND TETON NATIONAL PARK
P.O. DRAWER 170
MOOSE, WYOMING 83012



L7619 (GRTE)

SEP - - 2006

Dear Interested Party:

Enclosed is the Final Environmental Impact Statement (FEIS) for the Grand Teton National Park (GTNP) Transportation Plan. The need for the plan comes from a number of trends in park use and recreation preferences. While the overall number of recreational visits to the park has remained relatively stable over the past decade, some of the most popular activity areas and trailheads are experiencing increased use. The purpose of the Grand Teton National Park Transportation Plan is to proactively address and manage transportation-related issues.

The FEIS responds to public comments on the Transportation Plan Draft EIS received during the May 27, 2005 to August 25, 2005 comment period and incorporates additional information and analysis collected since the draft was released. The FEIS analyzes five alternatives for transportation-related improvements within GTNP, with Alternative 3a as the preferred alternative.

Alternative 1: No Action - assumes that current conditions and the current transportation system would be carried forward for the next 5 to 10 years.

Alternative 2: Improved Road Shoulders - has the primary objective of improving the park's ability to proactively address transportation issues and enhance the experiences of visitors within the park, with little or no construction of multi-use pathways or parking facilities. In order to enhance safety and the quality of visitor experience, approximately 18 miles of roadway shoulders would be widened on the Teton Park Road between Moose Junction and Signal Mountain Lodge.

Alternative 3: Improved Shoulders and Multi-use Pathways - proposes a system of multi-use pathways and shoulder improvements (widening) to provide enhanced and safer experiences for bicyclists and pedestrians. This alternative proposes realigning the Moose-Wilson Road in two areas, with the existing alignments being restored to natural conditions; approximately 3 miles of multi-use pathways on the Moose-Wilson Road from the Granite Canyon Entrance to the Laurance S. Rockefeller (LSR) Preserve; approximately 20 miles of separated multi-use pathways between the south boundary and North Jenny Lake Junction; and approximately 16 miles of improved road shoulders between North Jenny Lake Junction and Colter Bay.

Alternative 3a: Preferred - a new preferred alternative combining elements of the Draft EIS alternatives 3 and 4. Based on comments received during public review, Alternative 3a provides a wide range of transportation opportunities for bicyclists and pedestrians. This alternative proposes approximately 23 miles of separated multi-use pathways between the south boundary and String Lake Junction via North Jenny Lake Junction; approximately 16 miles of pathways within the road corridor between North Jenny Lake Junction and Colter Bay; an approximately 3-



mile pathway within the road corridor along Moose-Wilson Road from the Granite Canyon Entrance to the Laurance S. Rockefeller (LSR) Preserve; and the Moose-Wilson Road realignment in two areas, with the existing alignments being restored to natural conditions.

Alternative 4: Multi-use Pathways - proposes a system of separated multi-use pathways with approximately 36 miles of multi-use pathways between the south boundary and Colter Bay; multi-use pathways along approximately 7 miles of the Moose-Wilson Road; and the Moose-Wilson Road realignment in two areas, with the existing alignments being restored to natural conditions.

Common to All Action Alternatives:

- Over the next several years, the NPS would use a new adaptive management plan to test a number of different operational and management strategies for managing traffic, as well as pedestrian and bicycle use on the Moose-Wilson Road, to ensure the existing character of the road is maintained.
- A transit business plan would be developed to analyze whether it is feasible to initiate a transit system in and around Grand Teton National Park. The plan would help determine how such a system could be operated effectively and efficiently such that it is a financially sustainable system that could be provided by the private sector or other entity.
- GTNP would implement a research and monitoring program to evaluate more precisely the impacts of pathways on wildlife and wildlife viewers, and identify wildlife safety hazards for pathway users. This information will be used to guide future management actions.
- Visitor information systems would be expanded and improved. Road signs and other forms of information, including information about existing transit services, would be improved to inform park visitors about current traffic/use conditions in the Park.
- A pedestrian-crossing signal would be constructed at the bridge in the Moose Complex to increase visitor safety.

The complete FEIS is also available on the web at <http://parkplanning.nps.gov>. Additional CD copies of the *Grand Teton National Park Transportation Plan/EIS* are available at the Moose Visitor Center in the park and at the Reference Desk in the Teton County Library. The NPS intends to issue a Record of Decision in January 2007. For further information, call 307-739-3410.

I appreciate your participation in the development of this EIS and look forward to your continued participation in future planning projects.

Sincerely,



Mary Gibson Scott
Superintendent

Enclosure



LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials	ESA	Endangered Species Act
ACHP	Advisory Council on Historic Preservation	FHWA	Federal Highway Administration
ACOE	Army Corps of Engineers	FOIA	Freedom of Information Act
ADA	Americans with Disabilities Act	FTA	Federal Transit Administration
AMP	Adaptive Management Plan	FY	fiscal year
APE	area of potential effect	GIS	geographical information system
ATV	all-terrain vehicle	GMP	General Management Plan
BLM	Bureau of Land Management	GYA	Greater Yellowstone Area
BMP	best management practice	IGBC	Interagency Grizzly Bear Committee
BMU	Bear Management Unit	IGBST	Interagency Grizzly Bear Study Team
BOR	Bureau of Reclamation	ITS	Intelligent Transportation Systems
CEQ	Council on Environmental Quality	JDR	John D. Rockefeller, Jr.
CFR	Code of Federal Regulations	LAU	Lynx Analysis Unit
DOE	U.S. Department of Energy	LEED	Leadership in Energy and Environmental Design
DPS	Distinct Population Segment	LSR	Laurance S. Rockefeller
EIS	Environmental Impact Statement	MAC	Multi-agency Campus
EO	Executive Order	MBSMC	Migratory Bird Species of Management Concern
EPA	Environmental Protection Agency	MOA	Memorandum of Agreement



MUTCD	Manual on Uniform Traffic Control Devices	TDP	Transit Development Plan
NAGPRA	Native American Graves Protection and Repatriation Act	USC	United States Code
NEPA	National Environmental Policy Act	USFS	U.S. Forest Service
NHPA	National Historic Preservation Act	USFWS	U.S. Fish and Wildlife Service
NPS	National Park Service	WDEQ	Wyoming Department of Environmental Quality
NRHP	National Register of Historic Places	WGFD	Wyoming Game and Fish Department
NWI	National Wetlands Inventory	WTI	Western Transportation Institute
OSV	over-snow vehicle	WVC	wildlife vehicle collisions
PCA	primary conservation area	WYDOT	Wyoming Department of Transportation
PL	Public Law	WYNDD	Wyoming Natural Diversity Database
ROD	Record of Decision	YNP	Yellowstone National Park
RTS	regional transit system	ZOI	zone of influence
RV	recreational vehicle		
SGAHP	Standards and Guidelines for Archeology and Historic Preservation		
SHPO	State Historic Preservation Office		
SPCC	Spill Prevention, Control, and Countermeasure		
START	Southern Teton Area Rapid Transit		
TBP	Transit Business Plan		



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CHAPTER 1

Purpose of and Need for Action

This Final Grand Teton National Park Transportation Plan/Environmental Impact Statement (Final Plan/EIS) addresses transportation related actions in Grand Teton National Park and the John D. Rockefeller, Jr. (JDR) Memorial Parkway. Grand Teton National Park and the JDR Memorial Parkway are located in the northwest corner of Wyoming, just south of Yellowstone National Park (YNP). Grand Teton National Park encompasses approximately 310,000 acres (125,550 ha) of land and the JDR Memorial Parkway comprises about 23,700 acres (9,591 ha) of land between the northern boundary of Grand Teton National Park and the southern boundary of YNP. For the purposes of this document, references to “Grand Teton National Park” or the “Park” hereafter refer to both Grand Teton National Park and the JDR Memorial Parkway.

This Final Plan/EIS evaluates and recommends a preferred system of transportation improvements within Grand Teton National Park including roadways and parking, development of a plan to evaluate whether there is a need for a pilot transit project within the Park, construction of improved road shoulders and multi-use pathways, improvements to developed areas, and development of traveler information systems. It also includes plans for testing several adaptive management strategies on the Moose-Wilson Road in order to gather information about the best way to maintain the existing character of the corridor while recognizing its sensitive wildlife, scenic, and historic values. This Final Plan/EIS also seeks to identify opportunities to develop transportation partnerships with neighboring communities (i.e., Jackson, Teton Village, and Teton County, Wyoming). The course of actions described in this Final Plan/EIS seek to improve and enhance the experience of park visitors and employees and address public safety concerns.

Project Background

Over the past several decades, Grand Teton National Park has worked to reduce the impacts of motor vehicles on core activity areas within the Park. The potential for additional impacts from future increases in visitation and motor vehicle traffic prompted park staff to undertake a transportation study (Charlier Associates 2001) to identify actions that would:

- Improve visitor experience by providing a broader range of choices for movement within and between key activity areas and destinations.
- Improve mobility within the Park with a better balance between motorized and non-motorized travel modes.
- Reduce the potential for congestion in key areas.
- Provide information to visitors to help avoid adverse impacts to park resources and to promote a variety of transportation options.

The transportation study relied on data gathered from visitor, staff, and concessioner surveys; analysis of trends in visitation and average daily traffic volumes; analysis of accident data; and interviews with staff from Jackson, Teton County, and private transit operators (Charlier Associates 2001). The transportation study made several recommendations that are included in the alternatives described in Chapter 2 of this Final Plan/EIS. The study recommended integrating proposed improvements, with plans adopted by the county and neighboring towns, as well as associated infrastructure improvements. Recommendations for and coordination with related planning efforts are addressed throughout this Final Plan/EIS. These related efforts include:

- *The Jackson Regional Transportation Plan*, adopted by Teton County and Jackson in January 2000 as part of the Regional Comprehensive Plan. The plan seeks to reduce and manage the impacts of traffic growth occurring in the valley and sets numerical goals for reductions in the share of single-occupant vehicle trips by 2020.
- *The Jackson/Teton County Transit Development Plan: 2000-2005 and Long Range*, adopted by Teton County and Jackson in June 2000. Specific transit development plan recommendations relevant to Grand Teton National Park include initiating public transit service between Jackson and Grand Teton National Park (Colter Bay) and developing a multi-agency transit center in Jackson.
- *The Jackson Hole Community Pathways Program*, a jointly-funded independent department of the Town of Jackson, under the Town Administrator, has built a network of off-road multi-use “pathways” radiating from Jackson. The Pathways Program has identified a



connection from the town north along U.S. Highway 26/89/191 to the south boundary of the Park as one of its highest priority segments.

Purpose of and Need for the Plan

The purpose of the Final Plan/EIS is to address and manage transportation-related issues in Grand Teton National Park. The need for the Final Plan/EIS results from a number of trends in park use and recreation preferences. While the overall number of recreational visits to the Park has remained relatively stable over the past decade, some of the most popular activity areas and trailheads are experiencing increased use. In these locations, parking areas are occasionally congested and impacts to natural resources (e.g., trampling of vegetation and the development of social trails) are evident in some areas. Furthermore, traffic between these key locations can be heavy at times.

Many visitors to Grand Teton National Park choose only to visit areas that can be easily reached from their vehicles. Particularly scenic and easily accessible areas, like South Jenny Lake, have become popular destinations, and their parking areas are sometimes crowded and congested during periods of peak visitation. Opportunities for visitors to enjoy the Park while minimizing impacts on resources can be enhanced by providing additional options for travel through the Park, as well as by providing better information about how to access key areas.

Although opportunities for recreational bicycling exist in the Park, there is the potential for conflicts between vehicles, bicyclists, and occasionally pedestrians. Bicyclists currently must share the roads with fast-moving traffic, and while the number of reported collisions is low, the speed and volume of traffic create both perceived and actual safety risks. Shoulder widths also vary on the Teton Park Road, and bicyclists and motorists can be caught off guard. Providing safer facilities for bicyclists and pedestrians would improve recreational opportunities while at the same time reducing some safety risks.

The Moose-Wilson Road is a popular destination for many park visitors due to its high scenic value and opportunities for viewing wildlife. The road runs between Moose and the Granite Canyon Entrance Station and provides access to destinations such as the Granite Canyon and Death Canyon Trailheads, the White Grass Ranch, and beginning in 2007, the Laurance S. Rockefeller (LSR) Preserve (formerly the JY Ranch). Traveling the Moose-Wilson Road provides a

more slow speed and intimate park experience than does driving on some of the Park's other main roads. The road is constructed to a relatively low standard (e.g., a section of the road is unpaved). Travel volumes are approaching the point where the road physically may not be able to handle the capacity, and congestion occurs because of the inability of motorists to get around vehicles that have stopped in the roadway to view wildlife. Increasingly, persons seeking a convenient connection between the Wyoming Highway 22 corridor, Wyoming Highway 390 (commonly referred to as the Teton Village access road), and points within the Park use the road as a through-route. Currently approved plans for expansion of Teton Village, as well as the growth in background traffic on Wyoming Highway 390, could increase the traffic on the Moose-Wilson Road.

The alternatives in this Final Plan/EIS call for testing several different management strategies over the next 5 to 10 years to determine how the National Park Service (NPS) can maintain the existing character of the road and protect its special wildlife, scenic, and historic values.

Transportation issues facing the Park and neighboring gateway communities of Jackson and Teton Village are connected. Community transit provided through Southern Teton Area Rapid Transit (START) exists outside of the Park but does not extend into it. Similarly, multi-use pathways have been constructed to encourage bicycling and hiking elsewhere in Teton County, but these pathways do not extend into the Park. This Final Plan/EIS examines opportunities for the Park to partner with these neighboring communities to develop an integrated transportation system that benefits all parties while preserving important park resources.

The following objectives were identified for this Final Plan/EIS:

- Provide improved opportunities for visitors to enjoy the Park safely by providing additional travel/recreational options, both motorized and non-motorized.
- Reduce and manage the level of traffic and parking congestion at key locations.
- Reduce and minimize adverse impacts to park resources attributable to human use.
- Enhance cooperation between park and gateway communities to achieve complementary transportation goals.



Project Area Description and Location

Grand Teton National Park encompasses more than 333,000 acres (135,000 ha) in northwestern Wyoming, approximately 5 miles east of the Idaho state line and south of YNP. The current road system in Grand Teton National Park includes three primary highways: the Teton Park Road; U.S. Highway 26/89/191 (also known as the Outer Highway); and the North Park Road (Figure 1). The Teton Park Road links Moose to Jackson Lake Junction and provides access to major activity areas in the Park, including South Jenny Lake, Jenny Lake Lodge, and Signal Mountain. A regional route, U.S. Highway 26/89/191, parallels the Teton Park Road and serves as a more direct connection to YNP and eastern Wyoming. The North Park Road (U.S. Highway 89/191/287), which extends from Moran Junction through the JDR Memorial Parkway to the South Entrance of YNP, provides access to the Jackson Lake Lodge, Colter Bay, and Flagg Ranch activity areas. An important characteristic of Grand Teton National Park is its proximity to YNP and to numerous other public lands, including several large national forests and wilderness areas. A large portion of the Park's historic use has been drive-through sightseers visiting Jackson, YNP, and other destinations in the region.

Jackson and other developing areas within rural Teton County, Wyoming, represent the closest and most important communities in relation to transportation issues facing Grand Teton National Park. The Jackson Hole Airport is located within Grand Teton National Park, between Moose and Jackson. Regular passenger service is provided by several airlines, with as many as seven carriers providing service during the peak summer and winter seasons. Grand Teton Lodge Company provides limited shuttle service between Jackson, the Jackson Hole Airport (by advance reservation only), Jackson Lake Lodge, and Colter Bay Village. It also offers regularly scheduled bus tours of the Park and YNP during the summer. Similar tours are offered by at least one other operator from Jackson.

Grand Teton National Park provides visitors with an opportunity to experience two linked but distinct settings, the backcountry and frontcountry areas. The backcountry areas of the Park occupy a vertical landscape of towering peaks and deep, glaciated valleys. With wild and challenging terrain, the backcountry is laced with hiking trails but is largely roadless and only indirectly affected by visitor transportation needs and demands. The

frontcountry area occupies the valley floor with numerous lakes, a major river, and varying terrain. The valley floor is also a wild and scenic part of the Greater Yellowstone Ecosystem and contains important scenic, cultural, and wildlife resources. The frontcountry area is where most of the roads are located, visitor use is highest, and transportation issues addressed in this Final Plan/EIS are most relevant

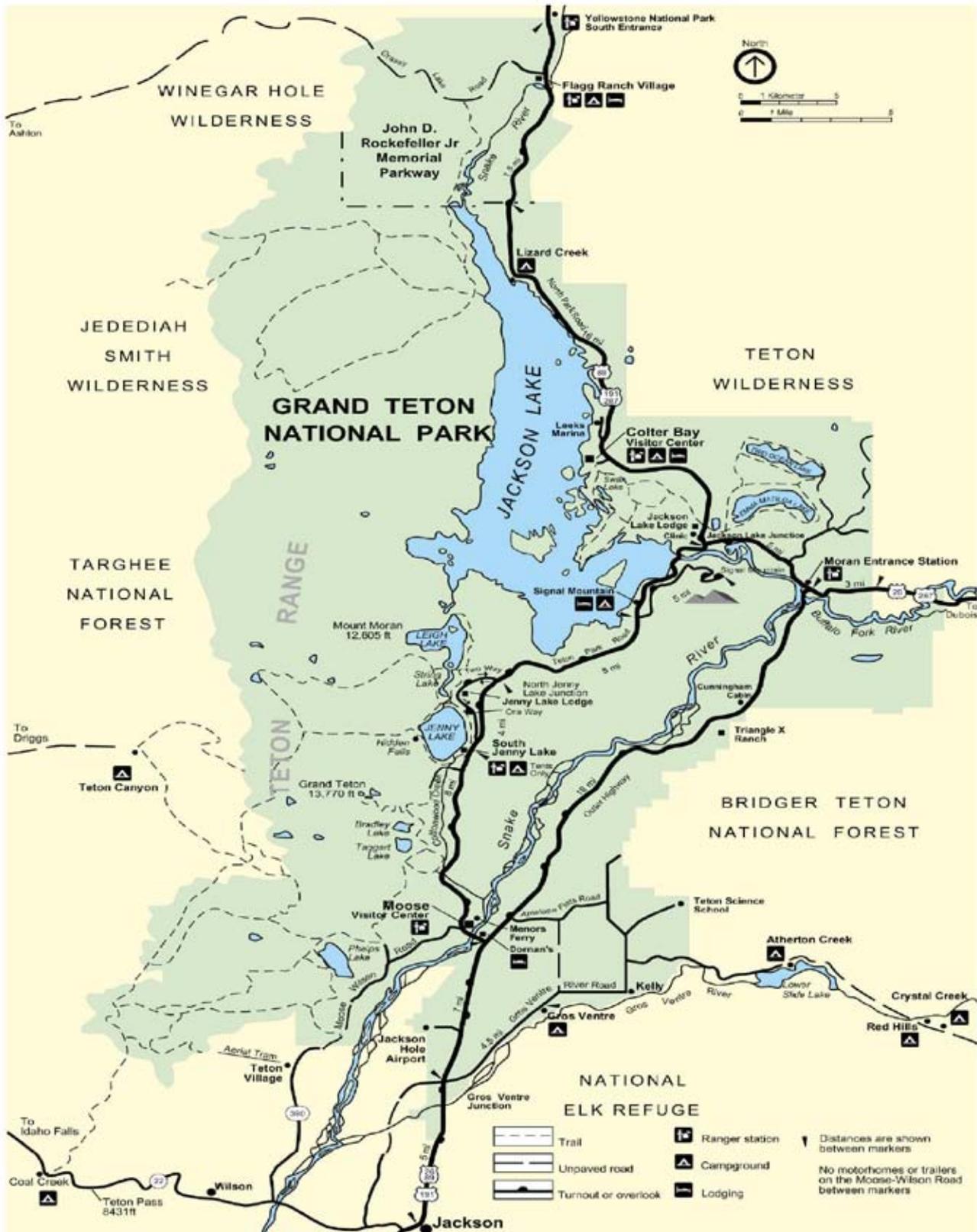
Scope of Plan

During the initial scoping phases of this planning effort, which included several public workshops, a number of alternatives were considered, including a comprehensive system of transit, pathways, intelligent transportation systems, and other transportation-related infrastructure (see Chapter 5 for a summary). As the planning effort progressed, it became apparent that these original alternatives would be operationally and financially infeasible to implement. In addition, the scope of the initial alternatives was disproportionate to the types of transportation-related issues that exist in the Park and were of a magnitude that would be inappropriate to address outside of a long-term planning effort that would provide guidance for overall management of the Park.

Over the last year, while revising the Draft Plan/EIS, the Park initiated several studies to provide professional guidance on adaptively managing certain road segments (e.g., the Moose-Wilson Road), assessing the feasibility of transit within the Park, and monitoring the impacts of construction and use of the first phase of multi-use pathways proposed from Dornan's to South Jenny Lake Junction (see Chapter 2).

As a result of these changes, this Final Plan/EIS addresses actual implementation measures over the next 5 to 10 years. The alternatives presented in this document reflect focused and achievable actions that can be accomplished over the next 5 to 10 years, provided that funding is available. While the activities proposed herein will take place over that period, monitoring their effects, and subsequent decisions based on these effects, would extend beyond this implementation period. Future park planning efforts, potentially including a new long-range plan, will provide an opportunity to examine further and more comprehensively the transportation-related issues not addressed in this Final Plan/EIS, within the context of overall park management.

**FIGURE 1
PROJECT AREA**



Because of this focus, this Final Plan/EIS consists of a comprehensive environmental analysis of potential effects on the Park's natural, cultural, and social resources that would result from implementing new transportation management actions. This Final Plan/EIS analyzes resource impacts associated with the enhancement of pedestrian pathways, signs, and way-finding resources in developed areas; the construction of multi-use pathways inside and outside of existing road corridors; realignment of entrance ways; construction of information kiosks; road shoulder widening; road realignment; and the placement or construction of other limited facilities and signs that would accommodate these improvements.

As described above, this Final Plan/EIS provides for studies and monitoring that would provide input to future decisions. The NPS would review and evaluate the extent to which the actions are meeting the stated objectives after the initial phases of implementation of the Final Plan/EIS. Based on this evaluation, the NPS may consider whether additional transportation-related actions or improvements are warranted, including public transit, multi-use pathways, parking availability, intelligent transportation systems, and roadway management practices.

Park Purpose, Significance, and Mission

The Park's purpose statement is based upon legislative history and historic trends. It reiterates why the area was set aside as a national park unit, thus helping to define management priorities for the protection of those resources and values.

Purpose and Significance

The purpose of Grand Teton National Park is to protect the area's native plant and animal life, its cultural and historic resources, and its spectacular scenic values, as characterized by the geologic features of the Teton Range and Jackson Hole.

The original Grand Teton National Park (approximately 96,000 acres [39,000 ha]) was established by Congress on February 29, 1929, "...and dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people of the United States under the name of the Grand Teton National Park of Wyoming" (45 Stat. 1314).

Congress enlarged the Park to its present size on September 14, 1950 (Public Law 81-787, 64 Stat. 849), "...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 Jackson Hole National Monument."

Geologists regard the Teton Range as one of the most impressive examples of fault-block mountains in the world. The peaks of the range, which tower 3,000 to 7,000 ft (900 to 2,100 m) above the sagebrush flats of Jackson Hole and culminate in the Grand Teton (13,770 ft [4,197 m]), dominate the Park landscape. Mountains within the Teton Range, which began to rise about 9 million years ago, are the youngest mountains of the Rocky Mountain chain, although the Teton Range also includes some of the oldest rocks on Earth.

The Park's physiographic and biologic features fall within the central Rocky Mountain region and include features representative of the themes of mountain systems, works of glaciers, geologic history, alpine tundra, boreal forest, lakes and ponds, and rivers and streams.

Several piedmont lakes, rimmed by moraines from the last glaciation, lie adjacent to the range and form part of the scenic foreground. The Park also includes 25.5 miles (41.0 km) of the Snake River. In addition to being an outstanding recreational resource, the Snake River is one of the last remaining natural habitats of the native Yellowstone cutthroat trout (*Oncorhynchus clarkii bowvieri*).

The flora and fauna of the Park are typical of the central Rocky Mountain region. The forested areas include a mixture of limber pine (*Pinus flexilis*), lodgepole pine (*Pinus contorta*), whitebark pine (*Pinus albicaulis*), Englemann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), and Douglas-fir (*Pseudotsuga menziesii*). Scattered patches of aspen (*Populus tremuloides*) are found at lower elevations. Narrowleaf cottonwood (*Populus angustifolia*), willow (*Salix* sp.), and Colorado blue spruce (*Picea pungens*) line the Snake River and its tributaries, and sagebrush (*Artemisia* sp.) dominates the valley floor.

At least 61 species of mammals inhabit the Park. Elk (*Cervus elaphus*), moose (*Alces alces*), pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and bison (*Bison bison*) are common, and bighorn sheep (*Ovis canadensis*) can be found in higher elevations. Other mammals include beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), coyote (*Canis latrans*), pika (*Ochotona princeps*), and Uinta ground squirrel (*Spermophilus armatus*). Black bears (*Ursus americanus*) are common in forested areas. The grizzly bear (*Ursus arctos horribilis*),

a threatened species, occurs throughout most of Grand Teton National Park as the ecosystem's population expands in number and distribution, but currently inhabits the northern part of the Park in higher densities.

Bird life in the Park is varied and includes peregrine falcon (*Falco peregrinus*), bald eagle (*Haliaeetus leucocephalus*), white pelican (*Pelecanus erythrorhynchos*), great blue heron (*Ardea herodias*), trumpeter swan (*Cygnus buccinator*), Canada goose (*Branta canadensis*), sandhill crane (*Grus canadensis*), sage-grouse (*Centrocercus urophasianus*), golden eagle (*Aquila chrysaetos*), common raven (*Corvus corax*), several species of woodpecker, and a variety of songbirds.

Park Mission Statement

Grand Teton National Park is dedicated to the preservation and protection of the Teton Range and its surrounding landscapes, ecosystems, and cultural and historic resources. The singular geologic setting makes the area and its features unique. Human interaction with the landscape and ecosystem has resulted in an area rich in natural, cultural, and historic resources representing the natural processes of the Rocky Mountains and the cultures of the American West.

Legal and Policy Framework

The legal framework supporting this Final Plan/EIS is defined by Grand Teton National Park's enabling legislation (64 Stat. 849, 1950) and by other legislation pertinent to the National Park System. Other laws and regulations that guide the Final Plan/EIS include the 1916 Organic Act, the National Historic Preservation Act (NHPA), the Clean Air Act, the Clean Water Act, and the Endangered Species Act (ESA). Policy guidance is provided by NPS Management Policies (2001). The alternatives in this Final Plan/EIS have been designed to comply with all legislative requirements and policy directives. Chapter 6, "Compliance with Federal or State Regulations," provides a more comprehensive list and more detail on the regulations that guide the development of this Final Plan/EIS. A summary of some of this legislation is provided below.

Organic Act, 1916

Under the 1916 Organic Act, the NPS is charged with stewardship of parks 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 a manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Public Law 81-787, 1950

This law established Grand Teton National Park as a 310,521-acre (125,663-ha) entity that includes portions of both the Teton Range and Jackson Hole. The rights of residents and others legally occupying and using lands within the Park in 1950 were also specified in the law.

National Historic Preservation Act, 1966 (Section 106)

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on cultural resources, either listed in or eligible to be listed in the National Register of Historic Places (NRHP), and afford the State Historic Preservation Office (SHPO), affiliated American Indian tribes (and, as appropriate, the Advisory Council on Historic Preservation [ACHP]), individuals with a demonstrated interest in the undertaking, and the general public, a reasonable opportunity to comment on such undertakings.

Clean Air Act, 1970 (including 1977 and 1990 amendments)

The Clean Air Act requires that the U.S. Environmental Protection Agency (EPA) set national health-based air quality standards to protect against common pollutants (e.g., ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and particulate matter) and national standards for major new sources of pollution, including automobiles, trucks, and electric power plants.

National Environmental Policy Act, 1969

The National Environmental Policy Act (NEPA) was passed by Congress in 1969 and took effect on January 1, 1970. This legislation mandates that every federal agency prepare an in-depth study of the impacts of "major federal actions having a significant effect on the environment" and alternatives to those actions, and requiring that each agency make that information an integral part of its decisions. NEPA also requires that agencies make a diligent effort to involve the interested and affected public before they make decisions affecting the environment.

Clean Water Act, 1972

The Clean Water Act gives the EPA the authority to set effluent standards on an industry basis and water quality standards for all contaminants in surface waters. Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Proposed activities are regulated through a permit review process.



Endangered Species Act, 1973

The ESA provides for the listing and protection of endangered and threatened species and in some cases their critical habitat. The Act requires consultation under Section 7 if any listed species would be adversely affected. Federally listed species in Grand Teton National Park include grizzly bear, bald eagle, gray wolf (*Canis lupus*), and Canada lynx (*Lynx canadensis*). Habitat for the yellow-billed cuckoo (*Coccyzus erythrophthalmus*), a candidate species, also exists in the Park but the species has not been documented there to date. No specific plant species in the Park is listed as threatened or endangered.

NPS Management Policies, 2001

The NPS Management Policies describe how Grand Teton National Park will meet its management responsibilities under the 1916 Organic Act. Sections of particular relevance to this Final Plan/EIS include Section 9.2, “Transportation Systems,” and Section 9.2.5, “Parking Areas.” Section 9.2 encourages the NPS to “... find better transportation solutions, which will preserve the natural and cultural resources in its care while providing a high-quality visitor experience...” Section 9.2.5 provides guidance for the design of parking areas to minimize impacts on visitor experience, park resources, and values.

Relationship to Other Planning Studies

This Final Plan/EIS was developed to maintain consistency with, or directly reinforce, a number of planning studies undertaken by the Park or neighboring gateway communities, as described below.

Grand Teton National Park Master Plan, 1976

This plan identifies areas in the Park as different use zones, and notes that “...implicit in all efforts to accommodate visitors within Grand Teton’s various use zones is the fact that upper limits of use do exist, beyond which resource quality and/or the level of visitors’ enjoyment diminishes.”

Jenny Lake Development Concept Plan, 1977

The Final Plan/EIS offers recommendations for reducing conflicts between pedestrians and vehicles, for reducing the incidence of social trails, and for eventually integrating transit operations within this developed area to limit parking congestion.

John D. Rockefeller, Jr. Memorial Parkway General Management Plan, 1980

Goals of this plan include providing diverse recreational opportunities (within resource capability); promoting

and practicing cooperative regional planning; providing interpretive opportunities that do not duplicate those of Grand Teton National Park and YNP; identifying and preserving important natural and cultural resources; and facilitating wildlife management and backcountry quality through cooperation with adjacent agencies.

Signal Mountain Development Concept Plan, 1989

This plan offers recommendations for improving vehicular and pedestrian circulation and safety and for reducing the incidence of social trails. Recommendations for improved pedestrian circulation within the activity area, and between the campgrounds and activity area, are also provided.

Colter Bay Village/Jackson Lake Lodge Development Concept Plan, 1989

This plan offers recommendations for redesigning visitor circulation and parking to improve visitor experience and reduce way-finding confusion. Recommendations for improved pedestrian circulation within the activity area, and between the campgrounds and activity area, are also provided.

Teton Corridor Development Concept Plan/ Environmental Assessment-Moose to North Jenny Lake, 1990

Among other improvements, this plan recommends connecting developed areas within the corridor with a signed network of hardened pathways, and expanding the existing Moose Visitor Center area.

Grand Teton National Park Statement for Management, 1995

This document provides a statement of purpose and significance for the Park.

Moose Visitor Center and Area Plan/Environmental Assessment, 2002

This area plan provides recommendations for improving visitor facilities and experience at Moose, including a new visitor center and associated circulation improvements.

North Park Road Reconstruction/Environmental Assessment, 2002

This project provides for roadway widening and roadway shoulder improvements from Lizard Creek Campground to the YNP boundary.

Greater Yellowstone/Teton Clean Cities Coalition, 2002

After 5 years of effort, the Greater Yellowstone/Teton Clean Cities Coalition received official “clean cities” designation from the U.S. Department of Energy (DOE) in September

2002. DOE sponsors the National Clean Cities Program, whose mission is to reduce the nation's dependence on imported petroleum by advancing the use of cars and trucks powered by alternative fuels. The program helps all parties identify mutual interests while meeting their individual objectives, such as the need to improve air quality, comply with federal fleet regulations, or identify and create markets for vehicles or fuel.

Jackson/Teton County Transit Development Plan, 2003

Specific plan recommendations relevant to the Park include initiating public transit service between Jackson and Grand Teton National Park and developing a multi-agency transit center in Jackson that would also serve as a park transit staging area.

Teton County Comprehensive Plan, (Chapter 8 Transportation), 2003

Adopted by Teton County and Jackson in January 2000 as part of the joint County/Town Regional Comprehensive Plan, this plan focuses on reducing and managing the impacts of traffic growth occurring in the valley. The plan sets numerical goals for reductions in the share of single occupant vehicle trips and increases in the share of "alternative mode" (i.e., walking, bicycling, and transit) trips by 2020.

Laurance S. Rockefeller Preserve

On May 26, 2001, Laurance S. Rockefeller announced his intent to donate 1,106 acres (448 ha) of land to the NPS; the parcel was the remaining privately held portion of the JY Ranch that had been owned by the Rockefeller family since the 1930s. The transfer of ownership is expected to occur in 2007, after which the site will become the public LSR Preserve. The Preserve will include a system of trails and a visitor contact station.

Greater Yellowstone Rural Intelligent Transportation Systems Corridor Project

This effort addresses the feasibility of applying technologies from Intelligent Transportation Systems to solve travel and safety issues in a rural environment. The specific setting of the project encompasses the three major transportation corridors in the surrounding states of Idaho, Wyoming, and Montana, which travelers use to access the national parks.

Wyoming Department of Transportation (WYDOT) Planning and Construction Initiatives

The WYDOT routinely publishes an advance list identifying capital planning, design, and construction projects in the Jackson/Teton County area.

Draft Bison/Elk Management Plan for the National Elk Refuge and Grand Teton National Park Environmental Impact Statement

The U.S. Fish and Wildlife Service (USFWS) and the NPS are developing a plan for managing bison and elk in the National Elk Refuge and Grand Teton National Park. Management issues being addressed include numbers of elk and bison, population control measures, forage management, winter feeding, disease management, restoration of habitat, and management of other species of wildlife. The plan is expected to result in a Record of Decision (ROD) in 2007.

Moose Concept Master Plan

This plan consists of an on-going site analysis and several architectural design concepts that address issues such as visitor, employee, concessioner, and emergency services access; pedestrian, bicyclist, and vehicular circulation and parking; and the proper configuration of functional areas for residential, administrative, commercial, and recreational activities related to the Moose Visitor Center, post office, residential loop, administrative and maintenance buildings, and boat launch areas. The plan will also include traffic volume analyses and flow pattern recommendations, improved trail locations, and vegetative screening as mitigative measures.

White Grass Ranch Rehabilitation and Adaptive Use Environmental Assessment/Assessment of Effect

The NPS has prepared an environmental assessment and finding of no significant impact for rehabilitation and adaptive use of the White Grass Ranch Historic District in Grand Teton National Park as a western historic preservation center. The center will increase the capacity of the NPS to preserve and rehabilitate historic structures in the Intermountain West. White Grass Ranch is located off Death Canyon Road, which would be accessed by the Moose-Wilson Road. Future activities at the White Grass Ranch may slightly increase the level of motorized and non-motorized activity along the Moose-Wilson Road.



Teton Village Expansion

In this plan, Snake River Associates address development at three primary areas located on the southwest border of Grand Teton National Park, including:

1. The Village Core Expansion, which consists of a mixed-use core sub-tract and an associated spaces sub-tract that includes public areas, local and visitor services, pathways, parking, condominiums, townhouses, affordable housing, and employee housing.
2. A residential development south of McCollister Drive.
3. A golf course/Nordic ski area that establishes a continuous buffer to the south of the village.

Expansion and development in these areas has the potential to affect motorized and non-motorized traffic on the Moose-Wilson Road, and may impact wildlife habitat and backcountry use of adjacent areas.

Winter Use Plan

Limited snowmobile use is currently allowed in Grand Teton National Park under a temporary Winter Use Plan. The NPS has begun preparation of a long-term plan for managing winter recreational use in Yellowstone and Grand Teton National Parks. The purpose of the Winter Use Plan and EIS will be to ensure that park visitors have a range of appropriate winter recreational opportunities, while ensuring that these recreational activities are in an appropriate setting and do not impair or irreparably harm park resources or values.

Issues and Impact Topics

Issues and concerns were defined through the initial Transportation Study (Charlier Associates 2001) and further developed at internal and public scoping meetings, other public meetings, and working group meetings. These issues represented the range of opinions in regard to the purpose of and need for action and also addressed concerns about certain resources and values. Initial issues identified included visual quality, vegetation, soils, water quality and wetlands, threatened and endangered species, wildlife, cultural resources, transportation and traffic, visitor use and experience, employee use and experience, socioeconomics and local community impacts, and park operations.

Some issues were not carried forward as impact topics for detailed analysis in the Final Plan/EIS because impacts expected under any of the alternatives would not exceed negligible or minor adverse levels (see the “Impact Topics

Dismissed from Further Analysis” section in this chapter). Issues that were not carried forward, including floodplains, wild and scenic rivers, air quality, soundscapes, historic structures and cultural landscapes, ethnographic resources, museum collections, American Indian trust resources, land use, environmental justice, lightscape management, prime and unique agricultural lands, several wildlife species (whooping crane [*Grus Americana*], wolverine [*Gulo gulo*], harlequin duck [*Histrionicus histrionicus*], trumpeter swan, white-tailed deer [*Odocoileus virginianus*], bighorn sheep), fish, energy consumption, and wilderness, are discussed in the subsequent section.

The issues that were carried forward as impact topics are presented below, along with statements that describe the issue or area(s) of concern. Each impact topic is described in Chapter 3, and environmental consequences related to each topic are analyzed in Chapter 4.

Visual and Scenic Quality

Development actions within the Park have the potential to affect the visual quality of the scenic views for which the Park was established.

Vegetation

Certain park areas are presently being used disproportionately, causing impacts on vegetation as visitors create social trails and/or impromptu parking areas when lots are full in peak season. Additionally, introduction and/or expansion of invasive nonnative species is an ongoing concern in existing developed areas, roadsides, and potential pathways.

Soils

Certain park areas are presently being used disproportionately, causing impacts to soils as visitors create social trails and/or impromptu parking areas when lots are full in peak season.

Hydrology and Water Quality

Transportation-related improvements may affect hydrology or water quality to the degree that they increase impervious surface, storm runoff, and non-point source pollution, or where pathways increase levels of public use and activity near surface water features.

Wetlands

Executive Order (EO) 11990, Protection of Wetlands, requires federal agencies to avoid, where possible, adversely impacting wetlands. Wetlands have been identified and mapped under the National Wetland Inventory Program

and roadway or pathway construction may directly or indirectly affect wetlands.

Threatened and Endangered Species/Species of Special Concern

Five species, listed as threatened, endangered, or candidate under the ESA, could be affected by transportation system improvements, including the bald eagle, grizzly bear, Canada lynx, gray wolf, and yellow-billed cuckoo. Other species of special concern may also occur in or near the project area and could be affected by actions included in the Final Plan/EIS alternatives.

Wildlife

Some resident and migratory animals within the Park may be affected by the introduction of new multi-use pathways.

Archeological Resources

A variety of archeological resources are found in Grand Teton National Park. Construction of transportation-related infrastructure may result in impacts to archeological resources, as well as visitation in areas of known archeological sites.

Transportation System and Traffic

Parking shortages sometimes occur at trailheads and selected activity areas during peak season.

Visitor and Employee Experience

Certain activity areas receive heavy use and are occasionally difficult to access in peak summer season because of parking capacity limitations. Real and perceived safety hazards exist for bicyclists using park roadways. Alternative travel modes (i.e., transit and multi-use pathways) are lacking in the Park. Many NPS and concession employees travel long distances daily by private vehicle because they have limited options to travel by other methods.

Social and Economic Environment

Jackson experiences heavy traffic to and from the Park, especially in the morning and early evening, creating congestion on town roadways and travel delays for local residents. The town and county have developed a shared use, off-road trail system; however, it ends at the Park boundary at the Granite Canyon Entrance Station. Visitors wishing to walk or bicycle into the Park must move from the trail to a roadway shoulder. The local economy in the Jackson-Teton County area may be temporarily affected by construction-related employment and business-related expenditures associated with construction of transportation-related infrastructure. Some actions

could also have an effect on area population, job growth, earnings, and demand for housing.

Local Communities

Local communities are beginning to experience traffic congestion as a result of growth in these communities and increased use of the Park. Opportunities for the Park to collaborate with gateway communities in the operation, management, and financing of such items as transit and multi-use pathways have not been fully developed.

Park Operations

The operation and construction of new multi-use pathways will increase NPS staff workloads and staffing needs, as well as associated capital costs.

Impact Topics Dismissed from Further Analysis

According to NPS policy, certain issues that were identified may be eliminated from detailed analysis if the expected adverse impacts are negligible to minor with implementation of the required mitigation across all alternatives. The following topics were eliminated from further analysis in this Final Plan/EIS for the reasons set forth.

Floodplains

The NPS manages floodplains in accordance with EO 11988, "Floodplain Management," and NPS Special Directive 93-4, "Floodplain Management Guidelines." Natural floodplain values and functions must be protected and risks to life and property must be minimized by avoiding use of the regulatory floodplain wherever there is a feasible alternative location. This Final Plan/EIS complies with these directives, and no proposed pathways or other improvements are located in the 100-year floodplain. Therefore, impacts to floodplains would be negligible, and this impact topic was dismissed.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act (Public Law 90-542) initially designated eight rivers or river segments nationwide as initial components in the National Wild and Scenic Rivers System (National System). The Snake River was recommended for Congressional designation as a part of the National System on September 13, 1982; tributaries to the Snake were determined eligible in 2005, but these recommendations have not been formally acted upon. Although the Snake River is not formally a part of the National System, the Final Plan/EIS has avoided locating trail facilities in the Snake River corridor. Impacts



to the Snake River's outstanding resources and free flow are expected to be negligible; therefore, this impact topic was dismissed.

Air Quality

Implementation of any of the alternatives considered would cause minor impacts to air quality due to releases of pollutants from internal combustion engines and fugitive emissions during construction. Sources of emissions would include continued traffic in the Park, road maintenance activities, and construction-related impacts from the disturbance of soils during the addition of road shoulders and/or pathways. However, these actions would cause no more than minor adverse impacts to air quality in the Park. Traffic levels are not expected to increase more than slightly over the life of this Final Plan/EIS, and any construction-related impacts would be localized and short term. Dust abatement measures would be implemented to control fugitive emissions during construction.

Use of bicycles for park transportation rather than vehicles could have a beneficial impact on air quality by reducing emissions. Providing information about transit options and future transit within the Park would also indirectly benefit air quality. Improving trails, signage, and way-finding could reduce the use of vehicles for short trips in congested areas, consequently reducing emissions. While these actions would have a beneficial impact on the Class I Airshed of the Park, these impacts would be negligible. Further analysis of air quality impacts was dismissed because (1) adverse impacts to air quality under any alternative would be minor; (2) all construction-related impacts would be localized, minor, and short-term; and (3) beneficial impacts would be negligible.

Soundscapes

Actions taken to construct pathways and road improvements under the alternatives considered would cause impacts to the natural soundscape, but these impacts would be limited in scope and short-term. Noise from motor vehicles and visitors using the Park would continue under any of the alternatives, and long-term impacts would be minor and similar for all alternatives since no major changes in traffic or visitor use would be expected over the life of the Final Plan/EIS. None of the alternatives would cause more than short-term or minor changes to the natural soundscape, and most of the effects would be limited to frontcountry areas where minor or short-term additions to background noise levels are not as noticeable. Therefore, soundscapes was eliminated as an impact topic.

Historic Structures and Cultural Landscapes

The Draft Plan/EIS identified many historical structures and six areas as potential cultural landscapes within the action alternative locations in Grand Teton National Park. None of these would be directly affected by any action proposed under any alternative since they are not located immediately in or near the proposed areas of construction. Any indirect adverse impacts to those resources related to construction noise would be negligible to minor since construction noise would be limited in scope and duration and because distance from the historic features or cultural landscapes is great enough to mitigate noise levels. Continued use of the Park by visitors and park traffic would cause only negligible to minor adverse impacts to these landscapes, similar to what is currently experienced. Because visitation is expected to grow only modestly over the life of the Final Plan/EIS, long-term impacts would remain negligible to minor. For these reasons, historical structures and cultural landscapes were dismissed from detailed evaluation in the Draft Plan/EIS.

In response to public comment received concerning proposed changes to the Moose-Wilson Road described in the Draft Plan/EIS, the Park initiated a review of the road to determine its eligibility for listing on the National Register. Documentation was submitted to the SHPO for review for determination of eligibility and the SHPO concurred that the road is eligible for listing. Because the road has been determined eligible for the NRHP, the NPS would consult with SHPO before taking any action. Consultation may result in additional mitigation.

Ethnographic Resources

There are no known ethnographic resources in the project area or its immediate vicinity. While locations of specific ethnographic resources are not known within the project area, it is known that American Indian people utilized the Grand Teton area over thousands of years for hunting and subsistence. Grand Teton National Park holds many resources important to these tribes, including wildlife, minerals, plants, and water. These resources do not always have a defined boundary and many may occur within the project area. Because many of these resources have not been identified, the NPS will continue to consult with the following tribes: Crow, Northern Arapaho, Northern Cheyenne, Eastern Shoshone, Shoshone-Bannock, Blackfoot, Flathead, Gros Ventre, Nez Perce, and others as may be identified.

If these tribes subsequently identify the presence of ethnographic resources, appropriate mitigation measures will be undertaken in consultation with the tribes. The location of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 United States Code [USC] 3001) will be followed. For these reasons, ethnographic resources were dismissed from detailed evaluation in this Final Plan/EIS.

Museum Collections

NPS Management Policies (2001) and Director's Order #28, "Cultural Resource Management," (1997) require consideration of impacts on museum collections (i.e., historic artifacts, natural specimens, and archival and manuscript material). Because none of the alternatives would effect a change in location or conservancy of current museum collections, and since there is no evidence that any one alternative would serve to increase conservancy demands or requirements, this topic was dismissed.

American Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The Federal Indian Trust Responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes.

There are no American Indian trust resources in Grand Teton National Park. Therefore, American Indian trust resources are dismissed as an impact topic.

Land Use

A number of recent planning efforts, including the Park's 2001 *Grazing Use and Open Space Study* (Grand Teton National Park 2001a) and the 2000 *Jackson/Teton County Comprehensive Plan*, have focused on options for preserving open space, rural character, wildlife, and scenic resource values within the Jackson Hole valley.

This project is not expected to appreciably increase the land area developed within the Park nor is it expected to alter the mix of recreational, concession, or administrative uses and functions that occur on public lands. The proposed alternatives would not affect any grazing rights

presently in force on park lands, and inholders (i.e., persons with private property within the Park boundary) would maintain all access to their properties (as necessary) to conduct business or personal affairs.

None of the Final Plan/EIS alternatives is expected to directly alter the mix of land uses in adjacent communities of Jackson and Teton Village. Minimal increases in park visitation are projected as a result, so demand for additional overnight lodging and new developed facilities in these communities is not expected to increase appreciably. Because Final Plan/EIS impacts on land uses are expected to be negligible, both within the Park and within adjacent gateway communities, this impact topic was dismissed.

Environmental Justice

EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions. None of the alternatives would have disproportionate health or environmental effects on minorities or low-income populations or communities, as defined in the EPA's Final Guidance for Incorporating Environmental Justice Concerns (1998). Should any additional increase in fees be necessary, it would be applied to all visitors; therefore, no disproportionate adverse effects are anticipated. Because impacts are expected to be negligible, environmental justice was dismissed as an impact topic.

Lightscape Management

In accordance with NPS Management Policies (2001), the NPS strives to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human-caused light. Impacts from the direct glare of motor vehicle lights are currently low in the Park, and any changes in motor vehicle traffic as a result of this Final Plan/EIS would be negligible. In addition, Grand Teton National Park strives to limit the use of artificial outdoor lighting to only that which is necessary for basic safety requirements, and to ensure that all outdoor lighting is shielded to the maximum extent possible to keep light on the intended subject and out of the night sky. Impacts to lightscape management associated with new facilities and structures would be negligible. Therefore, lightscape management was dismissed as an impact topic.



Prime and Unique Agricultural Lands

The Farmland Protection Policy Act (7 USC 4201 et seq.) and the U.S. Department of the Interior Environmental Statement Memorandum No. ESM94-7 require an evaluation of impacts on prime or unique agricultural lands. Private inholdings of agricultural land exist within the boundaries of Grand Teton National Park. However, there are no designated prime or unique agricultural lands within Grand Teton National Park (Natural Resources Conservation Service [formerly the Soil Conservation Service], unpublished data). None of the actions proposed in the range of alternatives would affect such lands, access to them, or their agricultural properties; therefore, this topic was dismissed.

Threatened and Endangered Species: Whooping Crane

Whooping cranes are one of the rarest animals in North America and were listed as endangered under the ESA in 1967. This endemic North American species historically ranged from the Arctic coast south to central Mexico and from the Rocky Mountain region east to the Atlantic coast. Historical records show whooping cranes visited portions of Jackson Hole and the Greater Yellowstone Area (GYA) (Drewien 1989). However, as of the summer of 2002, the USFWS considers whooping cranes to be extirpated from Wyoming and no longer requires consultation on this species in Wyoming (P. Deibert 2002, pers. comm.). For this reason, this species was dismissed from further analysis.

Sensitive Species/Species of Special Concern: Wolverine, Harlequin Duck, and Trumpeter Swan

The USFWS was petitioned to list the wolverine under the ESA in 2000, but it was determined on October 21, 2003 that the petition did not provide substantial information to indicate that listing may be warranted. The Wyoming Game and Fish Department (WGFD) classifies the wolverine as a Category 3 species of special concern, and the U.S. Forest Service (USFS) and Bureau of Land Management (BLM) classify the wolverine as a sensitive species.

Wolverines occur in low densities in the Park. As part of a study by the Wildlife Conservation Society, several wolverines were captured and radio-marked in recent years. At least two reproductive females are known to have home ranges that include the Park (Wildlife Conservation Service, unpublished data). Radio-telemetry, tracks, and other observations have shown that wolverines spend the majority of their time in the higher elevations of the Park above the valley floor. Wolverine activity in the valley,

especially at the base of the Teton Range during winter, is not uncommon. Nevertheless, actions proposed in this Final Plan/EIS are not expected to affect the wolverine; therefore, this species was dismissed from further analysis.

Harlequin duck is currently listed by the USFWS as a “sensitive” species and by the WGFD as a Category 3 species of special concern. Although previously listed by USFWS as a Category 2 candidate species for ESA listing, this classification has since been removed. Harlequin ducks are known to be present in Grand Teton National Park, primarily in small, low gradient mountain streams, but are unlikely to be present within any areas that would be affected by actions considered under any alternative; therefore, this species was dismissed from further analysis.

No trumpeter swan nesting habitat occurs within the project area. The section of the Snake River near the Moose Bridge does contain wintering habitat for swans, but this section would not be impacted by road maintenance or pathway construction. Trumpeter swan would not be affected by the proposal; therefore, this species was dismissed from further analysis.

Wildlife: White-tailed Deer, Bighorn Sheep, and Fish Species

A relatively small number of white-tailed deer reside year-round within Jackson Hole, primarily along the Snake River and its larger tributaries. Jackson Hole white-tailed deer are likely related to animals that have dispersed from Idaho. Numbers of deer present in or near the project area are expected to be small, and any adverse impacts would be negligible. For this reason, this species was dismissed from further analysis.

Bighorn sheep are sparsely distributed throughout the mountains surrounding Jackson Hole, with the highest densities occurring within the Gros Ventre Mountain Range, the mountains surrounding the Hoback River drainage, and in portions of the Teton Mountain Range in Grand Teton National Park and Targhee National Forest (WGFD, unpublished data). Winter habitat is confined primarily to the lower portion of the Gros Ventre River drainage, the Sheep Gulch/Curtis Canyon area east of the National Elk Refuge, near Camp Creek in the Hoback River drainage, and in the high elevations of the Teton Range. Bighorn sheep are not expected to occur within the project area. For this reason, this species was dismissed from further analysis.

Seven species of salmonids are present or possibly present within the project area (Kiefling 1978). Only two of these

species, the Yellowstone cutthroat trout and mountain whitefish (*Prosopium williamsoni*), are native to the area. The five remaining salmonids (brook trout [*Salvelinus fontinalis*], brown trout [*Salmo trutta*], rainbow trout [*Oncorhynchus mykiss*], lake trout [*Salvelinus namaycush*], and grayling [*Thymallus arcticus*]) are nonnative species that were introduced into Jackson Hole. In addition, three species of suckers (Utah [*Catostomus ardens*], bluehead [*Catostomus discobolus*], and mountain [*Catostomus platyrhynchus*]), two species of sculpins (Paiute [*Cottus beldingii*] and mottled [*Cottus bairdii*]), and five species of cyprinid minnows (Lahontan shiner [*Richardsonius egregius*], speckled dace [*Rhinichthys osculus*], longnose dace [*Rhinichthys cataractae*], leatherside chub [*Snyderichthys copei*], and Utah chub [*Gila atraria*]) are also present. The proposed project would have negligible impacts on fish or fish habitat; therefore, this topic was dismissed from further analysis.

Energy Consumption

Construction of multi-use pathways is not expected to have a substantial impact on traffic (and traffic emissions), although it would promote more non-motorized traffic in some areas. Encouraging the use of more energy efficient travel modes within the Park could reduce energy consumption and consumption of nonrenewable resources.

A public transit system may be proposed in the Park in the future pending the findings of a transit business plan studying that subject, but no decision on a transit system has yet been made. Following the ROD for the Final Plan/EIS, the NPS will complete a monitoring plan for collecting data on the effects of implementing a pilot transit program. If the Park chooses to implement a pilot transit program in the future, the NPS will strive to ensure that any vehicles purchased as a result of this Final Plan/EIS will meet EO 13149, which aims to reduce petroleum consumption by the government through improvements in fleet fuel efficiency and the use of alternative fuel vehicles and alternative fuels. If the Park partners with any entity to implement part of this Final Plan/EIS, the partner will be encouraged to meet this EO as well. Any pilot transit system within the Park would use clean fuel technology to limit air quality impacts. It is anticipated that if public transit occurs in the Park in the future, the effects to energy consumption would be beneficial; however, data relating to those potential impacts are not yet available. Because impacts on nonrenewable resources were considered negligible for all alternatives, this topic was dismissed from further analysis.

Wilderness

Grand Teton National Park has recommended that Congress include approximately 135,680 acres (54,908 ha) of the Park in the National Wilderness Preservation System pursuant to Public Law 88-577 (Grand Teton National Park 1984). This recommended wilderness area is about 44 percent of the Park's lands and includes most of the Teton Range within the Park and several of the lakes at its base. Along the eastern edge of the Teton Range, the wilderness line is drawn along the Bureau of Reclamation (BOR) withdrawal line from the north boundary to Spalding Bay. This roadless area provides a number of backcountry hiking trails as well as climbing opportunities. No improvements are proposed that would affect the backcountry wilderness area; therefore, backcountry wilderness impacts were considered negligible, and this impact topic was dismissed from further analysis.

Regulatory Compliance Process

The NPS is committed to continued public involvement as the decisions resulting from this Final Plan/EIS are implemented. This Final Plan/EIS, which describes the affected environment and analyzes environmental consequences, has been prepared with the best currently available data. However, as individual actions or projects from this Final Plan/EIS are implemented, it may become necessary to complete additional NEPA compliance (in accordance with 42 USC § 4321 et seq.) tiered from this Final Plan/EIS.

Site designs would be evaluated to determine the need for additional NEPA or other regulatory compliance (e.g., NHPA, ESA, and Clean Water Act). Additional environmental compliance (as appropriate) would be prepared and made available to the public. Chapter 6, "Compliance with Federal or State Regulations," provides more detail on the regulations that guide the development of the Final Plan/EIS.

Typically, everything in this Final Plan/EIS is covered by NEPA compliance, except in cases where project implementation would deviate from what is described in this document or is otherwise stated that future compliance would be necessary. Every implementation action proposed in this EIS will continue to be reviewed and monitored by the Park's interdisciplinary team of specialists to ensure compliance with all federal and state regulations. Additionally, the Park's NEPA specialists will continue to work with construction project leaders to ensure that all actions comply with NEPA and do not have an effect beyond what was analyzed in this Final Plan/EIS. Federal (Federal



Highway Administration [FHWA], USFWS, and U.S. Army Corps of Engineers [ACOE]) and state (SHPO, WGFD, and WYDOT) agencies will be consulted as necessary and best management practices (BMPs; see Appendix A) and other mitigation measures will be employed as much as possible.

Compliance with requirements of Section 7 of the ESA is completed through the analysis in this Final Plan/EIS.

Compliance with requirements of Section 404 of the Clean Water Act (Wetlands) and data collections for Sections 106 and 110 of the NHPA (Cultural Resources) will be accomplished through site-specific surveys once an alternative is selected and design is completed. Consultation with the ACOE and SHPO will be conducted prior to construction activities that have the potential to affect wetlands or cultural resources, respectively.

In the event that the Park decides to add or deviate from the Final Plan/EIS and subsequent ROD, further NEPA compliance would be required and would include a formal public participation process.



CHAPTER 2 Alternatives

Introduction

This chapter describes five alternatives that address the Final Plan/EIS's purpose of and need for action. These alternatives were formulated to explore the range of reasonable actions and strategies for which potential effects could be compared. Alternatives were considered that if implemented, would meet project objectives while protecting the Park's natural resources. Resource concerns identified in the development of this proposal are listed in Chapter 1 and described in Chapter 3. In accordance with the requirements of NEPA (42 USC § 4321 et seq.), the alternatives and their effects are presented in a comparative format along with a description of required mitigation measures (40 Code of Federal Regulations [CFR] §1502.14d) and an analysis for selecting the preferred alternative.

A summary comparison of alternatives is provided in tabular form, as is a discussion of alternatives considered but later eliminated from further evaluation. Actions proposed under the alternatives were organized by the following categories: (1) roadways and parking, (2) transit service and facilities, (3) multi-use pathways and improved (i.e., widened) shoulders, (4) developed areas, and (5) traveler information. Several elements are proposed that are common to all alternatives. These elements, which are discussed in more detail throughout this section, are listed first followed by the description of actions specific to each alternative. Table 1 summarizes the specific elements of the proposed alternatives.

Elements Common to All Alternatives

Several actions would be implemented under any alternative selected, as described below. As part of routine operations, the NPS would maintain existing roads and does not plan to make changes to any roads or trails not specifically identified in this Final Plan/EIS.

Roadways and Parking

The Park's roadway infrastructure currently encompasses 140 miles (225 km) of paved and 70 miles (113 km) of unpaved roads. Under all alternatives, park roadways would continue to be realigned, widened, or otherwise improved on a case-by-case basis as warranted. Periodic maintenance, including repaving, would continue as needed. Other summertime roadway-management practices would remain as they currently are, except on the Moose-Wilson Road, where a variety of adaptive management strategies would be tested to address periodic congestion, wildlife, wetlands, and visitor experience issues. Between the Granite Canyon Trailhead and the LSR Preserve, the NPS may, over the next several years, test strategies such as direction of traffic flow or other techniques to manage vehicle use of the road.

Four broad challenges have been identified that are driving the analysis of transportation management strategies on the Moose-Wilson Road: traffic growth, connectivity and compatibility, sensitive environment, and access requirements. The Park contracted the Western Transportation Institute (WTI) at Montana State University to identify approaches for managing the Moose-Wilson Road that could be used to address these issues. The goal is to develop a transportation management approach that enhances connectivity and compatibility between users of different modes and preserves access to key road users (such as emergency responders and private landowners within the Park boundary), while keeping traffic volumes at current levels and maintaining the existing footprint of the roadway, in order to protect the existing character and sensitive environment through which the Moose-Wilson Road passes.





<p style="text-align: center;">TABLE 1 SUMMARY OF ALTERNATIVES</p>				
<p>Alternative 1: No Action</p>	<p>Alternative 2: Improved Road Shoulders</p>	<p>Alternative 3: Improved Shoulders / Multi-Use Pathways</p>	<p>Alternative 3a: Preferred Alternative</p>	<p>Alternative 4: Multi-Use Pathways</p>
<p>No improvements would be made to roadways and parking except for improved signage for wildlife and visitor safety and construction of separate entrance lanes for park employees and other administrative traffic at park entrance stations. No improvements would be made to transit services and facilities. Multi-use pathways and/or improved road shoulders would not be created, other than those developed through normal park operations and maintenance or on a case-by-case basis. Limited improvements to developed areas would occur through normal park operations and maintenance and could include variable-messaging signs, bulletin boards, and other traveler information systems. An adaptive management plan, to test transportation management and operational strategies for vehicle use on the Moose-Wilson Road, would be implemented. A transit business plan, to examine the feasibility of transit in and around the Park, would be developed.</p>	<p>Changes to roadways and parking would be made by limiting motorized traffic on Signal Mountain Road to increase access to bicyclists and pedestrians, improving signage for wildlife and visitor safety, and construction of separate entrance lanes for park employees and other administrative traffic at park entrance stations. Multi-use pathways would not be created, other than those developed through normal park operations and maintenance or on a case-by-case basis. Improved road shoulders would be constructed on the Teton Park Road between Moose Junction and Signal Mountain Lodge (a distance of approximately 17.8 miles [28.6 km]). Limited improvements to developed areas would occur through normal park operations and could include information kiosks, bicycle racks, variable-messaging signs, bulletin boards, and other traveler information systems. An adaptive management plan, to test transportation management and operational strategies for vehicle use on the Moose-Wilson Road, would be implemented. A transit business plan, to examine the feasibility of transit in and around the Park would be developed and could result in operation of a pilot transit system in the Park.</p>	<p>Improvements to roadways would include realigning the Moose-Wilson Road in two areas, improving signage for wildlife and visitor safety, and constructing separate entrance lanes for park employees and other administrative traffic at park entrance stations. Some parking and circulation would be minimally redesigned. Additional information on transit services and facilities and current travel conditions within the Park would be provided. A multi-use pathway would be constructed outside the road corridor¹ from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km]), from Moose Junction to North Jenny Lake Junction (a distance of approximately 10.6 miles [17.0 km]), from North Jenny Lake Junction west to String Lake (a distance of approximately 1.5 miles [2.4 km]), and from the intersection of Golf Course Road (Sagebrush Drive) and Gros Ventre Junction west to Spring Gulch Road and then south to the Park boundary (a distance of approximately 1 mile [1.6 km]). A multi-use pathway would be constructed inside the road corridor¹ from North Jenny Lake Junction to Colter Bay (approximately 15.5 miles [25.0 km]), and from the Granite Canyon Entrance Station to Moose (a distance of approximately 7.1 miles [11.4 km]). Limited improvements to developed areas would occur through normal park operations and maintenance and could include improved social trails, signs, and way-finding, information kiosks, bicycle racks, variable-messaging signs, bulletin boards, and other traveler information systems. An adaptive management plan, to test</p>	<p>Improvements to roadways would include realigning the Moose-Wilson Road in two areas, improving signage for wildlife and visitor safety, and constructing separate entrance lanes for park employees and other administrative traffic at park entrance stations. Some parking and circulation would be minimally redesigned. Additional information on transit services and facilities and current travel conditions within the Park would be provided. A multi-use pathway would be constructed outside the road corridor¹ from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km]), from Moose Junction to Colter Bay (approximately 26.1 miles [42.0 km]) – except for a section between Signal Mountain Lodge and Jackson Lake Dam where an improved road shoulder would be constructed – and from the Granite Canyon Entrance Station to Moose (a distance of approximately 7.1 miles [11.4 km]). Limited improvements to developed areas would occur through normal park operations and maintenance and could include improved social trails, signs, and way-finding, information kiosks, bicycle racks, variable-messaging signs, bulletin boards, and other traveler information systems. An adaptive management plan, to test</p>	<p>Improvements to roadways would include realigning the Moose-Wilson Road in two areas, improving signage for wildlife and visitor safety, and constructing separate entrance lanes for park employees and other administrative traffic at park entrance stations. Some parking and circulation would be minimally redesigned. Additional information on transit services and facilities and current travel conditions within the Park would be provided. A multi-use pathway would be constructed outside the road corridor¹ from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km]), from Moose Junction to North Jenny Lake Junction (a distance of approximately 10.6 miles [17.0 km]), from North Jenny Lake Junction west to String Lake (a distance of approximately 1.5 miles [2.4 km]), and from the intersection of Golf Course Road (Sagebrush Drive) and Gros Ventre Junction west to Spring Gulch Road and then south to the Park boundary (a distance of approximately 1 mile [1.6 km]). A multi-use pathway would be constructed inside the road corridor¹ from North Jenny Lake Junction to Colter Bay (approximately 15.5 miles [25.0 km]), and from the Granite Canyon Entrance Station to the LSR Preserve (a distance of</p>

**TABLE 1
SUMMARY OF ALTERNATIVES**

Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 3a: Preferred Alternative	Alternative 4: Multi-Use Pathways
		<p>management plan, to test transportation management and operational strategies for vehicle use on the Moose-Wilson Road, would be implemented. A transit business plan, to examine the feasibility of transit in and around the Park, would be developed and could result in operation of a pilot transit system in the Park.</p>	<p>approximately 3.3 miles [5.3 km]). Limited improvements to developed areas would occur through normal park operations and maintenance and could include improved social trails, signs, and way-finding, information kiosks, bicycle racks, variable-messaging signs, bulletin boards, and other traveler information systems. An adaptive management plan, to test transportation management and operational strategies for vehicle use on the Moose-Wilson Road, would be implemented. A transit business plan, to examine the feasibility of transit in and around the Park, would be developed and could result in operation of a pilot transit system in the Park.</p>	<p>transportation management and operational strategies for vehicle use on the Moose-Wilson Road, would be implemented. A transit business plan, to examine the feasibility of transit in and around the Park, would be developed and could result in operation of a pilot transit system in the Park.</p>

'The term "road corridor" generally means the engineered corridor in which the road exists, including the cut and fill areas and clear zones. Multi-use pathways constructed outside the road corridor would generally be located within 50 ft of the road, but not greater than 150 ft from the road.

The NPS and WTI have developed the *Moose-Wilson Road Adaptive Management Plan (AMP)* to test transportation management and operational strategies for vehicle use on the Moose-Wilson Road. Over the next several years, the NPS may test a number of different strategies identified in the AMP for managing traffic, as well as pedestrian and bicycle use on the Moose-Wilson Road, that will ensure the existing character of the road is maintained. In addition, the NPS may consider minor widening in select areas to help accommodate safe travel without altering the character of the road.

Seven operational strategies were reviewed by park personnel as technically feasible in various segments and various combinations, as follows:

1. Reversible flow.
2. One-way northbound.
3. One-way southbound.
4. Gate restriction on through traffic.
5. Time of day restriction.
6. Limited vehicle access.
7. Separated pathway.

These strategies, if implemented, would be seasonal and/or temporary and would involve segments or portions of the Moose-Wilson Road to provide information to the NPS for developing a long-term solution in conjunction with future long-term planning efforts. Under all strategies, two-way traffic would be maintained from Moose to the LSR Preserve and from the Granite Canyon Entrance Station to the Granite Canyon Trailhead and considerations for emergency and inholder traffic would be developed.

Data collected during the 2006 season will be used to support planning and design of the most effective transportation management strategies on the Moose-Wilson Road over the next several years. The 2006 baseline data focus on traffic volume as well as other data needed to support the evaluation of transportation management approaches that may be implemented in the future. Counters have been installed to collect traffic flow data and to provide clarification of road capacity limits. The data will serve to (1) support selection of a strategy for potential implementation, and (2) assist with evaluation of transportation management strategies.

The selected transportation management strategy would be publicized to local stakeholders/park users well in advance of implementing any of these changes. Publicity would occur through local outreach and media and through the Park's web site (<http://www.nps.gov/grte>) to minimize visitor confusion or disruption of services. Strategies implemented in future years would depend on how well prior strategies met the critical performance measures.

A cultural resource investigation was completed along the Moose-Wilson Road from the Granite Canyon Entrance Station to Moose in July 2006 to evaluate the eligibility of the road for the NRHP. The Wyoming SHPO concurred with the finding of eligibility that was documented by the investigation. Therefore, any actions proposed on the Moose-Wilson Road under any of the alternatives that affect the road itself or its viewshed will require further consultation with the SHPO and the NPS to identify appropriate mitigation to ensure compliance with Section 106 of the NHPA.

The Park would also improve signs on roadways under all alternatives to enhance safety by advising visitors to be aware of areas frequented by wildlife, share the road with bicyclists, and watch for pedestrians.

Separate entrance lanes would be established for use by park employees and other administrative traffic in order to shorten lines at park entrance stations. Separate lanes at park entrance stations would allow for employee traffic, emergency vehicle traffic, delivery vehicles, and other recurring travel needs that do not require fee compliance and tabulation.

Reconfiguration of some parking areas in the Park could occur under all alternatives. Modifications could include simple parking lot redesign, reconfiguration of traffic flow, signage, re-striping, allocating sections to compact parking, re-distributing the proportion or number of car spaces to recreational vehicle (RV) spaces, and other engineering techniques that could easily improve the efficiency of parking areas and increase their capacity to some extent without increasing the impervious surface in that area. The NPS currently plans to reconfigure the Taggart, South Jenny Lake, and String Lake parking lots to utilize the existing footprint more efficiently. Other parking areas may also be modified.



Transit Service and Facilities

Currently, there is no public transportation system operating within the Grand Teton National Park. Within the Park, there are specialized tour services, including the Alltrans/National Park Tours companies (affiliated with Gray Line Tours) and the Grand Teton Lodge Company. Other companies may provide chartered service through the Grand Teton National Park, as many people often link visits to the Grand Teton National Park and YNP.

Alternatives described in the Draft Plan/EIS proposed implementing varying levels of a pilot transit system in the Park. More information is needed before implementation of any of the suggested transit alternatives to ensure that transit within the Grand Teton National Park will be a success. The Park wants to ensure that the pilot transit system most likely to succeed is implemented such that transit services in the Park will have the greatest opportunity to succeed in the future.

Development of a public transit business plan (TBP) is included under all alternatives. The goal of the TBP is to provide a sufficient analysis of options to determine whether it is feasible to begin a transit system in and around the Grand Teton National Park and, if so, how to operate it effectively and efficiently such that it is a financially sustainable system that could be provided by either the private sector or another entity.

The TBP will provide an analysis of potential ridership; routes, stops, and schedules; capital and operating costs; infrastructure and rolling stock needs; funding sources and leveraging opportunities; and coordination and partnership opportunities. This TBP will follow on previous planning efforts within Grand Teton National Park, as well as the Town of Jackson and Teton County, Wyoming. The TBP will provide the Park with specific information necessary to support a decision on whether to institute a transit system in the Park and what the appropriate phasing would be. The TBP will address various operating models, including cooperative models with public and/or private providers, including the financing and operating information of the system. The TBP will focus on a financially sustainable system that could be provided by a private concession or other entity and will also seek to enhance opportunities to develop transportation partnerships with neighboring communities.

Within the Town of Jackson and Teton County, START provides public transit service. This service operates under the Federal Transit Administration (FTA) Section 5311 program. START provides service primarily in and around the Town of Jackson and between Jackson and Teton Village. START currently does not provide service to the Jackson Airport (located within the Grand Teton National Park) or to any other location in the Park. Coordination and partnering will be a major focus of the TBP. A hallmark of coordination is its ability to leverage funds from various sources. Federal initiatives, such as the “United We Ride” effort, also focus attention on how to leverage funds from various federal, state, and local sources. In addition, language in the 2005 surface transportation bill (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users [SAFETEA-LU]) strongly encourages coordination among various providers of specialized and public transportation. It is also important to note that SAFETEA-LU provides an increase in funding to rural general public transportation providers (FTA Section 5311). START, as one of these types of providers, may be able to obtain more federal money if it can find additional matching funds.

The results of the TBP would guide specific implementation details for a transit program, but potential routes could include transit between Jackson, Jackson Hole Airport, Moose, Jenny Lake, Signal Mountain, Jackson Lake Lodge, Colter Bay, the Town of Kelly, Teton Village, and along the Moose-Wilson Road. The TBP will work with existing and future planned parking lots (e.g., the new Moose Discovery and Visitor Center parking lot) in order to assess the potential effects of transit on parking within the Park. The TBP would also recommend a range of minor infrastructure requirements (e.g., small shelters, small pull outs, kiosks, and signs) to ensure adequate user services. The Park anticipates that construction at the infrastructure level would cause only minor environmental effects within the Park and therefore, would likely categorically exclude these minor projects from further environmental impact analysis.

Multi-use Pathways

Alternatives 2, 3, 3a, and 4 propose improved (i.e., widened) road shoulders, multi-use pathways, or a combination of both. The multi-use pathways would be constructed either within the road corridor or outside the road corridor. The term “road corridor” generally means the engineered corridor in which the road exists, including the cut and fill areas and clear zones (Figure 2). Multi-use pathways constructed outside the road corridor would generally be located within 50 ft of the road, but not greater than 150 ft from the road, except in the vicinity of South Jenny Lake (Figure 3). Although precise pathway

locations would be determined during the design phase – and would take into consideration topography, terrain, vegetation, wildlife habitat, visitor use and enjoyment, and safety – they would be constructed as close as safely possible to existing roadways, and their placement would be guided by two principles: (1) if construction of a multi-use pathway would cause unacceptable impacts (e.g., actions that would significantly alter or impede wildlife movements), improved road shoulders would be constructed instead, and (2) the design would minimize resource impacts while providing a safe, quality pathway experience.

**FIGURE 2
TYPICAL PARK ROAD SECTION**

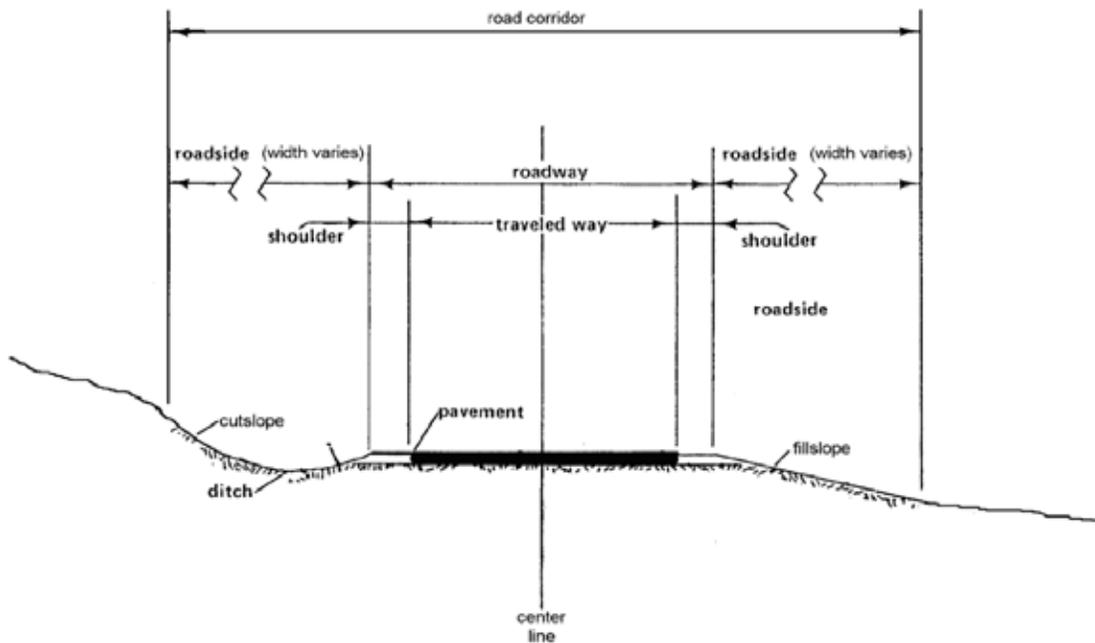
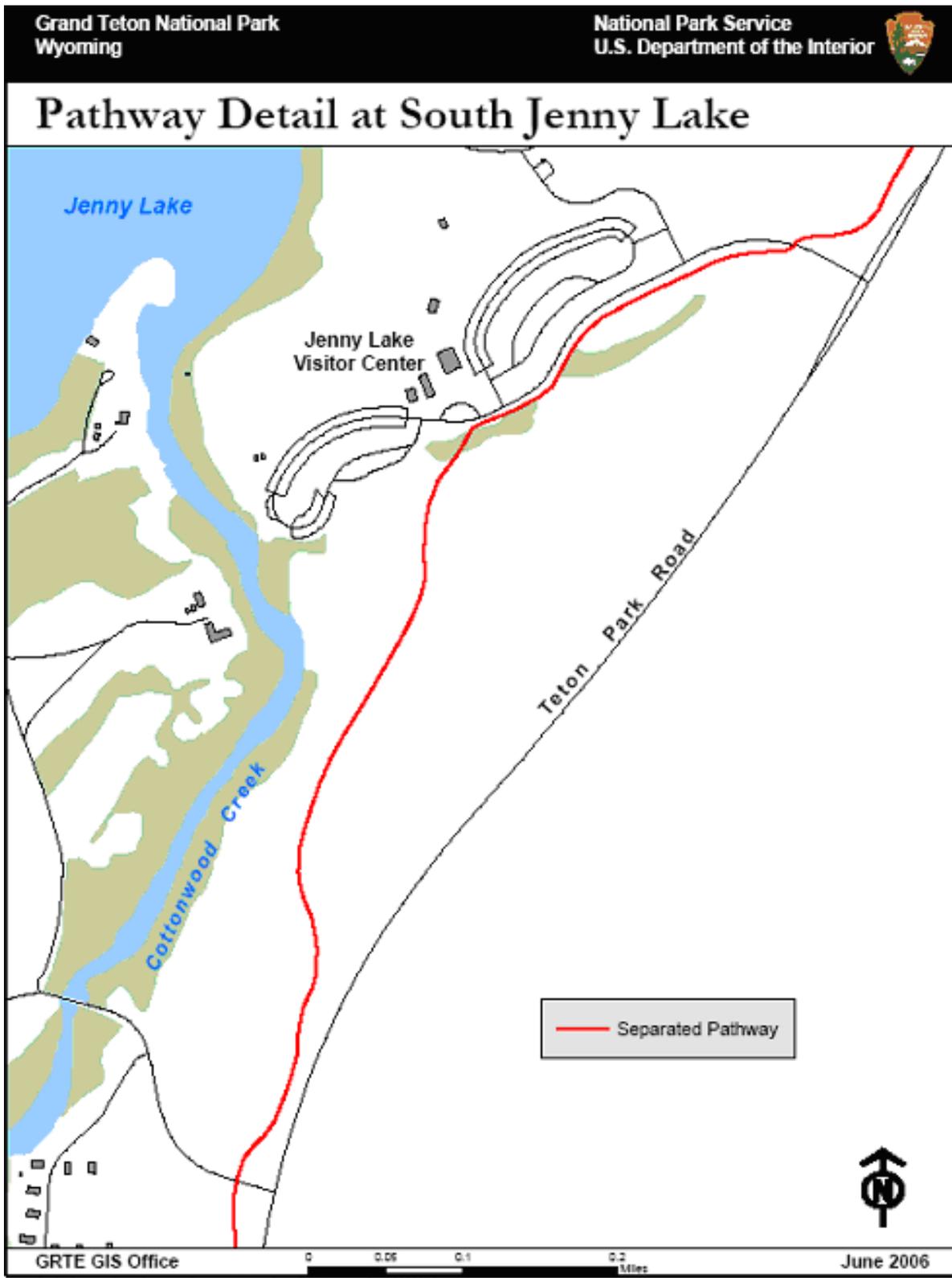


FIGURE 3
PATHWAY DETAIL AT SOUTH JENNY LAKE



The Park's intent is to implement designs that lie lightly on the land while providing low life-cycle costs. The specific details would be determined through a design process that balances resource impacts and visitor safety with opportunities for visitor use and enjoyment. All proposed multi-use pathways would be designed to avoid impacts to wetlands and other resources, wherever possible. Stream crossings would be constructed where pathways intersect waterways. Stream crossings would consist of bridges and/or culverts, as applicable and would include provisions for movement of fish, amphibians, and small mammals through the corridor.

Three general areas within the Park are assessed for improved road shoulders and/or separated multi-use pathways under Alternatives 2, 3, 3a, or 4:

1. Along U.S. Highway 26/89/191 (Outer Highway) from the south boundary to Antelope Flats Road, and along the Teton Park Road from Moose Junction to North Jenny Lake Junction, including a segment to Dornan's Junction. This section includes the following primary road segments:

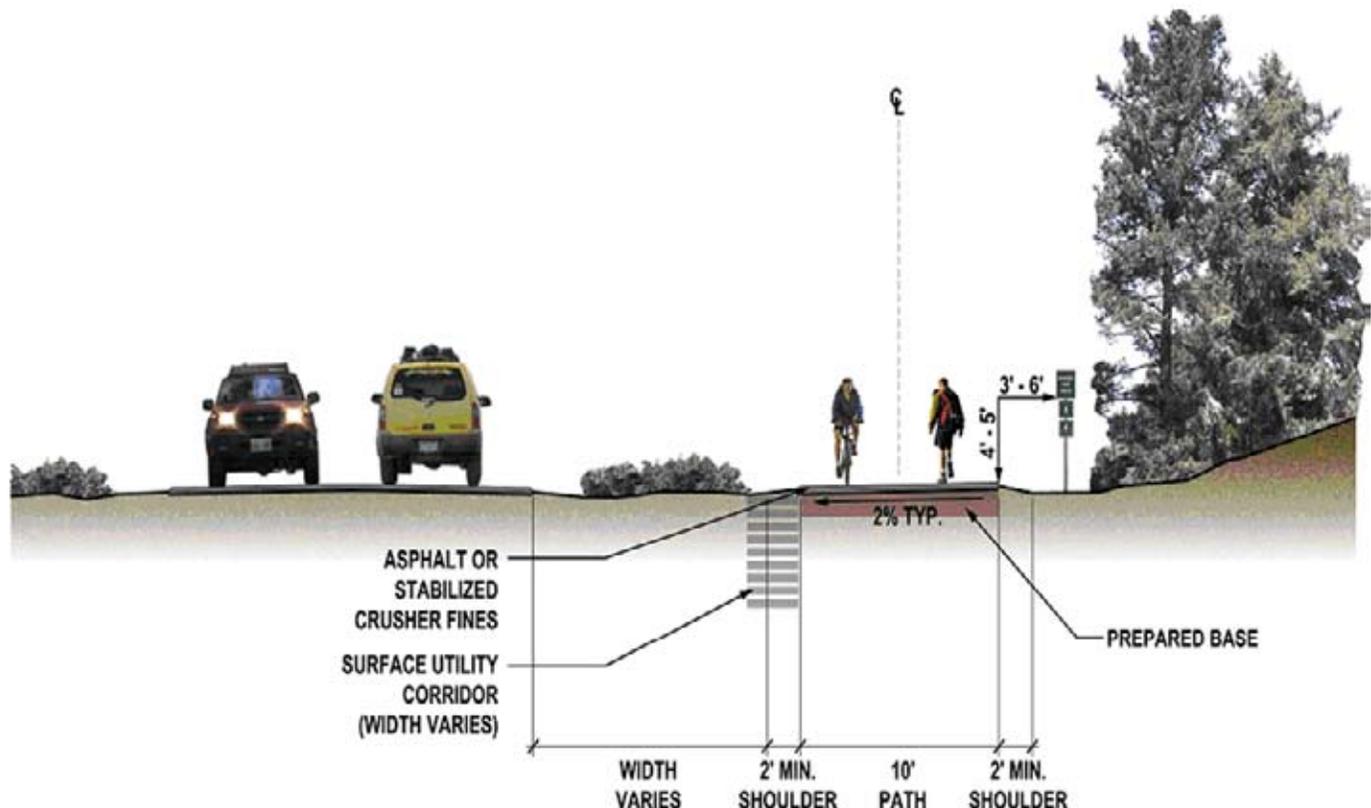
- South boundary to Antelope Flats (9.4 miles [15.0 km])

- Moose to North Jenny Lake Junction (10.6 miles [17.0 km]).
- North Jenny Lake Junction to String Lake (1.5 miles [2.4 km]).
- Gros Ventre Junction to Sagebrush Drive (1.0 miles [1.6 km]).

2. Along the Teton Park Road from North Jenny Lake Junction to Colter Bay (a distance of approximately 15.5 miles [25.0 km]).
3. Along the Moose-Wilson Road from the Granite Canyon Entrance Station to Moose (a distance of approximately 7.1 miles [11.4 km]). This section includes two road segments: Granite Canyon Entrance Station to the LSR Preserve (3.3 miles [5.3 km]) and LSR Preserve to Moose (3.8 miles [6.1 km]).

Pathway width would generally be consistent with American Association of State Highway and Transportation Officials (AASHTO) design standards. Pathways would typically be constructed to a paved width of 10 ft (3 m), with 2-ft (0.6-m) wide soft shoulders on either side. An additional 1-ft (0.3-m) tree-clear zone would extend on either side, resulting in a total 16-ft (4.8-m) wide clear corridor (Figure 4).

**FIGURE 4
SEPARATED 10-FOOT WIDE HARD SURFACE MULTI-USE PATHWAY**



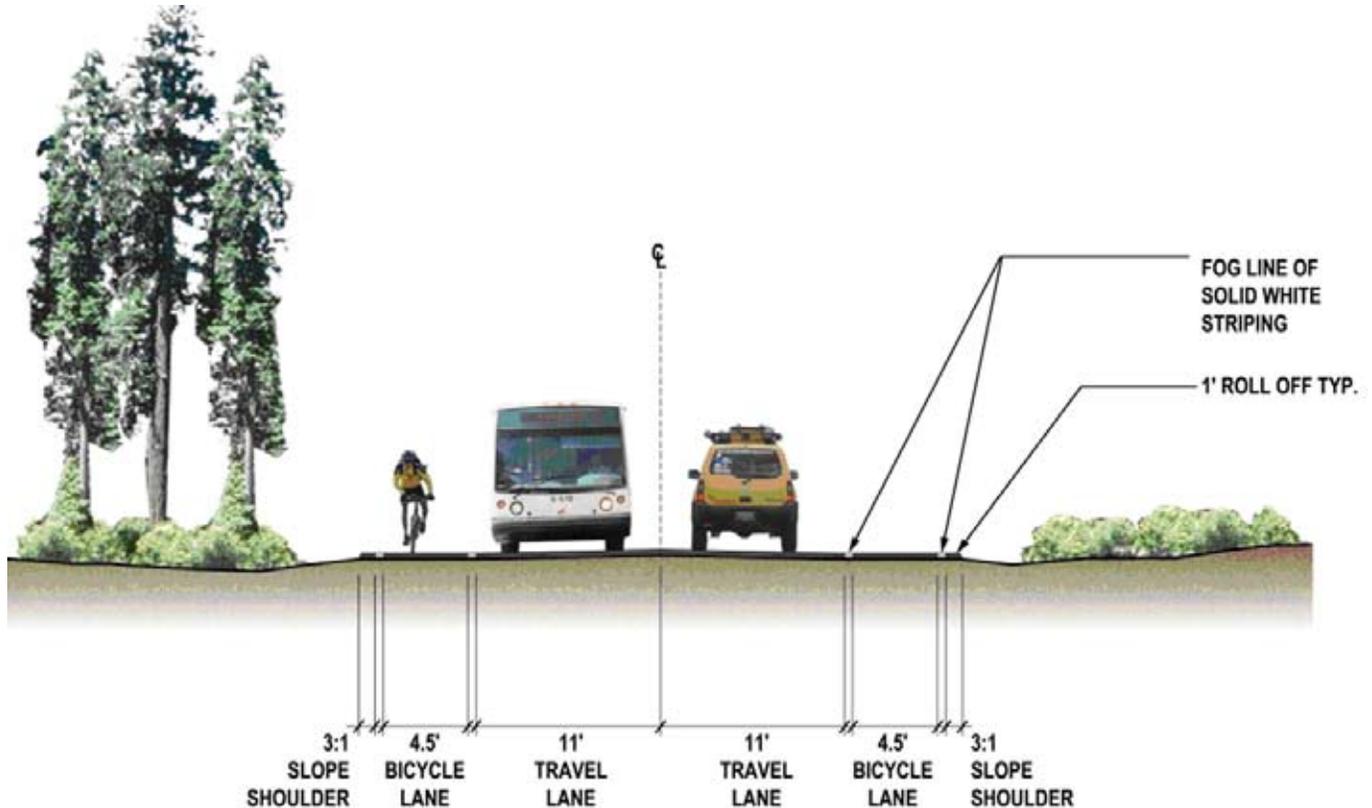
Road shoulders improvements would consist of widening the road to a 5-ft (1.5-m) width (4.5-ft travel lane, plus 3 inches on each side for striping) on both shoulders (Figure 5). Shoulder widening would be accomplished by notch widening, which consists of removal of existing paved shoulder, base, and subgrade material to an engineered depth. The subgrade would then be reconstructed to the new shoulder width, which would include ditches and any fill or cut slopes to accommodate the improved shoulders. Ground disturbance in areas with relatively flat terrain would be at a minimum 6.5 ft (2 m) beyond the existing edge of the pavement on each side.

Developed Areas

The existing roadway, parking, and pedestrian circulation infrastructure in the Moose Headquarters area dates back to the early 1960s, a time when park visitation was one-third what it is today. Visitors use this circulation infrastructure beyond design capacity during the busy summer season. Further complications include contemporary developments such as the introduction of temporary modular office buildings for park staff, construction of the new Moose Discovery and Visitor

Center, establishment of a base of operations for the Western Center for Historic Preservation, and adaptive use of the Murie Ranch, a National Historic Landmark. The NPS anticipates that construction of a pathway through the Moose Complex could result in increased demand for vehicle parking and congestion, consequently impacting visitor satisfaction and safety. In addition, much of the parking area is in a state of disrepair, storm water management is lacking, social trails in riparian habitat are expanding, and emergency response can be impeded. The Park intends to improve circulation and infrastructure in the Moose Complex as other future funds allow. Additional compliance may be required. In 2006, the Park commissioned a conceptual design and study process intended to address all of the aforementioned issues in the Moose Complex. The Park is also working with FHWA to analyze impacts at the three existing intersections along the Teton Park Road from the Snake River Bridge to the Moose-Wilson Road. Alternative design concepts for the Moose Complex will address the level of service at these intersections, provide enjoyable and safe pedestrian circulation and road crossings, analyze vehicle parking needs, improve emergency response, improve snow and

**FIGURE 5
MARKED 4.5-FOOT IMPROVED SHOULDER**



storm water management, consider potential locations for transit hubs (as may be recommended by the TBP), improve the overall experience for those accessing all the visitor use facilities in the Moose area, and mitigate the impact the Moose development has on natural and cultural resources. The relocation and redesign of the Moose Entrance Station (i.e., adding an administrative lane) was analyzed under a separate environmental document, but is also considered in this Final Plan/EIS and will address fee collection challenges with pedestrians and bicyclists at the entrance station. The study will also provide recommendations for crosswalks, signs, bicycle rack locations, and other minor amenities that will improve safety for all types of users.

Traveler Information

Information would be provided to visitors to assist with trip planning and scheduling off-peak visits. The use of the Park's web page and various forms of verbal and written communication mechanisms (i.e., local newspapers, brochures) would be employed to facilitate trip planning and visits to areas throughout the Park. The Park would assess the feasibility of traveler information radio systems, such as those used in the Grand Canyon National Park, or having rangers or concessioners radio entrance gates with parking lot capacity status, as is done for campgrounds. The installation of variable-messaging signs is common to all alternatives.

Estimated Capital Costs

The costs reflected under each of the alternatives considered represent construction prices in 2008, which is projected to be the initial phase of construction. Costs for implementation of any alternative would include initial construction and the long-term cost of ownership, including annually recurring expenditures for maintenance and operations. Project costs include construction and other direct costs (i.e., pre-design, design, construction supervision, construction contingency, and monitoring). Any project constructed beyond 2008 will need to factor 4 percent inflation, compounding per year. For example, one variable message sign that costs \$56,000 in 2008 would cost \$60,570 in 2010.

Alternative 1: No Action Alternative

Consideration of a No Action Alternative (Figure 6) provides a baseline against which to compare the proposed action alternatives, as well as their environmental consequences. Under the No Action Alternative, the Park would continue its current transportation management actions. No improvements would be made to roadways, parking, or transit service and facilities, and no changes would occur related to development of multi-use pathways or improved road shoulders other than those that would be accomplished through normal and ongoing park operations and maintenance or on a case-by-case basis. Minor improvements to developed areas may occur and limited improvements would occur in the traveler information arena. Alternative 1 would include all of the actions described above under the "Elements Common to All Alternatives" section, as well as specific features described below.

Roadways and Parking

No changes to roadways and parking are proposed under Alternative 1 other than periodic and routine maintenance, improved signage for wildlife and visitor safety, and construction of separate entrance lanes for park employees and other administrative traffic at park entrance stations, which are elements common to all alternatives.

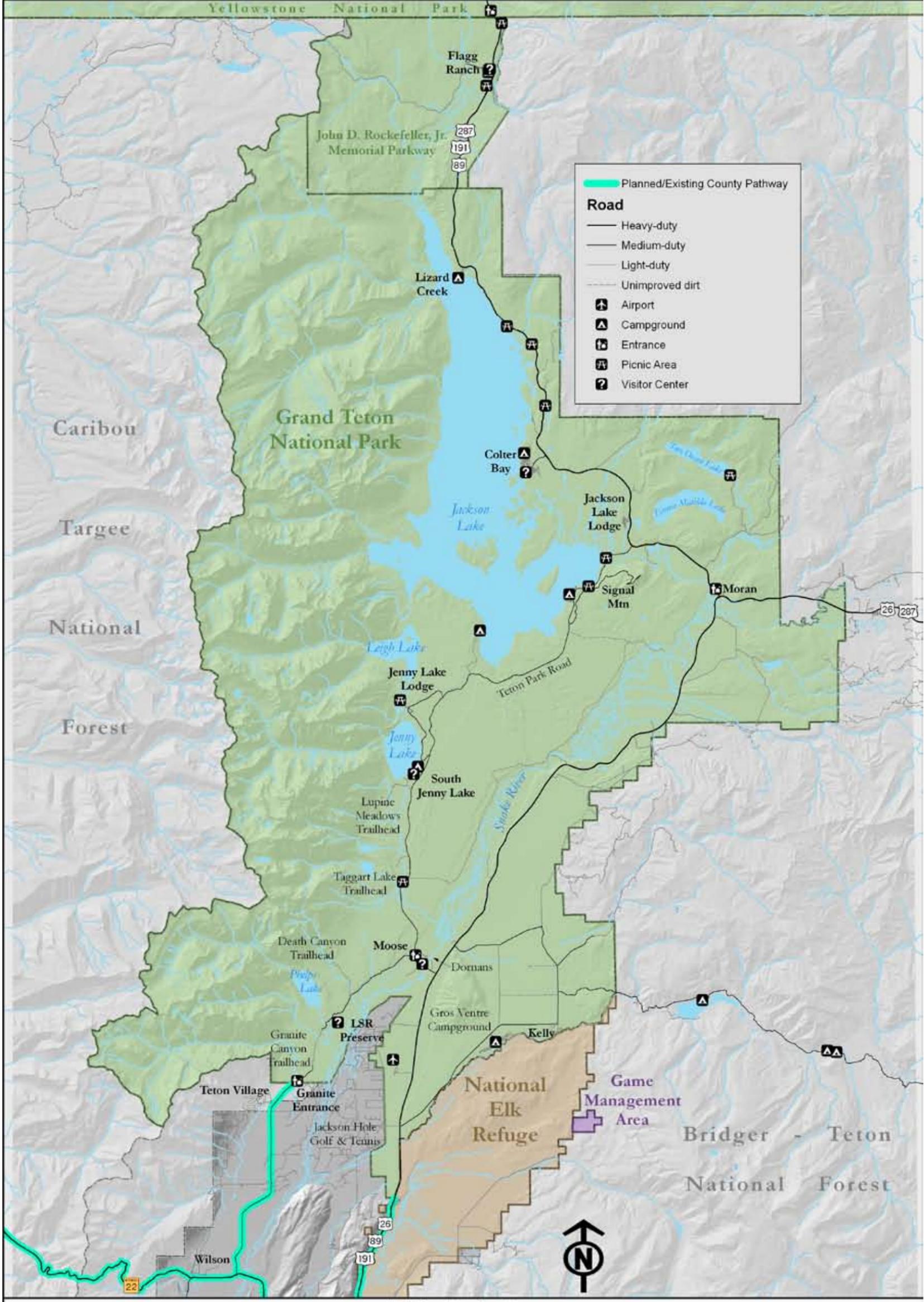
Transit Service and Facilities

No changes to transit service and facilities are proposed under Alternative 1 other than development of the TBP, which is common to all alternatives.





Alternative 1 - No Action



GRTE GIS Office

0 0.5 1 2 3 4 Miles

September 2006

FILE: Q:\Map_Files\Planning\Transportation_Plan\Alt_3_20060725.mxd

FIGURE 6
ALTERNATIVE 1: NO ACTION

Multi-use Pathways and Improved Shoulders

No multi-use pathways would be constructed; motorists and bicyclists would continue to share the road and existing shoulders (Figure 7). Shoulder width on park roads currently ranges from 0 to 5 ft (1.5 m) (Table 2). Shoulder improvements would not occur except as part of scheduled road reconstruction projects on a case-by-case basis.

Developed Areas

Under this alternative, improvements to developed areas would occur only on a case-by-case basis to address specific issues and as funds become available. Improvements may include changes such as enhancement of pedestrian walkways, improved signs, and way-finding. Alternative 1 would make minor, if any, modifications in the following activity areas of the Park.

Moose

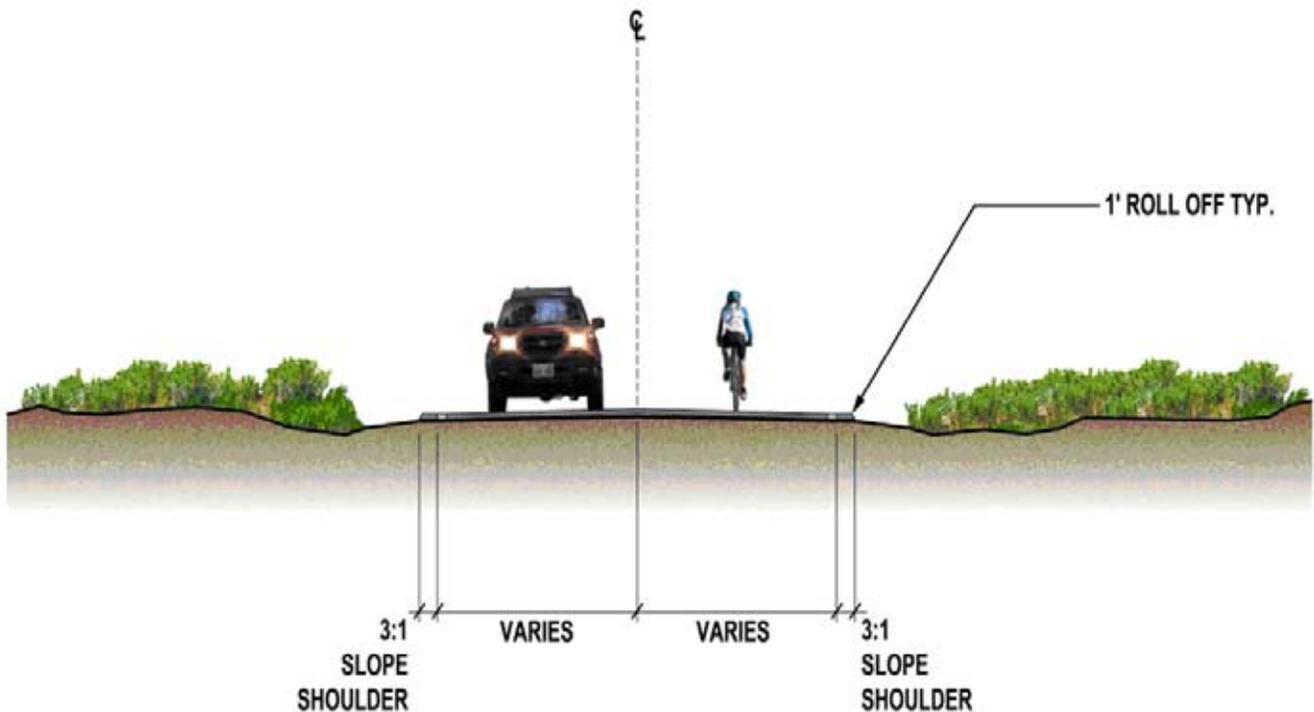
Moose currently houses a visitor center, the Park’s administrative and maintenance facility, employee housing, a boat launch and associated float concession operations along the Snake River, and post office. Menor’s Ferry and Maud Noble cabin are within one-half mile (0.8 km) of

the visitor center. The Chapel of the Transfiguration is a slightly longer distance, although many visitors opt to drive. In addition to its historic value, the chapel also provides a vantage point with especially good views of the Teton Range. The new Moose Discovery and Visitor Center will provide orientation for park visitors regardless of mode of travel. Routine maintenance to facilities at Moose would be made as warranted.

South Jenny Lake

The existing activity area encompasses a ranger station and museum, visitor center, campground, and parking area. Concession facilities in the South Jenny Lake area include a general store and Exum Mountain Guide Service and School of Mountaineering. The Jenny Lake boating concession runs multiple shuttles across Jenny Lake on a daily basis. An NPS and concessioner seasonal housing area is located at the north end of Lupine Meadows. The NPS search and rescue operations are based out of a facility at nearby Lupine Meadows. Parking would continue to be available in the main visitor activity area.

**FIGURE 7
ROADWAY SHARED BY CYCLISTS AND MOTOR VEHICLES**



**TABLE 2
EXISTING SHOULDER CONDITIONS BY SEGMENT**

U.S. 26/89/191: South boundary to Moose Junction	5-ft attached shoulder
Sagebrush Drive: Gros Ventre Junction south to the Spring Gulch Road boundary	1-ft attached shoulder
U.S. 26/89/191: Moose Junction to east boundary	4-ft attached shoulder
Teton Park Road: Moose Junction to South Jenny Lake	4-ft attached shoulder
Dornan's Access Road	2-ft attached shoulder
Teton Park Road: South Jenny Lake to North Jenny Lake Junction	4-ft attached shoulder
North Jenny Lake Junction to the String Lake Access Road	4-ft attached shoulder, west bound lane
	3-ft attached shoulder, east bound lane
Jenny Lake Area (includes Jenny Lake activity area)	4-ft attached shoulder
Teton Park Road: North Jenny Lake Junction to Jackson Lake Junction (includes Signal Mountain activity area)	4-ft attached shoulder (North Jenny Lake Junction to Spalding Bay Junction)
	3-ft attached shoulder (Spalding Bay Junction to Jackson Lake Junction)
North Park Road: Moran Junction to Jackson Lake Junction	3-ft attached shoulder
North Park Road: Jackson Lake Junction to Colter Bay Junction (includes Jackson Lake Lodge)	3-ft attached shoulder
North Park Road: Colter Bay to YNP boundary (includes the Colter Bay activity area)	3-ft attached shoulder Colter Bay to Lizard Creek Campground).
	5-ft attached shoulder (Lizard Creek Campground to YNP boundary – will be in place following North Park Road reconstruction)
Moose-Wilson Road: Granite Canyon Entrance Station to Moose Junction	No shoulder
Antelope Flats/Gros Ventre	2-ft attached shoulder on Gros Ventre Road
River Road: Bar BC Ranch Road to the RKO Road Junction	Shared use unpaved road



A 50-site tent campground is part of the South Jenny Lake activity area. This campground was recently redesigned to improve functionality, increase separation between campsites, and mitigate resource degradation arising from activities spreading beyond designated campsite pads.

Numerous formal and social trails connect the activity area to the campground and to a concession-operated boat launch. Although multiple pathways exist, major routes to the campground or to Jenny Lake are not clearly marked or identified. Many visitors make short trips from the campground to the store via private vehicle because the trail is not obvious and they are unaware that the distance is less than one-quarter mile (0.4 km). In other cases, where multiple routes are visible from selected points on a trail that lacks clear orientation features, the likelihood increases that visitors will create social trails.

The facilities in the South Jenny Lake area are expected to remain without major upgrades or improvements beyond routine maintenance. No specific changes would occur under this alternative.

Signal Mountain Area

Signal Mountain has been the site of a visitor facility on the shores of Jackson Lake since the late 1920s. Both the NPS and a concessioner operate facilities within the Signal Mountain developed area. The developed area includes an 87-site campground, amphitheater, boat launch, and parking area. The concessioner operates a facility containing lodging accommodations, a camp ground, two restaurants, two gift shops, a gas station and convenience store, and a marina with a fuel dock and boat rentals. The concessioner also provides housing for its employees. The area provides parking spaces for overnight lodge guests and the campground.

Few designated pathways are available for visitors and employees to travel between the campground, housing areas, and the lodge. Instead, the access roads serve as pedestrian ways, and some social trails have developed. No specific changes or improvements are proposed under this alternative.

Jackson Lake Lodge

The center of this activity area is the historic Jackson Lake Lodge, which provides 385 rooms with capacity for approximately 1,500 guests. Lodging is also provided for an estimated 875 concession employees. The area provides parking spaces for lodge guests. No expansion or

reconfiguration of these parking areas is planned at this time, although this may occur in the future as conditions warrant.

Colter Bay

Colter Bay Village is a product of the NPS Mission 66 program. The village was conceived in the late 1950s and completed in the early 1960s. At 340 acres (138 ha), this activity area is the largest developed area within the Park containing 350 campsites, 112 RV sites, 66 tent cabins, 166 camp cabins, two restaurants, a general store and gift shop, a laundry/shower, a marina with fuel dock, rental boats and store, two service stations (one with convenience store). Guest accommodations provide for peak occupancy of just over 2,200 persons.

In addition to concession services, this area also includes a visitor center, boat launch, amphitheater, and day use picnic area, as well as NPS and concessioner employee housing. Concessioner housing serves approximately 275 summer residents.

Colter Bay provides parking spaces for visitor lodging and day use visitors. Pathways between the visitor center, store, and restaurant are limited because so many visitors use the parking areas as pedestrian ways. No improvements are planned for the parking areas, though modifications may be made in the future as conditions warrant.

Several informal trails bisect the campground, and one main trail links the campgrounds to the store and laundry area. These pathways are not well marked, and many visitors will drive from their campsite to the store because they are either unaware of the trail location or unaware they are one-quarter to one-half mile (0.4 to 0.8 km) from these facilities. Social trails are prevalent, especially leading to the lake, picnic area, visitor center-amphitheater. No specific changes or improvements are proposed under this alternative.

Traveler Information

No changes to traveler information would occur under Alternative 1 other than what is proposed under the “Elements Common to All Alternatives” section.

Estimated Capital Costs

Estimated capital costs and annual maintenance and operation costs for implementing Alternative 1 are as follows:

ESTIMATED COSTS ALTERNATIVE 1	
Roadways and Parking	
Improve signage for pedestrian and wildlife safety	\$9,000
Construct separate entrance lanes for employees	\$140,000
Transit Services and Facilities	
Develop a transit business plan (on-going)	\$100,000
Multi-use Pathways and Improved Shoulders, Bridges, Culverts & Restoration	
South Boundary to North Jenny Lake Junction	
No improvements proposed on this segment	\$0
North Jenny Lake Junction to Colter Bay	
No improvements proposed on this segment	\$0
Moose-Wilson Road	
No improvements proposed on this segment	\$0
Developed Areas	
No improvements proposed	\$0
Traveler Information	
Install variable messaging signs (\$56,000 per sign)	\$112,000
Total Capital Cost	\$361,000
Annual Maintenance and Operations	
Annual maintenance and operations - Pathways/Shoulders	\$0
Total Annual Maintenance and Operation	\$0
<i>Note: Draft EIS cost estimates were based on 2005 prices. Final EIS costs reflect 2008 prices. Add 4% inflation each year beyond 2008.</i>	

Alternative 2: Improved Road Shoulders

Under Alternative 2, the primary objective is to improve the ability to proactively manage the traffic flow, parking, and visitor experience within the Park with little or no construction of new highway or parking facilities (Figure 8).

Roadways and Parking

Changes to roadways and parking areas proposed under Alternative 2 — other than periodic and routine maintenance, improved signage for wildlife and visitor safety, and construction of separate entrance lanes for park employees and other administrative traffic at park entrance stations (which are common to all alternatives) — would consist of limited motorized traffic on Signal Mountain

Road at certain times in order to provide increased access to bicyclists and pedestrians, and improvements to the shoulders of certain segments in order to provide enhanced and safer roadway bicycling (see “Multi-use Pathways and Improved Shoulders” section below).

The intent of limiting vehicular traffic on Signal Mountain Road is to provide safer recreational opportunities for bicyclists and pedestrians in this area by eliminating conflicts with vehicular traffic without construction of new pathways or widening existing roadways.





Alternative 2 - Improved Road Shoulders

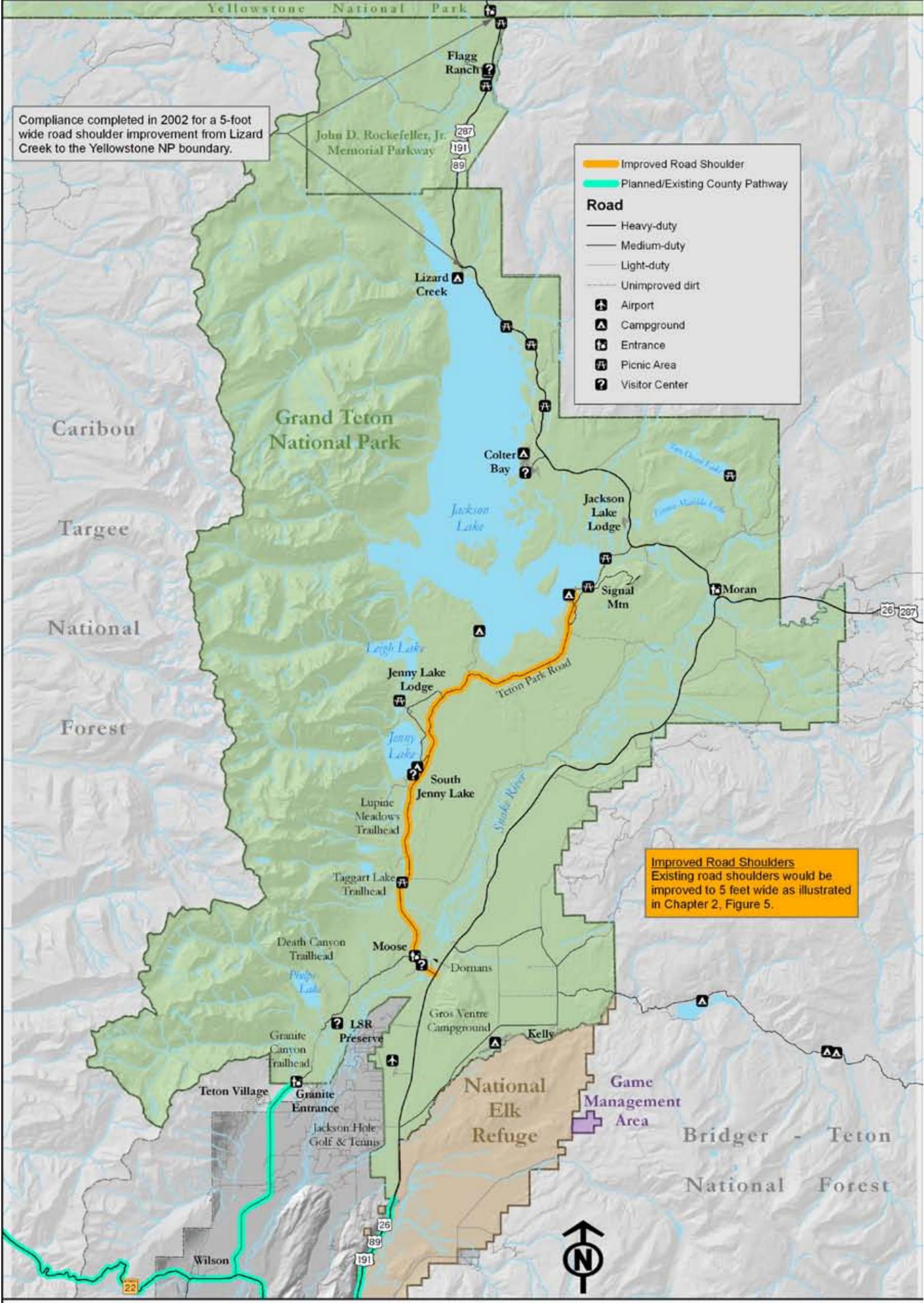


FIGURE 8
ALTERNATIVE 2: IMPROVED ROAD SHOULDERS

Alternative 2 would improve the efficiency of parking by providing enhanced information to park visitors regarding the availability of parking. Entrance stations, visitor centers, self-service information kiosks, and variable messaging signs within the Park would provide information on lot capacity and filled lots.

Transit Services and Facilities

Completion of the TBP could result in operation of a pilot transit system in the Park.

Multi-use Pathways and Improved Shoulders

Under Alternative 2, improved shoulders would be constructed along the Teton Park Road from Moose Junction to North Jenny Lake Junction (a distance of approximately 10.6 miles [17.0 km]), and from North Jenny Lake Junction to Signal Mountain Lodge (a distance of approximately 7.2 miles [11.6 km]), but would not extend farther north. Road shoulders would be improved to a 5-ft (1.5-m) width (4.5-ft travel lane, plus 3 inches on each side for striping) along each side of this stretch of road (see Figure 5). Multi-use pathways or improved shoulders would not be constructed along U.S. Highway 26/89/191 between the south boundary and Antelope Flats Road, since road shoulders along this stretch of road are currently 5-ft (1.5-m) wide; that width would be maintained. No multi-use pathways or improved shoulders would be created along the Moose-Wilson Road under this alternative.

Developed Areas

Alternative 2 would incorporate limited modifications and additions to infrastructure through normal park operations and maintenance and could include information kiosks, bicycle racks, and improved signs in the following activity areas of the Park:

Moose

Existing facilities would remain and would be modified as warranted, as described under the “Elements Common to All Alternatives” section.

South Jenny Lake

Changes would include installation of a visitor information kiosk near the Jenny Lake store, bicycle racks, and improved signs.

Signal Mountain Area

Modifications and additions to the existing infrastructure would include installation of a visitor information kiosk.

Jackson Lake Lodge

Proposed improvements would include installation of a visitor information kiosk.

Colter Bay

Proposed improvements would include installation of a visitor information kiosk.

Traveler Information

Alternative 2 would include improvements to the amount and type of information available to park visitors and the local community regarding transportation related issues. The Park would employ various information transmission methods, depending on effectiveness and as funds become available, which could include traveler information systems (i.e., localized radio transmissions with information on current park conditions), additional variable messaging signs, bulletin boards, an improved website, and information kiosks with current information at key locations. Signboards would list congested areas, such as popular areas or trailheads, and alternative destinations to visit in the Park, thus allowing visitors to plan their visit and assist the Park in managing visitor access without the aid of park staff at trailhead sites. Wildlife hazard signs, particularly for grizzly bears and moose, and particularly in areas with low sight distance, could also be provided.

Estimated Capital Costs

Estimated capital costs and annual maintenance and operation costs for implementing Alternative 2 are as follows:

ESTIMATED COSTS ALTERNATIVE 2	
Roadways and Parking	
Improve signage for pedestrian and wildlife safety	\$9,000
Construct separate entrance lanes for employees	\$140,000
Transit Services and Facilities	
Develop a transit business plan (on-going)	\$100,000
Capital costs for pilot transit within the Park	TBD
Capital costs for shuttle concession	TBD
Capital costs for infrastructure supporting transit	TBD
Multi-use Pathways and Improved Shoulders, Bridges, Culverts & Restoration	
Improve shoulders (4.5-ft travel lane with 6 inches for striping) to accommodate bicyclists from Moose Junction to Signal Mountain Lodge (a distance of approximately 17.8 miles [28.6 km])	\$12,235,000
South Boundary to North Jenny Lake Junction	
No other improvements proposed on this segment	\$0
North Jenny Lake Junction to Colter Bay	
No other improvements proposed on this segment	\$0
Moose-Wilson Road	
No improvements proposed on this segment	\$0
Developed Areas	
Install kiosks, bicycle racks, trash cans, way-finding signs, vault toilet(s)	\$138,000
Traveler Information	
Install variable messaging signs (\$56,000 per sign)	\$336,000
Total Capital Cost	\$12,958,000
Annual Maintenance and Operations	
Annual maintenance and operations - Pathways/Shoulders	\$63,000
Total Annual Maintenance and Operation	\$63,000
<i>Note: Draft EIS cost estimates were based on 2005 prices. Final EIS costs reflect 2008 prices. Add 4% inflation each year beyond 2008.</i>	



Alternative 3: Improved Shoulders / Multi-Use Pathways

Under Alternative 3, the Moose-Wilson Road would be realigned in two areas to restore aspen and wetland habitat. Under this alternative, 23.3 miles (37.3 km) of multi-use pathways would be constructed outside existing road corridors, and 15.5 miles [25.0 km] of improved road shoulders would be constructed to provide enhanced and safer experiences for bicyclists and pedestrians (Figure 9).

Roadways and Parking

Under this alternative, improvements to park roadways and parking areas would occur during scheduled maintenance or on an as needed basis. A combination of improvements may be implemented and could include road signs to increase awareness of wildlife crossings, improved information on parking lot capacity and filled lots, self-service information kiosks, and variable messaging signs. A pedestrian-crossing signal would be constructed at the Jackson Lake Dam crossing to increase visitor safety. Improvements would also be made to the shoulders of certain segments in order to provide enhanced and safer roadway bicycling (see “Multi-use Pathways and Improved Shoulders” section below).

The Moose-Wilson Road would be realigned in two areas and the existing alignments would be abandoned and restored to natural conditions. Specifically, a section of the existing Moose-Wilson Road between Sawmill Ponds Overlook and a point approximately one-third mile (0.5 km) north of Death Canyon Road Junction would be abandoned and restored to natural conditions. Pavement would be removed and the roadbed would be regraded and revegetated to restore aspen and wetland habitat in this area. The road realignment between those two points would generally follow an old abandoned roadbed on the east side of the wetland and riparian areas. The other realignment, approximately one-half mile (0.8 km) east of Sawmill Ponds Overlook to a junction with the Teton Park Road near Moose, would intersect the Teton Park Road between the Moose Entrance Station and the access road to the Chapel of the Transfiguration.

Realignment would occur for the purpose of restoring aspen habitat to this area and avoiding important wetland and riparian areas. Realignment near the Moose Entrance Station also would protect and facilitate a wildlife migration corridor in the Snake River riparian area. The aspen, cottonwood, and mixed deciduous-coniferous forests and wetlands located along this section of the

Moose-Wilson Road provide important habitat for birds, wildlife, and distinct vegetative communities. The area to be restored differs notably from the surroundings, and the road passing through this area currently affects its wildlife habitat value. The Park may consider the addition of wildlife viewing areas as part of the realignment of the Moose-Wilson Road between Sawmill Ponds and Death Canyon Road. In other areas, the existing character of the road would be maintained and, thus, there are no plans for further development in the form of pull outs or formal viewing areas. User-created pull outs may be formalized or barricaded as necessary to ensure resource protection and enhance visitor safety. A secondary benefit to realigning the road would be improved vehicle and bicycle safety because of improved line of sight.

Transit Services and Facilities

This alternative would provide additional information concerning the transit services available to the public, including route maps and schedules at lodges within and outside the Park, visitor centers, and other locations where visitors may congregate. Completion of the TBP could result in operation of a pilot transit system in the Park.

Multi-use Pathways and Improved Shoulders

Under Alternative 3, multi-use pathways would be constructed outside the road corridor, but generally within 50 ft of the road, along U.S. Highway 26/89/191 (Outer Highway) from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km]), and along the Teton Park Road from Moose Junction to North Jenny Lake Junction (a distance of approximately 10.6 miles [17.0 km]).

Alternative 3 would also include improved shoulders (widening to 5 ft [1.5 m]) along 15.5 miles (25.0 km) of the Teton Park Road from North Jenny Lake Junction to Colter Bay (Figure 9). Shoulder widening (instead of multi-use pathways) is proposed along this route to provide improved opportunities for bicycling or walking while minimizing the impacts on park resources in an area where there are considerable wildlife/habitat disturbance concerns. The total new shoulder width would be 5 ft (1.5 m) on each side of the road (see Figure 5). Shoulder widening would be accomplished by notch widening, which consists of removal of existing paved shoulder, base, and subgrade material to an engineered depth. The subgrade would then be reconstructed to the new shoulder width, including ditches and any fill or cut slopes to accommodate the improved shoulders. Ground disturbance in areas with

relatively flat terrain would be at a minimum 6.5 ft (2 m) beyond the existing edge of the pavement on each side.

Finally, under Alternative 3 a multi-use pathway also would be constructed outside the road corridor, but generally within 50 ft of the road, along the Moose-Wilson Road from the Granite Canyon Entrance Station to the LSR Preserve (a distance of approximately 3.3 miles [5.3 km]).

Developed Areas

Alternative 3 would incorporate limited modifications and additions to infrastructure through normal park operations and maintenance and could include improved social trails, signs, and way-finding, information kiosks, bicycle racks, variable-messaging signs, bulletin boards, and other traveler information systems in the following activity areas of the Park:

Moose

As described under the “Elements Common to All Alternatives” section, issues in the Moose Complex will be examined to address the increase in use of the area as a result of pathway construction.

South Jenny Lake

Social trails, signs, and way-finding would be improved in this area in order to create well-marked pathways that would facilitate pedestrian travel between key points (i.e., the campground and the store), thereby lessening the use of private vehicles to travel short distances and reducing congestion. Social trails would likely be paved or graveled. Information kiosks would be added at South Jenny Lake.

Signal Mountain Area

Social trails, signs, and way-finding would be improved in this area in order to facilitate pedestrian travel between key points (i.e., the campground and the store), thereby lessening the use of private vehicles to travel short distances and reducing congestion. Information kiosks would be added at Signal Mountain.

Jackson Lake Lodge

Signs and way-finding would be improved in this area to facilitate pedestrian travel between key points. Information kiosks would be added at Jackson Lake Lodge.

Colter Bay

Social trails, signs, and way-finding would be improved in this area in order to create well-marked pathways that would facilitate pedestrian travel between key points (i.e., the campground, store, visitor center, and picnic areas), thereby lessening the use of private vehicles to travel short distances and reducing congestion. Social trails would

likely be paved or graveled. Information kiosks would be added at Colter Bay. Parking, boat trailer parking, and circulation would be minimally redesigned to improve function and safety. Information kiosks would be added at Colter Bay.

Traveler Information

Alternative 3 would improve the amount and type of information available to park visitors and the local community regarding transportation related issues. The Park would employ various information transmission methods, depending on effectiveness and as funds become available, which could include traveler information systems (localized radio transmissions with information on current park conditions), additional variable messaging signs, bulletin boards, an improved website, and information kiosks with current information at key locations. Signboards would list congested areas, such as popular areas or trailheads, and alternative destinations to visit in the Park, thus allowing visitors to plan their visit and assist the Park in managing visitor access without the aid of park staff at trailhead sites. Wildlife hazard signs, particularly for grizzly bears and moose, and particularly in areas with low sight distance could also be provided.





Alternative 3 - Improved Shoulders/Multi-Use Pathways

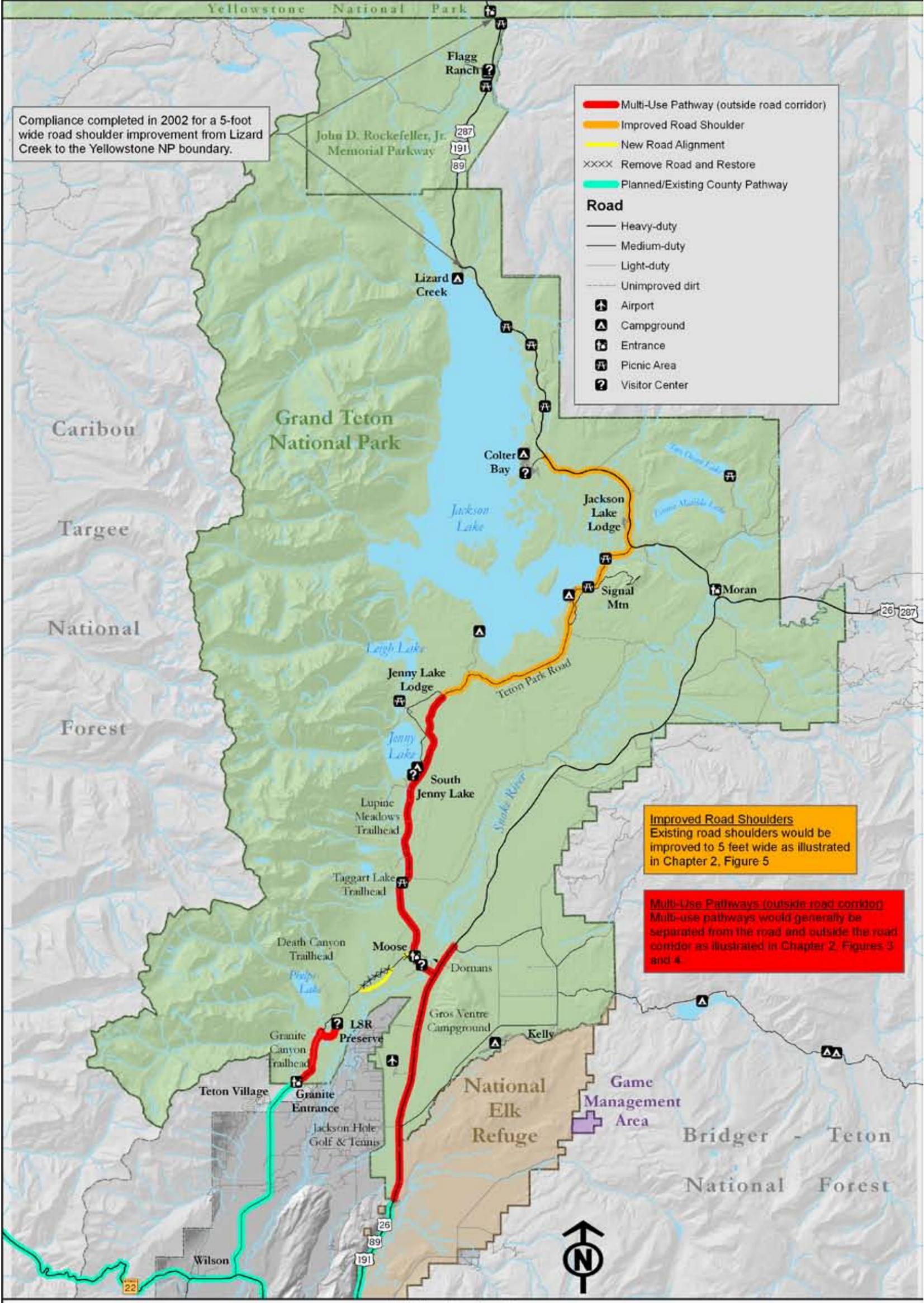


FIGURE 9
ALTERNATIVE 3: IMPROVED SHOULDERS / MULTI-USE PATHWAYS

Estimated Capital Costs

Estimated capital costs and annual maintenance and operation costs for implementing Alternative 3 are as follows:

ESTIMATED COSTS ALTERNATIVE 3	
Roadways and Parking	
Improve signage for pedestrian and wildlife safety	\$9,000
Construct separate entrance lanes for employees	\$140,000
Realign and restore the Moose-Wilson Road	\$2,285,000
Transit Services and Facilities	
Develop a transit business plan (on-going)	\$100,000
Capital costs for pilot transit within the Park	TBD
Capital costs for shuttle concession	TBD
Capital costs for infrastructure supporting transit	TBD
Multi-use Pathways and Improved Shoulders, Bridges, Culverts & Restoration	
Wildlife impacts monitoring for post Phase 1 multi-use pathway construction*	\$700,000
South Boundary to North Jenny Lake Junction	
Construct 10-ft wide separate multi-use pathways from the south boundary of the Park to Moose Junction (a distance of approximately 8.2 miles [13.1 km])	\$6,879,000
Construct 10-ft wide separate multi-use pathways from Moose Junction to the Antelope Flats Road, including segment to Dornan's Junction (a distance of approximately 1.2 miles [1.9 km])	\$941,000
Construct 10-ft wide separate multi-use pathways Dornan's Junction to South Jenny Lake Junction (a distance of approximately 7.7 miles [12.3 km])	\$5,697,000
Construct 10-ft wide separate multi-use pathways South Jenny Lake Junction to North Jenny Lake Junction (a distance of approximately 2.9 miles [4.6 km])	\$1,936,000
North Jenny Lake Junction to Colter Bay	
Improve shoulders (4.5-ft travel lane with 6 inches for striping) to accommodate bicyclists from North Jenny Lake to Colter Bay (a distance of approximately 15.5 miles [25.0 km])	\$10,654,000
Signal for Safety Crossing at Jackson Lake Dam/Bridge	\$56,000
Moose-Wilson Road	
Construct 10-ft wide separate multi-use pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to the north end of unpaved section; then follow the levee access road to the new LSR Preserve (approximately 3.3 miles [5.3 km])	\$4,557,000
Developed Areas	
Install kiosks, bicycle racks, trash cans, way-finding signs, vault toilet(s)	\$252,000
Traveler Information	
Install variable messaging signs (\$56,000 per sign)	\$336,000
Total Capital Cost	\$34,542,000
Annual Maintenance and Operations	
Annual maintenance and operations - Pathways/Shoulders**	\$417,000
Total Annual Maintenance and Operation	\$417,000
<p><i>Notes: Draft EIS cost estimates were based on 2005 prices. Final EIS costs reflect 2008 prices. Add 4% inflation each year beyond 2008.</i></p> <p><i>*Capital cost for post construction wildlife monitoring will be \$500,000-\$900,000; an average of \$700,000 was used for this estimate.</i></p> <p><i>**Does not reflect future wildlife monitoring following the first 3 years of initial monitoring; on average, an estimation of \$100,000/yr is predicted.</i></p>	

Alternative 3a: Preferred Alternative

Based on comments received during public review of the Draft Plan/EIS, the NPS developed a new preferred alternative that combines elements of Alternatives 3 and 4, and additionally includes some new elements that were not included in the Draft Plan/EIS. Under Alternative 3a, a combination of multi-use pathways within and outside road corridors would be constructed, which would provide a wide range of transportation opportunities for bicyclists and pedestrians (Figure 10). Under this alternative, the Moose-Wilson Road would be realigned in two areas to restore aspen and wetland habitat; 22.5 miles (36.0 km) of multi-use pathways would be constructed outside existing road corridors; and 18.8 miles (30.3 km) of multi-use pathways would be constructed inside existing road corridors.

Roadways and Parking

Under Alternative 3a, improvements to park roadways and parking areas would occur during scheduled maintenance or on an as needed basis. A combination of improvements may be implemented and could include road signs to increase awareness of wildlife crossings; improved information on parking lot capacity and filled lots; self-service information kiosks; and variable messaging signs. A pedestrian-crossing signal would be constructed at the Jackson Lake Dam crossing to increase visitor safety.

The Moose-Wilson Road would be realigned in two areas under Alternative 3a, and the existing alignments would be abandoned and restored to natural conditions. Specifically, a section of the existing Moose-Wilson Road between Sawmill Ponds Overlook and a point approximately one-third mile (0.5 km) north of Death Canyon Road Junction would be abandoned and restored to natural conditions. Pavement would be removed and the roadbed would be regraded and revegetated to restore aspen and wetland habitat in this area. The road realignment between those two points would generally follow an old abandoned roadbed on the east side of the wetland and riparian areas. The other realignment, approximately one-half mile (0.8 km) east of Sawmill Ponds Overlook to a junction with the Teton Park Road near Moose, would intersect the Teton Park Road between the Moose Entrance Station and the access road to the Chapel of the Transfiguration.

Realignment near the Moose Entrance Station also would protect and facilitate a wildlife migration corridor in the Snake River riparian area. The aspen, cottonwood, and mixed deciduous-coniferous forests and wetlands located

along this section of the Moose-Wilson Road provide important habitat for wildlife and distinct vegetative communities. The area to be restored differs notably from the surroundings, and the road passing through this area currently affects its wildlife habitat value. The Park may consider the addition of wildlife viewing areas as part of the realignment of the Moose-Wilson Road between Sawmill Ponds and Death Canyon Road. In other areas, the existing character of the road would be maintained and thus, there are no plans for further development in the form of pull offs or formal viewing areas. User-created pull offs may be formalized or barricaded as necessary to ensure resource protection and enhance visitor enjoyment and safety. A secondary benefit to realigning the road would be improved vehicle and bicycle safety because of improved line of sight.

Transit Service and Facilities

This alternative would provide additional information concerning the transit services available to the public, including route maps and schedules at lodges within and outside the Park, visitor centers, and other locations where visitors may congregate. Completion of the TBP could result in operation of a pilot transit system in the Park.

Multi-use Pathways and Improved Shoulders

Under Alternative 3a, a distinction is made between pathways constructed within the road corridor as opposed to those constructed outside of the corridor. For the purposes of this plan, the term “road corridor” generally means the engineered corridor in which the road exists, including the cut and fill areas and clear zones (see Figure 2 on page 24). Under this alternative, multi-use pathways would be constructed outside the road corridor along U.S. Highway 26/89/191 (Outer Highway) from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km]); along the Teton Park Road from Moose Junction to North Jenny Lake Junction (a distance of approximately 10.6 miles [17.0 km]); from North Jenny Lake Junction west to String Lake (a distance of approximately 1.5 miles [2.4 km]); and from Gros Ventre Junction to an existing pathway at Jackson Hole Golf and Tennis via Sagebrush Drive and Spring Gulch Road (a distance of approximately 1.0 miles [1.6 km]). A total of 22.5 miles (36.0 km) of multi-use pathways would be constructed outside existing road corridors. In general, pathways constructed outside of the road corridor would still be located within approximately 50 ft of the road.



Alternative 3a - Preferred Alternative

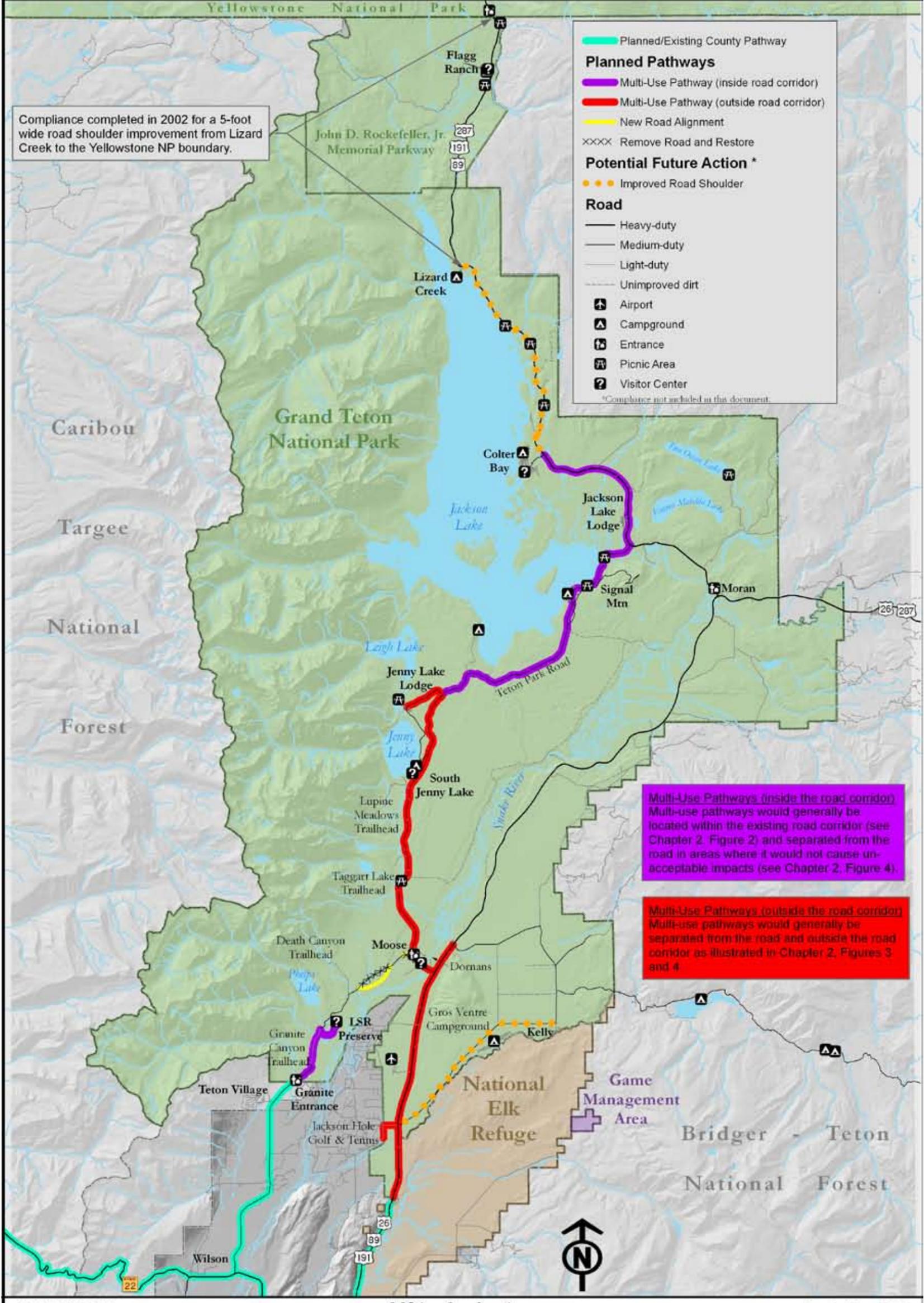


FIGURE 10
ALTERNATIVE 3A: PREFERRED ALTERNATIVE

Alternative 3a also includes construction of multi-use pathways inside the road corridor along the Teton Park Road from North Jenny Lake Junction to Colter Bay (approximately 15.5 miles [25.0 km]), except for a section between Signal Mountain Lodge and Jackson Lake Dam, where an improved shoulder would be constructed. In addition, improved shoulders would be used in other areas where constructability issues or unacceptable impacts to resources could occur.

Multi-use pathways would also be constructed inside the road corridor along the Moose-Wilson Road from the Granite Canyon Entrance Station to the LSR Preserve (a distance of approximately 3.3 miles [5.3 km]). The Moose-Wilson pathway would begin at the Granite Canyon Entrance Station and extend to the north end of the unpaved section of road. At that point, the pathway would divert eastward and follow the long-established alignment of the unpaved levee access road to the new LSR Preserve (opening planned for 2007).

Developed Areas

Alternative 3a would incorporate limited modifications and additions to infrastructure through normal park operations and maintenance and could include improved social trails, signs, and way-finding, information kiosks, bicycle racks, variable-messaging signs, bulletin boards, and other traveler information systems in the following activity areas of the Park:

Moose

As described under the “Elements Common to All Alternatives” section, issues in the Moose Complex will be examined to address the increase in use of the area as a result of pathway construction.

South Jenny Lake

Social trails, signs, and way-finding would be improved in this area in order to create well-marked pedestrian pathways that would facilitate pedestrian travel between key points (i.e., the campground and the store), thereby lessening the use of private vehicles to travel short distances and reducing congestion. Social trails would likely be paved or graveled. Information kiosks would be added at South Jenny Lake.

Signal Mountain Area

Social trails, signs, and way-finding would be improved in this area in order to facilitate pedestrian travel between key points (i.e., the campground and the store), thereby lessening the use of private vehicles to travel short

distances and reducing congestion. Information kiosks would be added at Signal Mountain.

Jackson Lake Lodge

Signs and way-finding would be improved in this area in order to facilitate pedestrian travel between key points. Information kiosks would be added at Jackson Lake Lodge.

Colter Bay

Parking, boat trailer parking, and circulation would be minimally redesigned to improve function and safety. Information kiosks would be added at Colter Bay.

Traveler Information

Alternative 3a would improve the amount and type of information available to park visitors and the local community regarding transportation related issues. The Park would employ various information transmission methods, depending on effectiveness and as funds become available, which could include traveler information systems (localized radio transmissions with information on current park conditions), additional variable messaging signs, bulletin boards, an improved website, and information kiosks with current information at key locations. Signboards would list congested areas, such as popular areas or trailheads, and alternative destinations to visit in the Park, thus allowing visitors to plan their visit and assist the Park in managing visitor access without the aid of park staff at trailhead sites. Wildlife hazard signs, particularly for grizzly bears and moose, and in areas with low sight distance, could also be provided.

Estimated Capital Costs

Estimated capital costs and annual maintenance and operation costs for implementing Alternative 3a are as follows:

ESTIMATED COSTS ALTERNATIVE 3A	
Roadways and Parking	
Improve signage for pedestrian and wildlife safety	\$9,000
Construct separate entrance lanes for employees	\$140,000
Realignment and restoration of the Moose-Wilson Road	\$2,285,000
Transit Services and Facilities	
Development of a transit business plan (on-going)	\$100,000
Capital costs for pilot transit within the Park	TBD
Capital costs for shuttle concession	TBD
Capital costs for infrastructure supporting transit	TBD
Multi-use Pathways and Improved Shoulders, Bridges, Culverts & Restoration	
Wildlife impacts monitoring for post phase 1 multi-use pathway construction*	\$700,000
South Boundary to North Jenny Lake Junction	
Construct 10-ft wide separate multi-use pathways from the south boundary of the Park to Moose Junction (a distance of approximately 8.2 miles [13.1 km])	\$6,879,000
Construct 10-ft wide separate multi-use pathways from Gros Ventre Junction south to the Spring Gulch Road boundary (a distance of approximately 1.0 miles [1.6 km])	\$634,000
Construct 10-ft wide separate multi-use pathways from Moose Junction to the Antelope Flats Road, including segment to Dornan's Junction (a distance of approximately 1.2 miles [1.9 km])	\$941,000
Construct 10-ft wide separate multi-use pathways Dornan's Junction to South Jenny Lake Junction (a distance of approximately 7.7 miles [12.3 km])	\$5,697,000
Construct 10-ft wide separate multi-use pathways South Jenny Lake Junction to North Jenny Lake Junction (a distance of approximately 2.9 miles [4.6 km])	\$1,936,000
Construct 10-ft wide separate multi-use pathways North Jenny Lake Junction to String Lake (a distance of approximately 1.5 miles [2.4 km])	\$968,000
North Jenny Lake Junction to Colter Bay	
Construct 10-ft wide separate multi-use pathways within corridor North Jenny Lake to Colter Bay (a distance of approximately 15.5 miles [25.0 km])	\$19,529,000
Signal for Safety Crossing at Jackson Lake Dam/Bridge	\$56,000
Moose-Wilson Road	
Construct 10-ft wide separate multi-use pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to the north end of unpaved section; then follow the levee access road to the new LSR Preserve (approximately 3.3 miles [5.3 km])	\$4,557,000
Developed Areas	
Install kiosks, bicycle racks, trash cans, way-finding signs, vault toilet(s)	\$252,000
Traveler Information	
Install variable messaging signs (\$56,000 per sign)	\$336,000
Total Capital Cost	\$45,019,000
Annual Maintenance and Operations**	
Annual maintenance and operations - Pathways/Shoulders	\$558,000
Total Annual Maintenance and Operation	\$558,000
<p><i>Notes: Draft EIS cost estimates were based on 2005 prices. Final EIS costs reflect 2008 prices. Add 4% inflation each year beyond 2008.</i></p> <p><i>*Capital cost for post construction wildlife monitoring will be \$500,000-\$900,000; an average of \$700,000 was used for this estimate.</i></p> <p><i>**Does not reflect future wildlife monitoring following the first 3 years of initial monitoring; on average, an estimation of \$100,000/yr is predicted.</i></p>	



Alternative 4: Multi-Use Pathways

Under Alternative 4, the Moose-Wilson Road would be realigned in two areas to restore aspen and wetland habitat, and an extensive system (a total of 42.6 miles [68.4 km]) of multi-use pathways would be constructed outside the road corridor to provide a wide range of transportation opportunities for bicyclists and pedestrians (Figure 11).

Roadways and Parking

Under Alternative 4, improvements to park roadways and parking areas would occur during scheduled maintenance or on an as needed basis. A combination of improvements may be implemented and could include road signs to increase awareness of wildlife crossings; improved information on parking lot capacity and filled lots; self-service information kiosks; and variable messaging signs. A pedestrian-crossing signal would be constructed at the Jackson Lake Dam Crossing to increase visitor safety.

The Moose-Wilson Road would be realigned in two areas under Alternative 4 and the existing alignments would be abandoned and restored to natural conditions. Specifically, a section of the existing Moose-Wilson Road between Sawmill Ponds Overlook and a point approximately one-third mile (0.5 km) north of Death Canyon Road Junction would be abandoned and restored to natural conditions. Pavement would be removed and the roadbed would be regraded and revegetated to restore aspen and wetland habitat in this area. The road realignment between those two points would generally follow an old abandoned roadbed on the east side of the wetland and riparian areas. The other realignment, approximately one-half mile (0.8 km) east of Sawmill Ponds Overlook to a junction with the Teton Park Road near Moose, would intersect the Teton Park Road between the Moose Entrance Station and the access road to the Chapel of the Transfiguration.

Realignment would occur for the purpose of restoring aspen habitat to this area and avoiding important wetland and riparian areas. Realignment near the Moose Entrance Station also would protect and facilitate a wildlife migration corridor in the Snake River riparian area. The aspen, cottonwood, and mixed deciduous-coniferous forests and wetlands located along this section of the Moose-Wilson Road provide unique habitat for wildlife and distinct vegetative communities. The area to be restored differs notably from the surroundings, and the road passing through this area currently affects its wildlife habitat value. The Park may consider the addition of wildlife viewing areas as part of the realignment of the Moose-Wilson Road between Sawmill Ponds and Death

Canyon Road. In other areas, the existing character of the road would be maintained and thus, there are no plans for further development in the form of pull offs or formal viewing areas. User-created pull offs may be formalized or barricaded as necessary to ensure resource protection and enhance visitor safety. A secondary benefit to realigning the road would be improved vehicle and bicycle safety because of improved line of sight.

Transit Service and Facilities

This alternative would provide additional information concerning the transit services available to the public, including route maps and schedules at lodges within and outside the Park, visitor centers, and other locations where visitors may congregate. Completion of the TBP could result in operation of a pilot transit system in the Park.

Multi-use Pathways and Improved Shoulders

Under this alternative, approximately 42.6 miles (68.4 km) of multi-use pathways outside the road corridor would be constructed. Although outside of the engineered road corridor, pathways would generally be located within 50 ft of the road. Multi-use pathways would be constructed outside the road corridor from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km]), from Moose Junction to Colter Bay (approximately 26.1 miles [42.0 km]), except for a section between Signal Mountain Lodge and Jackson Lake Dam, where an improved shoulder would be constructed. In addition, improved shoulders would be used in other areas where constructability issues or unacceptable impacts to resources could occur. Multi-use pathways also would be constructed outside the road corridor along the Moose-Wilson Road from the Granite Canyon Entrance Station to Moose (a distance of approximately 7.1 miles [11.4 km]).

Developed Areas

Alternative 4 would incorporate limited modifications and additions to infrastructure through normal park operations and maintenance and could include improved social trails, signs, and way-finding, information kiosks, bicycle racks, variable-messaging signs, bulletin boards, and other traveler information systems in the following activity areas of the Park:

Moose

As described under the “Elements Common to All Alternatives” section, issues in the Moose Complex will be examined to address the increase in use of the area as a result of pathway construction.

South Jenny Lake

Social trails, signs, and way-finding would be improved in this area in order to create well-marked pedestrian pathways that would facilitate pedestrian travel between key points (i.e., the campground and the store), thereby lessening the use of private vehicles to travel short distances and reducing congestion. Social trails would likely be paved or graveled. Information kiosks would be added at South Jenny Lake.

Signal Mountain Area

Social trails, signs, and way-finding would be improved in this area in order to facilitate pedestrian travel between key points (i.e., the campground and the store), thereby lessening the use of private vehicles to travel short distances and reducing congestion. Information kiosks would be added at Signal Mountain.

Jackson Lake Lodge

Signs and way-finding would be improved in this area in order to facilitate pedestrian travel between key points. Information kiosks would be added at Jackson Lake Lodge.

Colter Bay

Parking, boat trailer parking, and circulation would be minimally redesigned to improve function and safety. Information kiosks would be added at Colter Bay.

Traveler Information

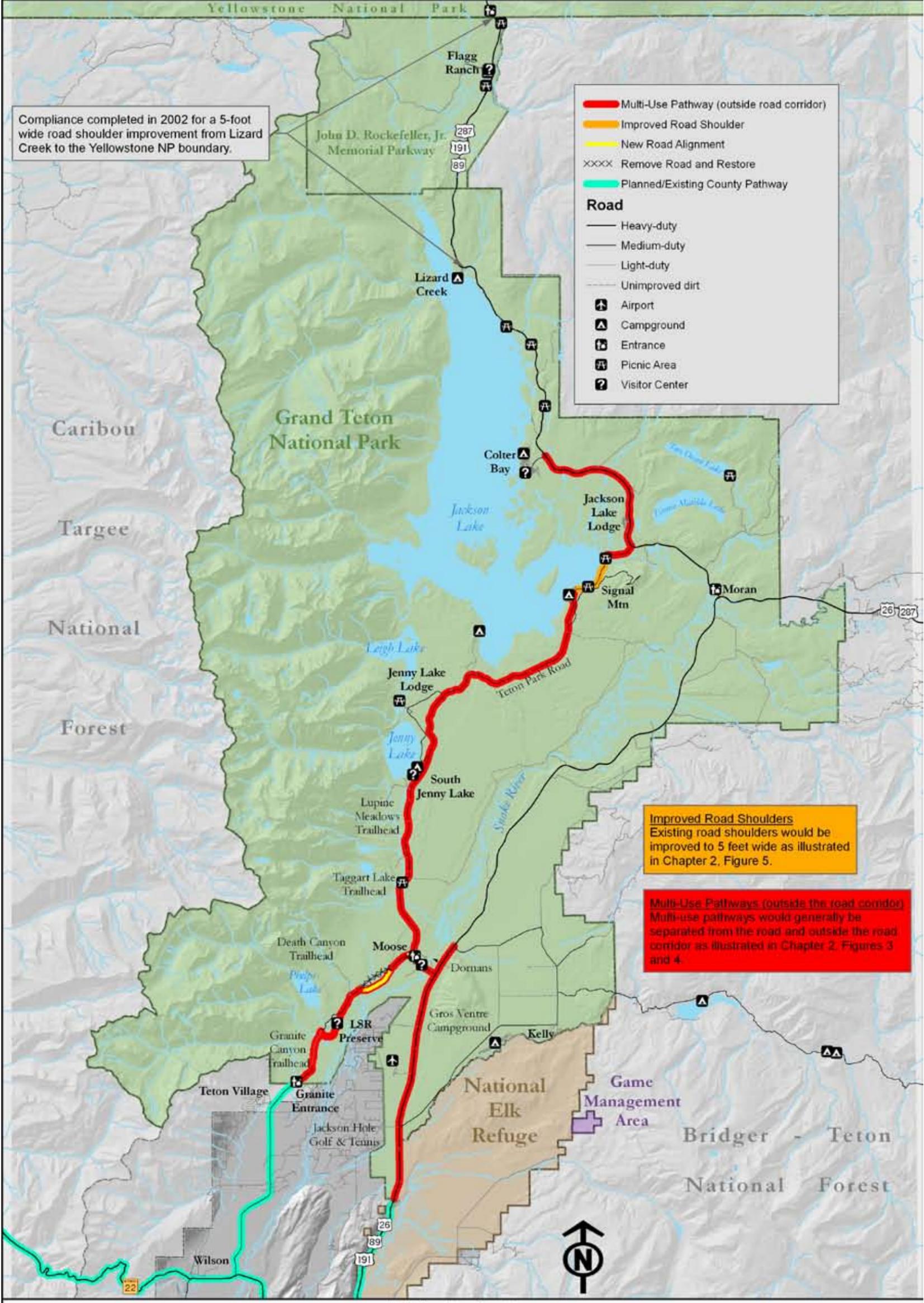
Alternative 4 would improve the amount and type of information available to park visitors and the local community regarding transportation related issues. The Park would employ various information transmission methods, depending on effectiveness and as funds become available, which could include traveler information systems (localized radio transmissions with information on current park conditions), additional variable messaging signs, bulletin boards, an improved website, and information kiosks with current information at key locations.

Signboards would list congested areas, such as popular areas or trailheads, and alternative destinations to visit in the Park, thus allowing visitors to plan their visit and assist the Park in managing visitor access without the aid of park staff at trailhead sites. Wildlife hazard signs, particularly for grizzly bears and moose, and in areas with low sight distance, could also be provided.





Alternative 4 - Multi-Use Pathways



GRTE GIS Office

0 0.5 1 2 3 4 Miles

September 2006

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FIGURE 11
ALTERNATIVE 4: MULTI-USE PATHWAYS

Estimated Capital Costs

Estimated capital costs and annual maintenance and operation costs for implementing Alternative 4 are as follows:

ESTIMATED COSTS ALTERNATIVE 4	
Roadways and Parking	
Improve signage for pedestrian and wildlife safety	\$9,000
Construct separate entrance lanes for employees	\$140,000
Realign and restore the Moose-Wilson Road	\$2,285,000
Transit Services and Facilities	
Develop a transit business plan (on-going)	\$100,000
Capital costs for pilot transit within the Park	TBD
Capital costs for shuttle concession	TBD
Capital costs for infrastructure supporting transit	TBD
Multi-use Pathways and Improved Shoulders, Bridges, Culverts & Restoration	
Wildlife impacts monitoring for post Phase 1 multi-use pathway construction*	\$700,000
South Boundary to North Jenny Lake Junction	
Construct 10-ft wide separate multi-use pathways from the south boundary of the Park to Moose Junction (a distance of approximately 8.2 miles [13.1 km])	\$6,879,000
Construct 10-ft wide separate multi-use pathways from Moose Junction to the Antelope Flats Road, including segment to Dornan's Junction (a distance of approximately 1.2 miles [1.9 km])	\$941,000
Construct 10-ft wide separate multi-use pathways Dornan's Junction to South Jenny Lake Junction (a distance of approximately 7.7 miles [12.3 km])	\$5,697,000
Construct 10-ft wide separate multi-use pathways South Jenny Lake Junction to North Jenny Lake Junction (a distance of approximately 2.9 miles [4.6 km])	\$1,936,000
North Jenny Lake Junction to Colter Bay	
Construct 10-ft wide separate multi-use pathways North Jenny Lake to Colter Bay (a distance of approximately 15.5 miles [25.0 km])	\$19,529,000
Signal for Safety Crossing at Jackson Lake Dam/Bridge	\$56,000
Moose-Wilson Road	
Construct 10-ft wide separate multi-use pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to the Teton Park Road (a distance of approximately 7.1 miles [11.4 km])	\$8,928,000
Developed Area	
Install kiosks, bicycle racks, trash cans, way-finding signs, vault toilet(s)	\$252,000
Traveler Information	
Install variable messaging signs (\$56,000 per sign)	\$336,000
Total Capital Cost	\$47,788,000
Annual Maintenance and Operations	
Annual maintenance and operations - Pathways/Shoulders**	\$558,000
Total Annual Maintenance and Operation	\$558,000
<p><i>Notes: Draft EIS cost estimates were based on 2005 prices. Final EIS costs reflect 2008 prices. Add 4% inflation each year beyond 2008.</i></p> <p><i>*Capital cost for post construction wildlife monitoring will be \$500,000-\$900,000; an average of \$700,000 was used for this estimate.</i></p> <p><i>**Does not reflect future wildlife monitoring following the first 3 years of initial monitoring; on average, an estimation of \$100,000/yr is predicted.</i></p>	

Implementation Schedule for All Action Alternatives

Development of the pathway system and improved shoulders would occur in phases. These phases would be based on the results of monitoring and analysis of environmental impacts, visitor use patterns, and other factors relevant to construction and use of the system. Following the construction of the first phase of pathways, the NPS would evaluate visitor use and any environmental impacts resulting from the use of pathways and use the data to help inform the planning and design of future segments and phases.

The Park intends to design pathway construction in segments that will provide adequate parking opportunities or pathway connectivity at both ends as much as possible. Alternative 1 would require only one phase to implement.

Alternative 2 includes implementation of a management strategy on the Moose-Wilson Road using an AMP, construction of a separate entrance lane for the Moose Entrance Station, development of a TBP, improving road shoulders between Moose and Signal Mountain Lodge, and associated signage. The total cost for this alternative would be \$12,958,000. This work would be split into two phases with the section from Moose Junction to North Jenny Lake Junction being completed in the first phase, then the remaining distance and entrance station work being completed in the second phase.

Implementation of a management strategy on the Moose-Wilson Road using the AMP, and construction of multi-use pathways and improved shoulders proposed in Alternatives 3, 3a, and 4, could occur in multiple phases. Potential phasing could occur as follows:

Phase 1 for Alternatives 3, 3a, and 4

- Development of the TBP that would identify alternatives for a technically and financially feasible transit system within the Park.
- Construction of a separated pathway along the Teton Park Road from Dornan's to South Jenny Lake Junction.
- Installation of signage and other elements associated with pathway construction.

Phase 2 for Alternatives 3, 3a, and 4

- Implementation of a pilot transit system as recommended by the TBP.

- Construction of a separated pathway along the Teton Park Road from South Jenny Lake Junction to String Lake as prescribed in Alternative 3a.
- Construction of a separated pathway along the Teton Park Road from South Jenny Lake Junction to North Jenny Lake Junction as prescribed in Alternatives 3 and 4.
- Installation of signage and other elements that go along with pathway construction.
- Restoration of wetlands area and realignment of the Moose-Wilson Road.
- Relocation of the Moose Entrance Station and the construction of a separate administrative entrance lane.
- Installation of signage and other elements associated with the Moose-Wilson road realignment and entrance station relocation.
- Enhancement of existing traveler information systems at visitor centers, on variable message signs, at lodges, and other appropriate locations.

Phase 3 for Alternatives 3, 3a, and 4

- Construction of a separated pathway along Highway 26/89/191 from the south boundary to Antelope Flats Road and along the Teton Park Road from Moose Junction to Dornan's Junction, as prescribed in Alternatives 3, 3a, and 4.
- Construction of a separated pathway along the Sagebrush Drive and Spring Gulch Road segments, as prescribed in Alternative 3a only.
- Installation of signage and other elements associated with pathway construction.

Phase 4 for Alternatives 3, 3a, and 4

- Construction of improved road shoulders or separated pathways along the Teton Park Road from North Jenny Lake Junction to Colter Bay, as prescribed in each alternative.
- Pedestrian trails, signage, and way finding improvements between key points at South Jenny Lake and Signal Mountain.
- Installation of signage and other elements associated with improved shoulders or pathways.
- Installation of information kiosks at Moose, South and North Jenny Lake, Signal Mountain, Jackson Lake Lodge, and Colter Bay.



- Enhancement of existing traveler information systems at visitor centers, on variable message signs, at lodges, and other appropriate locations.

Phase 5 for Alternatives 3, 3a, and 4

- Construction of a separated pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to the LSR Preserve as prescribed in Alternatives 3 and 3a.
- Construction of a separated pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to Moose as prescribed in Alternative 4.

The NPS considered several factors in developing the proposed implementation schedule (e.g., construction schedules, remote location, and projects by other entities). For example, the Park would strive to plan Phase 3 so that it coincides with the Town and County Plan for construction of their pathway up to the southern boundary of the Park. Another consideration is federal highway project planning, which occurs in 5-year increments. The current planning cycle runs from 2005 to 2009; the subsequent cycle runs from 2010 to 2014.

The primary intent of the proposed actions in Phase 1 is to develop a TBP to inform the Park on future transit service opportunities, and construct a separated pathway along one of the most-visited sections of the Park which connects two major developed visitor use areas. This corridor is a relatively easy area to monitor the effects of pathway users on wildlife and collect visitor use and experience data on pathways use. The information collected on this pathway segment would be used to inform planning and design of future pathway construction in more resource-sensitive, conflict-prone, and challenging design areas of the Park. Phase 2 focuses on connecting the Phase 1 pathway system to String Lake (Alternative 3a), another popular visitor use area with parking opportunities, or to the North Jenny Lake Junction (Alternatives 3 and 4). It also includes the realignment and restoration of approximately two miles of the northern section of the Moose-Wilson Road connecting the Moose Discovery and Visitor Center and the LSR Preserve. This realignment would support additional vehicular and non-motorized traffic anticipated between these two new destinations and restore a sensitive wetlands area. Phase 3 focuses on connecting the Park's new pathway system with pathways proposed by the Town and County. Phases 4 and 5 focus on extending the existing pathway system in the Park and addressing circulation in the Park's developed areas.

The implementation phases generally indicate the sequence in which actions would occur. It should be noted, however, that some actions that are shown within a particular phase could actually occur earlier or later. This is due to the fact that funding for the various actions would likely be provided through a number of different sources and may be available earlier or later than anticipated. However, actions that are dependent upon data collected in earlier phases would not generally be taken out of sequence unless there was a high degree of confidence that any resource impacts would be within acceptable levels.

Mitigation Measures Common to All Action Alternatives

To ensure implementation of the action alternatives protects natural and cultural resources and the quality of the visitor experience, a consistent set of mitigation measures would be applied to actions that result from this Final Plan/EIS, assuming that the individual measures are appropriate for specific types of action. The NPS has prepared appropriate environmental analysis and documentation, as required by NEPA, ESA, NHPA, and other relevant legislation for the proposed actions. Specific mitigation measures that are relevant and appropriate for each element of the project would be identified during the planning phase. As part of the environmental review, the NPS would avoid, minimize, and mitigate adverse impacts whenever practicable.

The NPS would employ a comprehensive monitoring program as part of implementation of any alternative involving pathways. This program would include collection of information on pathway users (i.e., number, type, etc.) and impacts of use, as well as impacts of pathways on wildlife, vegetation, etc. Information obtained from the monitoring program would inform planning and design of future phases. The Park would request additional funding to address additional staff responsibilities resulting from implementation of the Final Plan/EIS.

Management Considerations

Adaptive management principles, balanced with consideration for visitor access and safety and resource impacts, would guide the development of strategies and regulations for management and operation of the actions proposed in this Final Plan/EIS. Development of specific features and characteristics would take place during the design phase of the project. Appropriate safety signs would comply with the Manual on Uniform Traffic Control Devices (MUTCD) and the AASHTO Guide for the Development of Bicycle Facilities.

Subject to weather conditions, improved road shoulders and multi-use pathways would be swept in the spring. If it is determined that sweeping is required more than once per year, it would take place based on availability of park service personnel and funding. Pathways would not be groomed in winter.

Pathways would be closed from dusk to dawn for all sections of the pathway system for public safety and to protect park resources. Pathway use during non-daylight hours poses a safety risk to visitors by increasing the probability of wildlife encounters in an area away from the roadway with limited visibility. The Park would retain flexibility to implement pathway closures as needed, such as wintering wildlife and high bear use areas, but would strive to place pathways such that impacts to wildlife and dangerous wildlife-human encounters would be minimized.

Park regulations currently require dogs, cats, and other pets to be leashed, crated, or otherwise under physical restraint, and allow them only on roads and roadways open to vehicle traffic, launch ramps, or parking areas open to public use. Pets are prohibited in the backcountry and on trails. Because some pathway sections may traverse sensitive wildlife areas, regulations would prohibit pets on pathways. However, guide dogs, used for the sole purpose of aiding a disabled person, would be allowed.

Per 36 CFR 4 §4.10(a), motor vehicles would not be allowed on the pathway system. The compendium, which contains local park rules, states that the Park and parkway are closed to roller skis, rollerblades, skateboards, roller skates, scooters, coasting apparatus, etc. (except in areas such as residential areas and campgrounds), and would be modified to clarify that these devices would also be permitted on the multi-use pathway system as long as they are not motorized. Electric and battery-operated vehicles for the sole purpose of aiding persons with disabilities would be permitted.

The Moose-Wilson Road is currently open to small personal vehicles (automobiles, pickup trucks, motorcycles, etc.). Commercial trucks, RVs, vehicles with trailers (except for horse trailers) and large tour buses are prohibited. The NPS would continue to prohibit trailers and large RVs on Moose-Wilson Road and does not plan to groom cross-country ski trails between Moose and Teton Village. Seasonal winter road closure would continue.

The NPS would ensure compliance with the intent of the Architectural Barriers Act and the Rehabilitation Act and Section 507 of the Americans with Disabilities Act (ADA) for any improvements or construction proposed

in this Final Plan/EIS. The NPS intends to make every reasonable effort to ensure that any new construction or improvements are accessible to and usable by all people, including those with disabilities. All parking areas would be equipped with ADA parking spaces with easy access to other pedestrian facilities.

Best Management Practices During Construction

Appropriate BMPs would be implemented (as appropriate) before, during, and/or after construction of proposed improvements to provide long-term protection of park resources. BMPs specific to the design cannot be proposed until the full design is complete and specifics of the proposed construction are known. A partial list of BMPs is included in Appendix A.

Data Collection and Monitoring Plan

The Park is currently working on a data collection and monitoring plan (anticipated to be complete in early 2007) to address management strategies proposed along the Moose-Wilson Road and the effects on wildlife, visitor use and experience, and park operations for the first phase of pathways proposed for construction within the Park. The results of this data collection and monitoring will help park managers understand the effects of the new pathway system based on actual use and facilitate planning and design of additional pathway segments or different management strategies for the Moose-Wilson Road in the future.

Post-pathway construction monitoring would collect data on pathway distributions, volume, user types, behaviors, satisfaction, and conflicts to determine the pathways' effects on visitor use and experience. Visitor surveys would be conducted to assess opinions on improved safety, level of enjoyment and accessibility.

Pathways Visitor Use and Experience Monitoring

Following completion of the first phase of pathway construction, the NPS would monitor the types and levels of visitor use occurring on the pathways. The information on the number of users, patterns of use, and different types of users (i.e., bicyclists, pedestrians, etc.) would be used to complement the wildlife monitoring and data collection program, and to inform future planning and design of later phases of the pathway system. In addition, the NPS may also conduct surveys of pathway users, either in conjunction with other surveys of park visitors



in general, or as a stand-alone project. Surveys would provide additional information on user demographics, visitor satisfaction levels, and other information useful in managing the pathway system.

Moose-Wilson Road Data Collection and Monitoring

Because of the unique nature of the Moose-Wilson Road and the limited options for developing new pathways on this narrow and NRHP-eligible road, baseline data was collected in the summer of 2006 in order to provide a basis for comparison of effects for future management actions affecting this busy road corridor. After collection of baseline data, other data collection and monitoring activities will ensue based on the selected management strategy for the road. Baseline data collected on the Moose-Wilson Road in 2006 includes:

- Vehicle traffic volume, speed, and direction.
- Bicycle traffic volume and direction on peak and off-peak times.
- Visitor surveys to determine destination, satisfaction and purpose for visiting the Moose-Wilson Road.
- Travel mode usage observations.
- Directional traffic observations.
- Incident data analysis to assess historical conflicts and safety concerns.

Wildlife Monitoring and Research

In order to understand more precisely wildlife associated pathway impacts, the Park would implement a research and monitoring program designed to evaluate a variety of pathway effects, beginning with the Phase 1 construction. Phase 1 includes the construction of approximately 7.7 miles [12.3 km] of multi-use pathway between Dornan's and South Jenny Lake Junction. The NPS anticipates that this segment would be one of the easier sections on which to site pathways close to the existing road and would connect two popular park destinations – Moose and South Jenny Lake; as a result, it may be the most popular segment of all the pathways proposed within the Park for visitors.

Participants at a June 2006 workshop, composed of biologists from the NPS and academic and private research and transportation planning organizations, drafted several potential topics and initial strategies for a research and monitoring program. Each included the possibility of measuring attributes before, during, and after pathway construction. Topical areas included assessing average distance of selected species of wildlife from the

road/pathway corridor, behavior of wildlife in view of the corridor, movements and spatial distribution (including corridor crossings) of selected species using road/pathway corridors, and potentially measurements of productivity at graduated distances from the corridor. Other potential topics may be added as the program is further developed; implementation of these topics would be dependent on available funding.

The program's primary objective would be to quantify the effects of pathway construction and use, and employ this information during future design and development of additional phases of construction, pathway placement, and necessary mitigation. The initial phase of monitoring and research proposed for the constructed Phase 1 pathway would range from \$500,000 to \$900,000 for the first 3 years. Wildlife monitoring would occur within the Park along the Moose-Wilson Road, from the south boundary to Moose, and from Moose to North Jenny Lake Junction. Additional monitoring needs would depend on the results of the initial monitoring and the subsequent decisions based on this monitoring and could cost up to \$100,000 per year for the next 3 to 5-year period.

As pathway routes are designed, it may become apparent that additional mitigation is needed to compensate for wetland and/or habitat loss for park plants and animals. Such mitigation may be in the form of restoration or modification of access in other high quality habitats such as riparian zones, ungulate calving areas, and areas increasingly frequented by bears. Management options would range from seasonal use restrictions to pathway closures and may include site rehabilitation to restore native vegetation. As outlined in the Grizzly Bear Conservation Strategy approved in 2005, the Park intends to meet "no net habitat loss" objectives within the grizzly bear Primary Conservation Area and as needed in other areas where prevention of human-wildlife conflicts is a primary concern.

The Environmentally Preferred Alternative

NEPA requires the NPS to identify the "Environmentally Preferred Alternative" in the planning process. The environmentally preferred alternative is determined by applying the six goals listed in NEPA (Section 101(b)), and shown below (NEPA, 42 U.S.C. § 4321-4347):

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

2. Assure safe, healthful, productive, and aesthetically and culturally pleasing surroundings for all Americans.
3. Attain the widest range of beneficial uses of the environment without degradation, risk to health and safety, or other undesirable and unintended consequences.
4. Preserve important historic, cultural, and natural aspects of our national heritage, and maintain (wherever possible) an environment that supports diversity and variety of individual choice.
5. Achieve a balance between population and resource use, which will permit high standards of living and a wide sharing of life's amenities.
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Identifying the environmentally preferred alternative comprised a qualitative assessment of how well each alternative would meet each specific goal. All of the alternatives would essentially meet Goal 1 (as listed above) and fulfill the responsibilities of each generation as trustee of the environment for succeeding generations. All alternatives would provide for a TBP that could result in implementation of a transit program under Alternatives 2, 3, 3a, and 4 that would reduce emissions and dependency on cars and fossil fuels as the program is expanded and used, thereby preserving more resources for future generations. In addition, all alternatives include testing of adaptive management strategies on the Moose-Wilson Road to preserve the character of that road for future generations. Alternatives 3, 3a, and 4 would provide for multi-use pathways and/or road shoulder improvements, which would help limit off-road impacts to resources and promote use of non-motorized vehicles. Alternative 2 would also accomplish some of this through road shoulder improvements, although no pathways would be constructed.

All alternatives would also essentially meet Goal 2, but the additional safety provided by the multi-use pathways in Alternatives 3, 3a, and 4 would meet the goal more than the actions proposed in the other alternatives. Under Alternative 1, the potential for conflicts between vehicles and bicyclists sharing high volume park roadways would continue. In addition, opportunities for a wider range of "productive" uses of the Park and visitor enjoyment of park resources would not be achieved under this alternative. Alternative 2 would provide a small measure of

safety for bicyclists by adding wider shoulders to a heavily traveled corridor within the Park to allow for a striped bicycle lane. In other areas, real or perceived safety risks for bicyclists would remain. Alternative 3 would provide multi-use pathways outside the road corridor and improved shoulders and Alternatives 3a and 4 would provide multi-use pathways within and outside the road corridor in heavily traveled areas or areas where public safety issues for bicyclists are a concern. The pathways and shoulder improvements would begin to promote a wider range of "productive" uses of the Park.

Regarding Goal 3, Alternative 1 would not attain the widest range of beneficial uses of the environment. Alternative 1 does not provide for any multi-use pathways or improved shoulder areas; therefore, both real and perceived safety hazards would continue to discourage bicycling within the Park. Alternative 2 would provide some additional opportunities because the traveler information and improved shoulders would provide minor enhancements to the range of visitor experiences within the Park, but these would be limited in geographic scope. Alternative 3 would attain "... the widest range of beneficial uses of the environment without degradation, risk to health and safety, or other undesirable and unintended consequences" compared to the other alternatives. The traveler information, pathways, and improved shoulders system would provide enhancements to the range of visitor experiences within the Park but not at the same spatial scope as Alternatives 3a and 4. Alternatives 3a and 4 would attain a wide range of beneficial uses of the environment because they provide the largest amount of multi-use pathways; however, it would also involve the greatest number of acres of new permanent disturbance of all the alternatives and the greatest change in the natural character of the Moose-Wilson Road corridor.

Alternative 3 would best meet Goal 4 due to its enhancement of individual choice while preserving important natural aspects of the Park. Alternative 3 would provide diversity and variety of individual choice with its provision of multi-use pathways and improved shoulders and enhanced communication regarding the variety of recreational options in the Park. Alternatives 3a and 4 would also enhance individual choice but would cause more disturbances to natural and visual aspects of the Park due to the increase in construction, paving, and vegetation clearing along the Moose-Wilson Road corridor and the multi-use pathways north of Jenny Lake. Construction of pathways along these environmentally sensitive corridors under Alternatives 3a and 4 poses a



risk to vegetation and wildlife and may deter from the current experience. Alternative 1 would preserve important aspects of our national heritage, but the diversity and variety of recreation and transportation choices would remain unchanged for both visitors and employees and heavily dependent on use of a private vehicle pending the results of the TBP, which may provide future transit options under the other alternatives. Alternative 2 would generally “...maintain, wherever possible, an environment which supports diversity and variety of individual choice.” Visitors seeking to drive, bicycle, or hike within the Park would find opportunities to do so. Road restrictions would be applied only to Signal Mountain (time-limited closures for recreational purposes). These restrictions would inconvenience a small number of people for limited times during the peak summer season.

All alternatives would meet Goal 5 to a large degree. However, Alternative 1 would not balance population and resource use as well, since areas that are presently heavily used may be expected to become more so as visitation increases. Alternative 2 would provide information to allow visitors to make informed decisions about what they see and do in the Park so that they can become “self-managing” dispersing to less crowded areas. To the extent that this premise is accurate, such a balance between visitation and resource use may result. Alternatives 3, 3a, and 4 would also supply this benefit and would further balance population and resource use by their promotion of multiple means of touring the Park.

Regarding Goal 6, all alternatives would potentially enhance the quality of renewable resources through the findings of the TBP, which could result in pilot transit within the Park under Alternatives 2, 3, 3a, and 4. Under Alternative 1, transportation within the Park would still be oriented toward the private vehicle rather than a mix of modes, including bicycles. Alternative 2 would better attain this goal, but transportation within the Park would still be oriented toward the private vehicle. Alternatives 3, 3a, and 4 would help to enhance the quality of renewable resources by providing greater opportunities for using mixed travel modes.

The NPS has identified Alternative 3 as the “Environmentally Preferred Alternative.” Aspects of this determination include the fact that Alternative 3 would not include multi-use pathways from North Jenny Lake to Colter Bay. These differences make Alternative 3 more environmentally preferable than Alternatives 3a and 4 because it supports balanced use while posing fewer impacts to the environment.

Alternative 3 would minimize the anticipated adverse effects to visitor safety due to wildlife encounters, relative to Alternatives 3a and 4. Compared to Alternatives 3a and 4, it would cause fewer impacts to vegetation and habitat fragmentation because it would avoid forcing pathways into areas where construction could be technically challenging. Trying to construct pathways near roads with steep inclines and drop-offs or through wetlands with dense, large trees and large infrastructure (dams and bridges) is more difficult, costly, and adverse to the environment. In addition to vegetation removal, erosion, and habitat destruction, there is a greater long-term risk to users.

The alternatives described in the Draft Plan/EIS were formulated to explore the range of reasonable actions and strategies for which potential effects could be compared. During the alternative development process, the NPS considered alternatives that, if implemented, would meet project objectives while protecting the Park’s natural resources.

As discussed throughout this chapter, actions proposed under the alternatives comprised the following categories:

1. Roadways and Parking.
2. Transit Service and Facilities.
3. Multi-use Pathways and Improved Shoulders.
4. Developed Areas.
5. Traveler Information.

Of these elements, “Multi-use Pathways and Improved Shoulders” was the element that differentiated the alternatives the most in terms of potential impacts, and it was also the topic of greatest public concern and engagement. The greatest change in the preferred alternative is the addition of more pathways, but in a modified manner for some segments. The pathways from North Jenny Lake Junction to Colter Bay would be constructed inside the road corridor under Alternative 3a rather than as a widened shoulder under Alternative 3 (the Preferred Alternative in the Draft Plan/EIS) or outside the road corridor under Alternative 4. Multi-use pathways would be constructed inside the road corridor under Alternative 3a between the Granite Canyon Entrance Station and the LSR Preserve (3.3 miles [5.3 km]), but outside the road corridor under Alternative 3. Under Alternative 4, multi-use pathways would be built outside the road corridor for the entire segment of the Moose-Wilson Road from the Granite Canyon Entrance Station to Moose (a distance of approximately 7.1 miles [11.4 km]).

In order to address public comment on the Draft Plan/EIS, the NPS decided to undertake several additional studies. These studies focused on clarifying the technical and financial feasibility of several proposed actions, as well as the potential safety and wildlife impacts that could result from construction of new multi-use pathways and improved shoulder segments adjacent to the major roadway systems in the Park. The NPS recognizes that the Moose-Wilson Road requires a management strategy different from other road segments in the Park because of its rustic nature, wildlife habitat, wetlands, and eligibility for listing on the NRHP, and contracted with the WTI to provide professional services and consultation for adaptive management strategies for the Moose-Wilson Road, as described earlier. Elements of their consultation included a data collection and monitoring plan, refinement of desired future conditions, and development of performance measures, vehicle-traffic data collection processes, visitor use surveys, and a TBP. The Park also conducted a workshop with biologists from the NPS, academic, private research, and transportation planning organizations. The group drafted several potential topics and initial strategies for a wildlife research and monitoring program, each of which included the possibility of measuring attributes before, during, and after pathway construction.

The NPS, in consultation with FHWA, recognized that the development of multi-use pathways would be problematic in certain areas. In certain locations, pathways could pose potentially unacceptable impacts to wildlife, present unnecessary safety impacts to pathway users, and would be technically and financially infeasible to construct due to topography, vegetation, wildlife, and site conditions. These factors combine to make it very difficult to determine cost, risk to safety, or impacts to resources without first completing a 100-percent design.

In order to address these concerns (as well as public comment), the NPS decided to consider to multi-use pathways within the road corridor in areas like the Moose-Wilson Road, where one or more of these factors (i.e., topography, vegetation, wildlife, or site conditions) posed a challenge. The process of designing these segments would eventually produce a combination of pathways and/or improved shoulder sections with separation of motor vehicles and pathways within the road corridor, with the exact location subject to specific design and site analyses and a determination that there would not be unacceptable impacts. In some areas, pathways could diverge from the road corridor for small distances to accommodate grade, increase safety, or reduce resource impacts.

Small pathway spurs (i.e., Sagebrush Drive, Spring Gulch Road, and String Lake) were added to Alternative 3a to maximize the pathway system connectivity with the community in the future and make the best use of existing use areas and facilities. Under a separate environmental assessment, environmental compliance was completed in 2002 for widening (5-ft [1.5 m]) road shoulders along U.S. Highway 89/191/287 from Lizard Creek campground, north to the boundary of YNP. This action would occur as part of future road improvements regardless of the action alternative selected under this Final Plan/EIS. The Park is also retaining the option of adding improved shoulders in two other locations: (1) from Colter Bay north along U.S. Highway 89/191/287 to Lizard Creek campground, and (2) from the intersection of U.S. Highway 26/89/191 east along Gros Ventre Road to the Town of Kelly. These actions would occur as part of future planning and the NPS would need to complete additional NEPA documentation for these segments.

In the Draft Plan/EIS, the NPS also identified the environmentally preferred alternative, Alternative 3, as the preferred alternative for implementation. In this Final Plan/EIS, the NPS has identified Alternative 3a as the preferred alternative for implementation, while Alternative 3 remains the environmentally preferred alternative.

The NPS has identified Alternative 3a as the preferred alternative for implementation rather than the environmentally preferred alternative because it better fulfills the purpose and need for the Final Plan/EIS. Specifically, Alternative 3a includes a more extensive system of multi-use pathways to improve opportunities for non-motorized users to safely travel between the Park's major activity areas and connect to important destinations outside of the Park. Both alternatives provide for a phased approach to constructing the pathways, with monitoring, data collection, and additional assessment of conditions occurring with each phase. The additional information gained by these activities would be used to inform the planning and design of subsequent phases, thus providing safeguards that unacceptable impacts would not be allowed to occur.

During the transition from the Draft Plan/EIS to the Final Plan/EIS, the NPS incorporated the phasing approach and safeguards into Alternative 3a that would ensure that decisions regarding details of implementation continue to be informed by pertinent new information as the pathway system develops. By providing for a more extensive system of pathways, while building in safeguards to ensure that



any environmental impacts are acceptable, Alternative 3a best meets the objectives of taking action as described in Chapter 1, such as providing additional travel/recreational options, both motorized and non-motorized. Alternative 3a allows for the development of an extensive system of pathways while building in appropriate safeguards to ensure that no unacceptable impacts are allowed to occur, and eliminates the need to engage in an entirely new planning and environmental compliance process to construct the segments that are not included in the other alternatives.

Alternatives Eliminated From Analysis

During the initial scoping phases of this planning effort, a number of individual actions were proposed for incorporation into Final Plan/EIS alternatives. Many of these actions were dismissed from subsequent consideration or inclusion as alternatives. These actions and their rationale for dismissal are listed below.

Roadways and Parking

Close Roadways to Vehicles with No Transit (Open to Bicyclists)

Permanent or seasonal closure on higher volume park access roads without compensation with transit would severely limit access for those unable or unwilling to ride a bicycle and could be viewed as potentially discriminatory toward certain population subgroups (e.g., the elderly, persons with disabilities). However, road restrictions limiting transit to non-motorized vehicles only are proposed for Signal Mountain Road under Alternative 2.

Close Antelope Flats Road between Mormon Row and Shadow Mountain Junction

Safety concerns and use conflicts are not sufficient to warrant restricting vehicular traffic. Closure would deprive visitors of an experience within the Park that currently has relatively low use.

Close the Teton Park Road South of South Jenny Lake

A considerable amount of NPS employee housing is located along this section of roadway, and closure would pose a burden to employees commuting to work. Providing these employees with access passes would limit the reduction in vehicular traffic, reducing the benefits of this alternative to cyclists.

Access to the Jenny Lake Campground and Lodge make closure south of the lake impractical; the campground is designed for access by private vehicle. The area requires

frequent access for park and concessions operations and management and closure would pose a burden for these employees. Providing these employees with access passes would limit the reduction in vehicular traffic, reducing the benefits of this alternative to cyclists.

Provide a Cap on the Number of Cars in the Park

Providing a cap on the number of cars in the Park is not necessary park-wide based on the Park's anticipated traffic volume through the life of the Final Plan/EIS.

Charge a Fee for Each Mode of Transportation

Fee structure proposals are not a part of this Final Plan/EIS's scope of work.

Charge Higher Fees for RVs, Cars, and Low Occupancy Cars

Fee structure proposals are not a part of this Final Plan/EIS's scope of work.

Transit

Construct Monorail or Other Fixed Guideway System

Potentially extreme visual impacts resulting from monorail or other similar systems could impair views of the Teton Range that contribute to the Park's purpose and significance. In addition, such systems offer capacities above the demand generated by park visitation. This alternative is not likely to enhance travel and/or recreational experience for visitors and employees due to the inflexibility to provide service to stations at all areas in the Park that are desired or needed. Because this alternative would be environmentally and economically excessive relative to the need for alternative transportation, it was dismissed from further analysis.

Multi-use Pathways and Facilities

Provide Attached Pathway Separated by Barrier (e.g., Guard Rail)

This alternative could create access and safety issues for pathway users and motorists, and pose excessive visual impacts when used over relatively long distances. Continuous sections of barriers such as guard rails and posts would pose unacceptable impacts to wildlife movement. However, barriers may be used in short segments in certain areas where it would not significantly impact wildlife movement or pose unacceptable safety or access issues to users.

Create Pathway from South Jenny Lake to River/ RKO Road Midpoint along Abandoned Two-Track

This alternative would introduce a non-conforming use

(i.e., pathway) into the Park's backcountry. It could also introduce additional/new use into areas in which wildlife are not accustomed to off-trail/road travel.

Create Pathway from River/RKO Road at Cow Lake to Cattleman's Bridge

Creating this pathway would introduce a non-conforming use (i.e., pathway) into a proposed wilderness addition (Grand Teton National Park 1984).

Create Pathway from Gros Ventre Junction to Moose via Solitude and Airport

This pathway travels through private property outside of the Park boundary. The proximity of the pathway to the runway and the runway protection zone would pose safety and security concerns.

Create Pathway from Jackson to Kelly via Elk Refuge Old Road

The National Elk Refuge is not within park jurisdiction.

Create New Pathway along Southern Portion of the Moose-Wilson Road, along the Snake River Levee

Early in the alternative development phase of this Final Plan/EIS, the Park considered alternative alignments for a separated multi-use pathway through the southern portion of the Moose-Wilson Road corridor. One such alignment followed the Snake River levee and levee access roads along the west back of the Snake River between the Park's south boundary and the LSR Preserve fish pond access road. This alternative would have required paving and use of dirt and gravel roads currently open to pedestrian, horse, and emergency vehicle travel only, and a new connecting pathway through undisturbed vegetation between the Park's Granite Canyon Entrance Station and the Snake River levee.

This area of the Park currently supports a diverse array of coniferous forest, cottonwood, aspen, sagebrush, and riparian wetlands, which support an equally diverse and abundant wildlife resource. Elk, deer, moose, bear, coyote, pine marten, river otter, great blue herons, bald eagles, and many species of smaller mammals, raptors, owls, waterfowl, and passerine birds use this area for foraging, breeding, denning, and nesting. Grizzly bears, wolves, and Canada lynx are likely to use the area occasionally as a travel corridor as well. Because this area is currently undeveloped and receives low levels of human use, it provides an important block of contiguous, high quality, and relatively secure habitat. It has added importance to wildlife as an interface and travel corridor between the Snake River

riparian corridor and floodplain forest with adjacent upland habitats, and as a riparian travel corridor parallel to the Snake River. This side of the Snake River corridor has added importance to wildlife because the opposite side, which is outside the Park, has a large number of residential units.

An analysis of predicted impacts of this action revealed substantial levels of direct and indirect habitat loss, habitat fragmentation, and loss of habitat security. Direct habitat loss from construction of the pathway from the Granite Canyon Entrance Station to the levee emergency access road would total 1.7 acres (0.7 ha). Along the entire route, indirect habitat loss from the pathway's zone of influence for smaller, less sensitive species (75 m [246 ft] buffer) would total about 200 acres (81 ha), while indirect habitat loss in the larger 400 m (1312 ft) buffer would total about 800 acres. Additional off-trail use expected from pathway access use would increase these totals, perhaps significantly. Over the long-term, these changes would adversely impact many wildlife species, including all four ESA-listed species that occur in the Park (bald eagle, grizzly bear, Canada lynx, and gray wolf), severely fragmenting a high quality and relatively secure block of habitat in the Park.

The Organic Act, NPS Management Policies, National Parks Omnibus Management Act, ESA, Migratory Bird Protection Act, NPS Director's Orders, and other federal policy guidance provide strong and clear direction for preserving and protecting natural resources in national parks. Based on the above considerations, the level of impacts associated with this alternative was determined to be unacceptable; hence, this alternative was dropped from further consideration.

Create New Pathway along Old Wagon Road between Jackson Lake Lodge and Colter Bay

Similarly, early on in the planning process the use of the Old Wagon Road between Jackson Lake Lodge and Colter Bay was considered as a possible alignment for a pathway. Like the Moose-Wilson corridor, this area includes a mix of coniferous and deciduous forest and large areas of riparian wetlands. Its value as wildlife habitat is very high and grizzly bears, as well as moose, deer, elk, and cougars, increasingly use it. Although it receives a limited amount of human use through concessioner operated wagon and horseback rides, the NPS does not consider it appropriate to encourage additional use of the area, which would result in similar direct and indirect loss of habitat, habitat fragmentation, and loss of habitat security, as described for the Moose-Wilson corridor. In addition, although bear



attacks of humans on horseback are exceedingly rare, human safety issues associated with the use of bicycles in grizzly bear occupied habitat are a concern, as described in Chapter 4.

Other

Some alternatives that were developed and initially considered were also eliminated from the final alternatives evaluated in this Final Plan/EIS. These included a comprehensive system of transit, certain pathway segments, intelligent transportation systems, and other transportation-related infrastructure. As the planning effort progressed, it became apparent that these original alternatives would be operationally and financially infeasible to implement and would result in unacceptable impacts to park resources. In addition, the scope of the initial alternatives was disproportionate to the types of transportation-related issues that exist in the Park and were of a magnitude that would be inappropriate to address outside of a future long-term planning effort. While retaining some of the elements of the initial alternatives, the alternatives in this document reflect focused and achievable actions that could be accomplished over the next 5 to 10 years.

Comparison of Alternatives

The following three tables provide a side-by-side summary comparison of the five alternatives. Table 3 provides a matrix that compares the alternatives element by element. Table 4 contains a cost comparison of the alternatives. Table 5 provides a summary of how well each alternative meets the objectives described in Chapter 1. Table 6 provides a comparative summary of impacts analyzed in Chapter 4.



TABLE 3 COMPARISON OF ELEMENTS PROPOSED FOR EACH ALTERNATIVE			
Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 3a: Preferred Alternative
Roadways and Parking			
Improve signage for pedestrian and wildlife safety	Improve signage for pedestrian and wildlife safety	Improve signage for pedestrian and wildlife safety	Improve signage for pedestrian and wildlife safety
Construct separate entrance lanes for employees	Construct separate entrance lanes for employees	Construct separate entrance lanes for employees	Construct separate entrance lanes for employees
Implementation of an AMP on the Moose-Wilson Road	Implementation of an AMP on the Moose-Wilson Road	Implementation of an AMP on the Moose-Wilson Road	Implementation of an AMP on the Moose-Wilson Road
Parking lot reconfiguration	Parking lot reconfiguration	Parking lot reconfiguration	Parking lot reconfiguration
—	Limit traffic on Signal Mountain Road to increase bicycle and pedestrian access	—	—
—	Provide enhanced information about parking, safety, etc.	Provide enhanced information about parking, safety, etc.	Provide enhanced information about parking, safety, etc.
—	—	Install safety signal at Jackson Lake Dam.	Install safety signal at Jackson Lake Dam.
—	—	Realignment of the Moose-Wilson Road	Realignment of the Moose-Wilson Road
Transit Services and Facilities			
Development of a TBP	Development of a TBP and possible pilot transit implementation	Development of a TBP and possible pilot transit implementation	Development of a TBP and possible pilot transit implementation
—	Provide additional information to visitors about existing transit services	Provide additional information to visitors about existing transit services	Provide additional information to visitors about existing transit services
Multi-use Pathways and Improved Shoulders, Bridges, Culverts and Restoration			
—	Construct improved road shoulders on the Teton Park Road between Moose Junction and Signal Mountain Lodge (a distance of approximately 17.8 miles [28.6 km])	—	—

**TABLE 3
COMPARISON OF ELEMENTS PROPOSED FOR EACH ALTERNATIVE**

Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 3a: Preferred Alternative	Alternative 4: Multi-Use Pathways
—	—	Construct 10-ft wide multi-use pathways outside the road corridor from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km])	Construct 10-ft wide multi-use pathways outside the road corridor from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km])	Construct 10-ft wide multi-use pathways outside the road corridor from the south boundary to Antelope Flats Road (a distance of approximately 9.4 miles [15.0 km])
—	—	Construct 10-ft wide multi-use pathways outside the road corridor from Moose Junction to North Jenny Lake Junction (a distance of approximately 10.6 miles [17.0 km])	Construct 10-ft wide multi-use pathways outside the road corridor from Moose Junction to North Jenny Lake Junction (a distance of approximately 10.6 miles [17.0 km])	Construct 10-ft wide multi-use pathways outside the road corridor from Moose Junction to North Jenny Lake Junction (a distance of approximately 10.6 miles [17.0 km])
—	—	—	Construct 10-ft wide multi-use pathways outside the road corridor from North Jenny Lake Junction west to String Lake (a distance of approximately 1.5 miles [2.4 km]), and from the intersection of the Golf Course Road (Sagebrush Drive) and Gros Ventre Junction west to the Spring Gulch Road and then south to the Park boundary (a distance of approximately 1.0 miles [1.6 km])	—
—	Improve road shoulders between North Jenny Lake Junction and Colter Bay (a distance of approximately 15.5 miles [25.0 km])	—	Construct 10-ft wide multi-use pathways inside the road corridor from North Jenny Lake Junction to Colter Bay (approximately 15.5 miles [25.0 km]). This includes a section between Signal Mountain Lodge and Jackson Lake Dam where an improved road shoulder would be constructed	Construct 10-ft wide multi-use pathways outside the road corridor from North Jenny Lake to Colter Bay (approximately 15.5 miles [25.0 km]), except for a section between Signal Mountain Lodge and Jackson Lake Dam where an improved road shoulder would be constructed



<p style="text-align: center;">TABLE 3 COMPARISON OF ELEMENTS PROPOSED FOR EACH ALTERNATIVE</p>				
<p style="text-align: center;">Alternative 1: No Action</p>	<p style="text-align: center;">Alternative 2: Improved Road Shoulders</p>	<p style="text-align: center;">Alternative 3: Improved Shoulders / Multi-Use Pathways</p>	<p style="text-align: center;">Alternative 3a: Preferred Alternative</p>	<p style="text-align: center;">Alternative 4: Multi-Use Pathways</p>
—	—	Construct 10-ft wide multi-use pathways outside the road corridor from the Granite Canyon Entrance Station to the LSR Preserve (a distance of approximately 3.3 miles [5.3 km])	Construct 10-ft wide multi-use pathways inside the road corridor from the Granite Canyon Entrance Station to the LSR Preserve (a distance of approximately 3.3 miles [5.3 km])	Construct 10-ft wide multi-use pathways outside the road corridor from the Granite Canyon Entrance Station to Moose (a distance of approximately 7.1 miles [11.4 km])
Developed Areas				
—	Install kiosks, bicycle racks, trash cans, way-finding signs, and vault toilet. Kiosks would be added at South Jenny Lake, Signal Mountain, Jackson Lake Lodge, and Colter Bay	Install kiosks, bicycle racks, trash cans, way-finding signs, and vault toilet. Kiosks would be added at South Jenny Lake, Signal Mountain, Jackson Lake Lodge, and Colter Bay. Additional work to social trails and way finding	Install kiosks, bicycle racks, trash cans, way-finding signs, and vault toilet. Kiosks would be added at South Jenny Lake, Signal Mountain, Jackson Lake Lodge, and Colter Bay. Additional work to social trails and way finding	Install kiosks, bicycle racks, trash cans, way-finding signs, and vault toilet. Kiosks would be added at South Jenny Lake, Signal Mountain, Jackson Lake Lodge, and Colter Bay. Additional work to social trails and way finding
Traveler Information				
Install two variable messaging signs	Install six variable messaging signs, along with providing additional types of information	Install six variable messaging signs, along with providing additional types of information	Install six variable messaging signs, along with providing additional types of information	Install six variable messaging signs, along with providing additional types of information

TABLE 4 COMPARISON OF COSTS ASSOCIATED WITH EACH ALTERNATIVE				
Alternative Components	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Roadways and Parking				
Improve signage for pedestrian and wildlife safety	\$9,000	\$9,000	\$9,000	\$9,000
Construct separate entrance lanes for employees	\$140,000	\$140,000	\$140,000	\$140,000
Realignment and restoration of the Moose-Wilson Road	—	—	\$2,285,000	\$2,285,000
Transit Services and Facilities				
Development of a transit business plan (on-going)	\$100,000	\$100,000	\$100,000	\$100,000
Capital costs for pilot transit within the Park	—	TBD	TBD	TBD
Capital costs for shuttle concession	—	TBD	TBD	TBD
Capital costs for infrastructure supporting transit	—	TBD	TBD	TBD
Multi-use Pathways and Improved Shoulders, Bridges, Culverts & Restoration				
Wildlife impacts monitoring for post phase 1 multi-use pathway construction *	—	—	\$700,000	\$700,000
Improve shoulders (4.5-ft travel lane with 6 inches for striping) to accommodate bicyclists from Moose Junction to Signal Mountain Lodge	—	\$12,235,000	—	—
South Boundary to North Jenny Lake Junction				
Construct 10-ft wide separate multi-use pathways from the south boundary of the Park to Moose Junction	—	—	\$6,879,000	\$6,879,000
Construct 10-ft wide separate multi-use pathways from Gros Ventre Junction west to Spring Gulch Road and then south to the Park boundary	—	—	—	\$634,000
Construct 10-ft wide separate multi-use pathways from Moose Junction to Antelope Flats Road, including segment to Dorman's	—	—	\$941,000	\$941,000



TABLE 4 COMPARISON OF COSTS ASSOCIATED WITH EACH ALTERNATIVE					
Alternative Components	Alternative 1	Alternative 2	Alternative 3	Alternative 3a	Alternative 4
Construct 10-ft wide separate multi-use pathways from Dornan's Junction to South Jenny Lake Junction	—	—	\$5,697,000	\$5,697,000	\$5,697,000
Construct 10-ft wide separate multi-use pathways from South Jenny Lake Junction to North Jenny Lake Junction	—	—	\$1,936,000	\$1,936,000	\$1,936,000
Construct 10-ft wide separate multi-use pathways from North Jenny Lake Junction to String Lake	—	—	—	\$968,000	—
North Jenny Lake Junction to Colter Bay					
Improve shoulders (4.5-ft travel lane with 6 inches for striping) to accommodate bicyclists from North Jenny Lake to Colter Bay	—	—	\$10,654,000	—	—
Construct 10-ft wide separate multi-use pathways North Jenny Lake to Colter Bay	—	—	—	—	\$19,529,000
Construct 10-ft wide separate multi-use pathways within corridor North Jenny Lake to Colter Bay	—	—	—	—	—
Signal for safety crossing at Jackson Lake Dam/Bridge	—	—	\$56,000	\$56,000	\$56,000
Moose-Wilson Road					
Construct 10-ft wide separate multi-use pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to the north end of unpaved section; then follow the levee access road to the new LSR Preserve	—	—	\$4,557,000	\$4,557,000	—
Construct 10-ft wide separate multi-use pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to the Teton Park Road	—	—	—	—	\$8,928,000
Developed Areas					
Install kiosks, bicycle racks, trash cans, way-finding signs, vault toilet(s)	—	\$138,000	\$252,000	\$252,000	\$252,000

TABLE 4 COMPARISON OF COSTS ASSOCIATED WITH EACH ALTERNATIVE					
Alternative Components	Alternative 1	Alternative 2	Alternative 3	Alternative 3a	Alternative 4
Traveler Information					
Install variable messaging signs (\$56,000 per sign)	\$ 112,000	\$336,000	\$ 336,000	\$336,000	\$336,000
Total Capital Cost	\$361,000	\$12,958,000	\$34,542,000	\$45,019,000	\$47,788,000
Annual Maintenance and Operations					
Annual maintenance and operations - Pathways/Shoulders**	\$0	\$63,000	\$417,000	\$558,000	\$558,000
Total Annual Maintenance and Operation	\$0	\$63,000	\$417,000	\$558,000	\$558,000
<i>Notes: Draft EIS cost estimates were based on 2005 prices. Final EIS costs reflect 2008 prices. Add 4% inflation each year beyond 2008. *Capital cost for post construction wildlife monitoring will be \$500,000-\$900,000; an average of \$700,000 was used for purposes of this estimate. **Does not reflect future wildlife monitoring following the first 3 years of initial monitoring; on average, an estimation of \$100,000/yr is predicted.</i>					



TABLE 5 EXTENT THAT EACH ALTERNATIVE MEETS IDENTIFIED OBJECTIVES					
OBJECTIVE	Does Alternative 1, No Action, meet objective?	Does Alternative 2, Improved Road Shoulders, meet objective?	Does Alternative 3, Improved Shoulders / Multi-Use Pathways, meet objective?	Does Alternative 3a, Preferred Alternative, meet objective?	Does Alternative 4, Multi-Use Pathways, meet objective?
Provide improved opportunities for visitors to safely enjoy the Park by providing additional travel/recreational options, both motorized and non motorized.	Partially meets; 1) Includes AMP on the Moose Wilson Road and TBP, which may present future opportunities to visitors.	Partially meets; 1) Includes AMP on the Moose-Wilson Road and TBP, which may present future opportunities to visitors. 2) Provides improved road shoulders to support bicycle use. 3) Provides for periodic non-motorized use on Signal Mountain Road. 4) Provides additional information to inform visitors of travel options.	Meets objective to a large degree; 1) Includes AMP on the Moose-Wilson Road and TBP. 2) Provides multi-use pathways and improved shoulders that support additional travel/recreational options. 3) Provides additional information to inform visitors of travel options	Meets objective to a large degree; 1) Includes AMP on the Moose-Wilson Road and TBP. 2) Provides more multi-use pathways and improved shoulders than Alternative 3 to support additional travel/recreational options. 3) Provides additional information to inform visitors of travel options.	Meets objective to the greatest extent of any alternative. 1) Includes AMP on the Moose-Wilson Road and TBP. 2) Provides more pathways than Alternatives 3 or 3a. 3) Provides additional information to inform visitors of travel options.
Reduce and manage the level of traffic and parking congestion at key locations.	Partially meets; 1) Several of the elements common to all alternatives address this objective (e.g., parking lot reconfiguration, separate entrance lanes, additional trip planning information to reduce congestion in key areas, and two variable-messaging signs), including the AMP on the Moose-Wilson Road and TBP, which will help manage the level of traffic and parking congestion in key areas in the future.	Partially meets; 1) Several of the elements common to all alternatives described for Alternative 1 would help meet this objective. 2) Additional information would be provided to visitors on parking and existing transit services, including four additional variable messaging signs (six total).	Meets objective to a greater degree than Alternative 2; 1) The components described for Alternative 2 apply to this alternative as well and would help meet this objective. 2) Additional improvements would be made to way finding aids and social trails to help alleviate periodic congestion in popular areas. 3) Multi-use pathways and improved road shoulders would promote more non-motorized traffic, although this would not substantially reduce road congestion and parking needs.	Meets objective to a same degree as Alternative 3; 1) The components described for Alternative 3 apply to this alternative as well and would help meet this objective. 2) More miles of pathways are proposed in this alternative than in Alternative 3, although this would not substantially reduce road congestion and parking needs.	Meets objective to same degree as Alternative 3. 1) Components described for Alternative 3 apply to this alternative as well and would help meet this objective. 2) Provides more pathways than Alternatives 3 and 3a, although this would not substantially reduce road congestion and parking needs.

**TABLE 5
EXTENT THAT EACH ALTERNATIVE MEETS IDENTIFIED OBJECTIVES**

OBJECTIVE	Does Alternative 1, No Action, meet objective?	Does Alternative 2, Improved Road Shoulders, meet objective?	Does Alternative 3, Improved Shoulders / Multi-Use Pathways, meet objective?	Does Alternative 3a, Preferred Alternative, meet objective?	Does Alternative 4, Multi-Use Pathways, meet objective?
Reduce and minimize adverse impacts to park resources attributable to human use.	Partially meets; 1) Some of the elements common to all alternatives address this objective, including parking lot reconfiguration and the AMP on the Moose-Wilson Road and TBP, which will help minimize impacts to park resources attributable to human use in the future.	Partially meets; 1) Specific components of the elements common to all alternatives that are described for Alternative 1 would help meet this objective. 2) Some improvements would be made to way-finding that would help reduce social trails and unnecessary vehicle trips.	Meets objective; 1) Specific components of the elements common to all alternatives that are described for Alternative 1 would help meet this objective. 2) Some improvements would be made to way-finding that would help reduce social trails and unnecessary vehicle trips. 3) Improvements in information systems may reduce resource impacts.	Partially meets objective; 1) The improvements described for Alternative 3 would help meet this objective. 2) Construction of pathways (rather than improved shoulders) from North Jenny Lake Junction to Colter Bay would create more adverse impacts to sensitive park resources.	Partially meets objective; 1) The improvements described for Alternative 3 would help meet this objective. 2) Construction of pathways along the Moose-Wilson Road and North Jenny Lake Junction to Colter Bay would create more adverse impacts to sensitive park resources.
Enhance cooperation between park and gateway communities to achieve complementary transportation goals.	Does not meet; 1) The TBP would be developed under this alternative but no action on transit would be taken; 2) There are no specific plans for additional bicycle pathways or improved shoulders to connect with those outside the Park.	Partially meets; 1) The TBP would be developed and could result in implementation of a pilot transit program in the future; 2) Limited improved shoulders would enhance the opportunity for bicyclists to continue biking in the Park, but there are no specific plans for additional bicycle pathways.	Meets objective; 1) The TBP would be developed and could result in implementation of a pilot transit program in the future; 2) Multi-use pathways and improved shoulders would enhance the opportunity for bicyclists to continue biking in the Park by providing connectivity with pathways outside the Park.	Meets objective; 1) The TBP would be developed and could result in implementation of a pilot transit program in the future; 2) Multi-use pathways inside and outside the road corridor would enhance the opportunity for bicyclists to continue biking in the Park by providing connectivity with pathways outside the Park.	Meets objective; 1) The TBP would be developed and could result in implementation of a pilot transit program in the future; 2) Multi-use pathways outside the road corridor would enhance the opportunity for bicyclists to continue biking in the Park by providing connectivity with pathways outside the Park.

**TABLE 6
COMPARATIVE SUMMARY OF IMPACTS**

Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 3a: Preferred Alternative	Alternative 4: Multi-Use Pathways
Visual and Scenic Quality				
<p>Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts on visual quality.</p> <p>Cumulative impacts would generally be long-term, negligible to minor, and adverse, with short-term, moderate, adverse impacts during routine maintenance and construction.</p>	<p>Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts on visual quality, with short-term, localized, moderate, adverse impacts during construction of improved shoulders.</p> <p>Cumulative impacts would generally be long-term, negligible to minor, and adverse, with short-term, moderate, adverse impacts occurring during periods of construction.</p>	<p>Alternative 3 would result in long-term, localized, minor to moderate, adverse impacts on visual quality, primarily because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. Short-term, localized, moderate, adverse impacts would result during realignment and construction of improved shoulders and pathways.</p> <p>Cumulative impacts would be long term, minor to moderate, and adverse, with short-term, moderate, adverse impacts during periods of construction.</p>	<p>Alternative 3a would result in long-term, localized, moderate, adverse impacts on visual quality, largely because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. Short-term, localized, moderate, adverse impacts would result during construction.</p> <p>Cumulative impacts would be long term, minor to moderate, and adverse, with short-term, moderate adverse impacts from construction activities.</p>	<p>Alternative 4 would result in long-term, localized, moderate, adverse impacts on visual quality, largely because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. Short-term, localized, moderate, adverse impacts would result during construction.</p> <p>Cumulative impacts would be long term, minor to moderate, and adverse, with short-term, moderate, adverse impacts from construction activities.</p>
Soils				
<p>Alternative 1 would result in short- and long-term, localized, negligible to minor, adverse impacts from entrance lane construction, sign installation and routine maintenance and construction and from the continued use of social trails.</p> <p>Cumulative impacts would be long-term, negligible to minor, and adverse.</p>	<p>Alternative 2 would result in short- and long-term, localized, minor, adverse impacts from entrance lane construction, sign installation, and construction of shoulders along a portion of the Teton Park Road and from continued use of social trails.</p> <p>Cumulative impacts would be long-term, negligible to minor, and adverse.</p>	<p>Alternative 3 would result in short- and long-term, localized, adverse impacts to soils, as well as long-term, localized, negligible, beneficial impacts to soils, primarily because of the construction and eventual use of a multi-use pathway system and improved road shoulders, plus the improvements and delineation of social trails. Short-term, localized, minor, adverse impacts would occur at locations of construction projects.</p> <p>Cumulative impacts would be long term, minor to moderate, and adverse.</p>	<p>Alternative 3a would result in short- and long-term, localized, moderate, adverse impacts to soils, as well as long-term, localized, negligible, beneficial impacts to soils, primarily because of the construction and eventual use of a multi-use pathways system, plus the improvements to and delineation of social trails. Short-term, localized, minor, adverse impacts would occur at locations of construction projects.</p> <p>Cumulative impacts would be long term, minor to moderate, and adverse.</p>	<p>Alternative 4 would result in long-term, localized, moderate, adverse impacts to soils, as well as long-term, localized, negligible, beneficial impacts to soils, primarily because of the construction and eventual use of a multi-use pathways system, plus the improvements to and delineation of social trails. Short-term, localized, minor, adverse impacts would occur at locations of construction projects.</p> <p>Cumulative impacts would be long term, minor to moderate, and adverse.</p>



**TABLE 6
COMPARATIVE SUMMARY OF IMPACTS**

Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 3a: Preferred Alternative	Alternative 4: Multi-Use Pathways
Vegetation				
<p>Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts from the degradation of native vegetation in and near areas with concentrated human use and areas of social trails. No (or negligible) effects to plant species of special concern are expected to result from implementation of Alternative 1. Cumulative impacts to vegetation would be long-term, minor, and adverse.</p>	<p>Alternative 2 would result in the permanent removal of approximately 13.3 acres (5.4 ha) of vegetation. Actions under Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts to vegetation due to continued use of social trails and direct impacts from construction of shoulders along a portion of the Teton Park Road, with short- and long-term, localized, minor, adverse impacts associated with construction. No (or negligible) effects to plant species of special concern are expected to result from implementation of Alternative 2. Cumulative impacts to vegetation would be long-term, minor, and adverse.</p>	<p>Alternative 3 would result in the permanent removal of approximately 63.8 acres (25.8 ha) of vegetation including between 5,200 and 7,100 trees. This Alternative would result in long-term, localized, moderate, adverse impacts on vegetation and long-term, localized, negligible, beneficial impacts to vegetation. In the short-term, localized, moderate, adverse impacts would occur where construction disturbs vegetation, including the realignment of two sections of the Moose-Wilson Road. With proper and successful regeneration, the long-term, adverse impacts in construction areas would be negligible to minor. No (or negligible) effects to plant species of special concern are expected to result from implementation of Alternative 3. Cumulative impacts would be long-term, minor to moderate, and adverse.</p>	<p>Alternative 3a would result in the permanent removal of approximately 82.9 acres (33.5 ha) of vegetation including between 17,900 and 23,075 trees. This alternative would result in long-term, localized, moderate, adverse impacts on vegetation and long-term, localized, negligible, beneficial impacts to vegetation. In the short-term, localized, moderate, adverse impacts would occur where construction disturbs vegetation, including the realignment of two sections of the Moose-Wilson Road. With proper and successful regeneration, the long-term, adverse impacts in construction areas would be negligible to minor. No (or negligible) effects to plant species of special concern are expected to result from implementation of Alternative 3a. Cumulative impacts would be long-term, minor to moderate, and adverse.</p>	<p>Alternative 4 would result in the permanent removal of approximately 85.1 acres (34.4 ha) of vegetation including between 29,950 and 33,775 trees. This alternative would result in long-term, localized, moderate, adverse impacts on vegetation and long-term, localized, negligible, beneficial impacts to vegetation. In the short-term, localized, moderate, adverse impacts would occur where construction disturbs vegetation, including the realignment of two sections of the Moose-Wilson Road. With proper and successful regeneration, the long-term, adverse impacts in construction areas would be negligible to minor. No (or negligible) effects to plant species of special concern are expected to result from implementation of Alternative 4. Cumulative impacts would be long-term, minor to moderate, and adverse.</p>
Hydrology and Water Quality				
<p>Alternative 1 would result in long-term, localized, negligible, adverse impacts on water quality and hydrology, resulting from continued road maintenance activities and construction of separate entrance lanes. Cumulative impacts would be long-term, negligible, and adverse.</p>	<p>Alternative 2 would result in long-term, localized, negligible, adverse impacts on water quality. Impacts associated with construction activities would be short-term, localized, negligible to minor, and adverse, with appropriate mitigation.</p>	<p>Alternative 3 would result in long-term, localized, minor, adverse impacts on water quality. Long-term, localized, minor, beneficial impacts would result from the paving and stabilization of social trails. Impacts associated</p>	<p>Alternative 3a would result in long-term, localized, minor, adverse impacts on water quality. Long-term, localized, minor, beneficial impacts would result from the paving and stabilization of social trails. Impacts associated</p>	<p>Alternative 4 would result in long-term, localized, minor to moderate, adverse impacts on water quality. Long-term, localized, minor, beneficial impacts would result from the paving and stabilization of social trails. Impacts associated with construction activities would</p>



TABLE 6 COMPARATIVE SUMMARY OF IMPACTS				
Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 3a: Preferred Alternative	Alternative 4: Multi-Use Pathways
Alternative 1 would result in long-term, localized, negligible, adverse impacts to wetlands in the Park, with no new or measurable net wetland losses. Cumulative impacts would be long-term, negligible to minor, and adverse.	Cumulative impacts would be long-term, negligible, and adverse.	with construction activities would be short term, localized, minor, and adverse, with appropriate mitigation. Cumulative impacts would be long-term, negligible, and adverse.	with construction activities would be short term, localized, minor, and adverse, with appropriate mitigation. Cumulative impacts would be long term, negligible, and adverse	be short term, localized, minor, and adverse, with appropriate mitigation. Cumulative impacts would be long term, negligible, and adverse.
Wetlands				
Alternative 1 would result in long-term, localized, negligible, adverse impacts to wetlands in the Park, with no new or measurable net wetland losses. Cumulative impacts would be long-term, negligible to minor, and adverse.	Alternative 2 would potentially result in long-term, localized, negligible to minor, adverse impacts to wetlands in the Park. Approximately 0.02 acre (0.008 ha) of wetlands would be impacted under this alternative. Cumulative impacts to wetlands would be long-term, negligible to minor, and adverse.	Alternative 3 would potentially result in long-term, localized, minor, adverse impacts on wetlands in the Park, mainly in the vicinity of Cottonwood Creek and Willow Flats, with long-term, localized, negligible, beneficial impacts due to improving social trails and long term, localized, minor to moderate, beneficial impacts from realignment of the Moose-Wilson Road. Approximately 1.40 acres (0.57 ha) of wetlands would be impacted under this alternative. Cumulative impacts would be long-term, negligible to minor, and adverse.	Alternative 3a would potentially result in long-term, localized, minor to moderate, adverse impacts on wetlands in the vicinity of Park, mainly in the vicinity of Cottonwood Creek and Willow Flats, with long-term, localized, negligible, beneficial impacts due to improving social trails and long-term, localized, minor to moderate, beneficial impacts from realignment of the Moose-Wilson Road. Approximately 3.85 acres (1.56 ha) of wetlands would be impacted under this alternative. Cumulative impacts would be long-term, negligible to minor, and adverse.	Alternative 4 would potentially result in long-term, localized, minor to moderate, adverse impacts to wetlands in the Park, mainly in the vicinity of Cottonwood Creek and the area from Jackson Lake Dam to Jackson Lake Junction, with long-term, localized, negligible, beneficial impacts due to improving social trails and long-term, localized, minor to moderate, beneficial impacts from realignment of the Moose-Wilson Road. Approximately 4.26 acres (1.72 ha) of wetlands would be impacted under this alternative. Cumulative impacts would be long-term, negligible to minor, and adverse.
Threatened, Endangered, and Species of Special Concern				
Alternative 1 would have long-term, localized, minor impacts to the bald eagle, Canada lynx, or yellow-billed cuckoo resulting in a formal determination of "May affect." Alternative 1 would also have long-term, localized moderate impacts to grizzly bears and gray wolf, resulting in a formal determination of "likely	Alternative 2 would have long-term, localized, minor impacts to the bald eagle, Canada lynx, or yellow-billed cuckoo resulting in a formal determination of "May affect." Alternative 2 would also have long-term, localized moderate impacts to grizzly bears and gray wolf, resulting in a formal determination of "likely	Alternative 3 would have long-term, localized, minor impacts to the bald eagle, Canada lynx, or yellow-billed cuckoo resulting in a formal determination of "May affect." Alternative 3 would also have long-term, localized moderate impacts to grizzly bears and gray wolf, resulting in a formal determination of "likely	Alternative 3a would have long-term, localized, minor impacts to the bald eagle, Canada lynx, or yellow-billed cuckoo resulting in a formal determination of "May affect." Alternative 3a would also have long-term, localized moderate impacts to grizzly bears and gray wolf, resulting in a formal determination of "likely	Alternative 4 would have long-term, localized, minor impacts to the bald eagle, Canada lynx, or yellow-billed cuckoo resulting in a formal determination of "May affect." Alternative 4 would also have long-term, localized moderate impacts to grizzly bears and gray wolf, resulting in a formal determination of "likely to

**TABLE 6
COMPARATIVE SUMMARY OF IMPACTS**

<p>Alternative 1: No Action</p>	<p>Alternative 2: Improved Road Shoulders</p>	<p>Alternative 3: Improved Shoulders / Multi-Use Pathways</p>	<p>Alternative 3a: Preferred Alternative</p>	<p>Alternative 4: Multi-Use Pathways</p>
<p>“likely to adversely affect” because vehicle collisions could occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. Impacts to bird species of special concern and/or neotropical migratory birds from Alternative 1 would be long-term, localized, negligible, and adverse. Cumulative impacts would be long term, negligible, and adverse.</p>	<p>to adversely affect” because vehicle collisions could occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. Impacts to bird species of special concern and/or neotropical migratory birds from Alternative 2 would be long-term, localized, negligible to minor, and adverse. Cumulative impacts would be long term, negligible, and adverse.</p>	<p>to adversely affect” because vehicle collisions could occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. Impacts to bird species of special concern and/or neotropical migratory birds from Alternative 3 would be long-term, localized, minor, and adverse. Cumulative impacts would be long term, minor, and adverse.</p>	<p>to adversely affect” because vehicle collisions could occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. Impacts to bird species of special concern and/or neotropical migratory birds from Alternative 3a would be long-term, localized, minor, and adverse. Cumulative impacts would be long term, minor, and adverse.</p>	<p>adversely affect” because vehicle collisions could occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. Impacts to bird species of special concern and/or neotropical migratory birds, from Alternative 4 would be long-term, localized, minor, and adverse. Cumulative impacts would be long term, minor, and adverse.</p>
<p>General Wildlife</p>				
<p>Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts to mammals, reptiles, and amphibians from continued use of park roads and trails due to displacement from and/or avoidance of habitats adjacent to existing roads. Direct mortality levels are not expected to increase under this alternative, but it is likely that vehicles using park roads would continue to strike and kill individual mammals. Cumulative impacts would be long term, minor to moderate, and adverse, with Alternative 1 adding a negligible amount to overall cumulative impacts.</p>	<p>Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts to mammals, reptiles, and amphibians from continued use of park roads and construction of shoulder widening. Direct mortality levels are not expected to increase under this alternative, but it is likely that vehicles using park roads would continue to strike and kill individual mammals. Effects to local species distributions and habitat use patterns are likely, but to a lesser degree than in Alternatives 3, 3a, or 4. Cumulative impacts would be long term, minor to moderate, and adverse, with Alternative 2 adding little to overall cumulative impacts.</p>	<p>Alternative 3 would have an intermediate level of adverse impacts on wildlife among the action alternatives considered. Although Alternative 3 is not expected to have adverse population level impacts on mammals, reptiles, and amphibians, there would be long-term, localized, negligible to minor, adverse effects. Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Effects to local species distributions and habitat use patterns are likely and would be long term, localized, negligible to moderate, and adverse. Cumulative impacts to general wildlife under this alternative would be long term, minor to moderate, and adverse.</p>	<p>Alternative 3a would have a higher level of adverse impacts on wildlife than Alternatives 1, 2, and 3. Although direct impacts to habitat for mammals, reptiles, and amphibians would be relatively small, the increased disturbance (both spatially and in terms of recreation use levels) would further fragment habitats and erode habitat effectiveness. Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Effects to local species distributions and habitat use patterns are likely and would be long term, localized, negligible to moderate, and adverse. Cumulative impacts to wildlife under this alternative would be long term, minor to moderate, and adverse.</p>	<p>Alternative 4 would have the highest level of adverse impacts on wildlife of the alternatives considered. Although direct habitat impacts on mammals, reptiles, and amphibians would be relatively small, the increased disturbance (both spatially and in terms of recreation use levels) would further fragment habitats and erode habitat effectiveness. Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Effects to local species distributions and habitat use patterns are likely and would be long term, localized, negligible to moderate, and adverse. Cumulative impacts to wildlife under this alternative would be long term, minor to moderate, and adverse.</p>



TABLE 6 COMPARATIVE SUMMARY OF IMPACTS			
Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 4: Multi-Use Pathways
Archeological Resources			
Alternative 1 would result in potentially long-term, localized, negligible to minor, adverse impacts on known archeological sites. Because many areas have either not been surveyed or have not been surveyed in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, fieldwork, and consultation with the SHPO and Native American tribal governments will be needed to determine whether sites are eligible for listing in the NRHP. Cumulative impacts would be long-term, negligible to minor, and adverse.	Alternative 2 would result in potentially long-term, localized, negligible to minor, adverse impacts on known archeological sites. Because many areas have either not been surveyed or have not been surveyed in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, fieldwork, and consultation with the SHPO and Native American tribal governments will be needed to determine whether sites are eligible for listing in the NRHP. Cumulative impacts would be long-term, negligible to minor, and adverse.	Alternative 3 would result in potentially long-term, localized, negligible to minor, adverse impacts on known archeological sites. Because many areas where resources are known to exist have either not been surveyed or have not been surveyed in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, fieldwork and consultation with the SHPO and Native American tribal governments would be needed to determine whether these sites are eligible for listing in the NRHP. Cumulative impacts would be long term, negligible to minor, and adverse.	Alternative 4 would result in potentially long-term, localized, negligible to minor, adverse impacts on known archeological sites. Because many areas where resources are known to exist have either not been surveyed or have not been surveyed in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, additional research, fieldwork and consultation with the SHPO and Native American tribal governments would be needed to determine whether these sites are eligible for listing in the NRHP. Cumulative impacts would be long term, negligible to minor, and adverse.
Transportation System and Traffic			
Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts on roadways within the Park. On the Moose-Wilson Road, impacts would be long-term, localized, minor to moderate, and beneficial. Long-term, localized, minor, adverse impacts would be expected at parking areas throughout the Park. Cumulative impacts would be long term, minor, and adverse.	Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts on roadways within the Park, with short-term, localized, negligible to minor, adverse impacts resulting from construction of improved shoulders on the Teton Park Road. Improvements in the dissemination of information to Park visitors would result in long-term, localized, minor, beneficial impacts. Long-term, regional, minor, beneficial impacts would	Alternative 3 would result in both beneficial and adverse impacts to the transportation system and traffic. If implemented, the transit system would have long-term, regional, negligible to minor, and beneficial impacts on traffic and park roadways and the management strategies employed on the Moose-Wilson Road would result in long-term, localized, moderate, beneficial impacts. Long-term, localized, minor, adverse impacts would	Alternative 4 would result in both beneficial and adverse impacts to the transportation system and traffic. If implemented, the transit system would have long-term, regional, negligible to minor, and beneficial impacts on traffic and park roadways and the management strategies employed on the Moose-Wilson Road would result in long-term, localized, moderate, beneficial impacts. Long-term, localized, minor, adverse impacts would continue to affect some parking areas and

**TABLE 6
COMPARATIVE SUMMARY OF IMPACTS**

Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 3a: Preferred Alternative	Alternative 4: Multi-Use Pathways
<p>Alternative 1 would result in short- and long-term, localized and regional, minor to moderate, beneficial and adverse impacts on visitor and employee use and experience.</p> <p>Cumulative impacts would include long-term, negligible to minor, adverse cumulative impacts to employee commuting time; long-term, negligible, beneficial cumulative impacts on employee mobility choices; and long term, moderate, beneficial cumulative impacts on visitor use and experience.</p>	<p>Alternative 2 would result in long-term, localized and regional, minor to moderate, beneficial impacts, and short-term, localized, negligible to moderate, adverse impacts on visitor and employee use and experience.</p> <p>Cumulative impacts would include long-term, negligible to minor, and both beneficial and adverse.</p>	<p>Alternative 3 would result in long-term, localized and regional, minor to major, beneficial impacts associated with the additional pathways and transit, and short- and long-term, localized, negligible to moderate, adverse impacts on visitor and employee use and experience.</p> <p>Cumulative impacts would include long-term, negligible to minor, adverse impacts to employee commuting time; long-term, negligible, beneficial impacts on employee mobility choices; and long-term, moderate, beneficial impacts on visitor use and experience.</p>	<p>Alternative 3a would result in long-term, localized and regional, minor to major, beneficial impacts associated with the additional pathways and transit, and short- and long-term, localized, minor to moderate, adverse impacts on visitor and employee use and experience.</p> <p>Cumulative impacts would include long-term, negligible to minor, adverse impacts to employee commuting time; long-term, negligible, beneficial impacts on employee mobility choices; and long-term, moderate, beneficial impacts on visitor use and experience.</p>	<p>Alternative 4 would result in long-term, localized and regional, minor to major, beneficial impacts associated with the additional pathways and transit, and short- and long-term, localized, minor to moderate, adverse impacts on visitor and employee use and experience.</p> <p>Cumulative impacts would include long-term, negligible to minor, adverse impacts to employee commuting time; long-term, negligible, beneficial impacts on employee mobility choices; and long-term, moderate, beneficial impacts on visitor use and experience.</p>
<p>Visitor and Employee Use and Experience</p>				
<p>Alternative 1 would have a total capital cost of \$361,000 and would result in long-term, regional, negligible, beneficial impacts.</p>	<p>Alternative 2 would have a total capital cost of \$12,958,000 and would result in short- and long-term, regional, negligible to minor, beneficial impacts.</p>	<p>Alternative 3 would have a capital cost of \$34,542,000 and would result in short- and long-term, regional, minor, beneficial impacts.</p>	<p>Alternative 3a would have a capital cost of \$45,019,000 and would result in short- and long-term, regional, minor, beneficial and adverse impacts.</p>	<p>Alternative 4 would have a capital cost of \$47,788,000 and would result in short- and long-term, regional, minor, beneficial and adverse impacts.</p>
<p>Social and Economic Environment</p>				

TABLE 6

COMPARATIVE SUMMARY OF IMPACTS

Alternative 1: No Action	Alternative 2: Improved Road Shoulders	Alternative 3: Improved Shoulders / Multi-Use Pathways	Alternative 3a: Preferred Alternative	Alternative 4: Multi-Use Pathways
<p>Cumulative impacts would be long-term, major, and both beneficial and adverse, with the increment associated with this alternative considered negligible.</p>	<p>Cumulative impacts would be long-term, major, and both beneficial and adverse, with the increment associated with this alternative considered negligible.</p>	<p>Cumulative impacts would be long term, major, and both beneficial and adverse, with the increment associated with this alternative considered negligible.</p>	<p>Cumulative impacts would be long term, major, and both beneficial and adverse, with the increment associated with this alternative considered negligible.</p>	<p>Cumulative impacts would be long term, major, and both beneficial and adverse, with the increment associated with this alternative considered negligible.</p>
Local Communities				
<p>Alternative 1 would result in a long-term, regional, negligible to minor, beneficial impact on collaboration between the Park and its gateway communities. Collaboration would continue at a modest and project specific level.</p> <p>Cumulative impacts on local communities would be long term, negligible to minor, and beneficial.</p>	<p>Alternative 2 would result in long-term, regional, negligible to minor, beneficial impacts on inter-jurisdictional collaboration if a transit system is implemented and short- and long-term, regional, negligible, adverse and beneficial impacts as a result of roadway management on the Signal Mountain and Moose-Wilson Roads.</p> <p>Cumulative impacts would be long term, negligible to minor, and adverse and beneficial.</p>	<p>Alternative 3 would result in long-term, regional, moderate, beneficial impacts on inter-jurisdictional collaboration if a transit system is implemented, and long-term, regional, minor to moderate, beneficial impacts as a result of the pathway system.</p> <p>Cumulative impacts would be long-term, minor to moderate, and beneficial.</p>	<p>Alternative 3a would result in long-term, regional, moderate, beneficial impacts on inter-jurisdictional collaboration if a transit system is implemented, and long-term, regional, minor to moderate, beneficial impacts as a result of the pathway system.</p> <p>Cumulative impacts would be long-term, minor to moderate, and beneficial.</p>	<p>Alternative 4 would result in long-term, regional, moderate, beneficial, impacts on inter-jurisdictional collaboration if a transit system is implemented, and long-term, regional, minor to moderate, beneficial impacts as a result of the pathway system.</p> <p>Cumulative impacts would be long-term, minor to moderate, and beneficial.</p>
Park Operations				
<p>Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts on park operations, if staffing levels do not keep pace with workloads in the future.</p> <p>Cumulative impacts would be long term, minor to moderate, and adverse.</p>	<p>Alternative 2 would result in long term, localized, minor, adverse impacts on park operations, if staffing levels do not keep pace with workloads in the future.</p> <p>Cumulative impacts would be long term, minor to moderate, and adverse.</p>	<p>Alternative 3 would result in long-term, localized, moderate, adverse impacts on park operations due to the increased workload necessary to implement and manage new programs such as multi-use pathways, a transit system (if implemented), and management strategies for the Moose-Wilson Road. Short-term impacts on park operations would also be localized, moderate, and adverse due to the workload involved in planning, design, and construction.</p>	<p>Alternative 3a would result in long-term, localized, moderate, adverse impacts on park operations due to the increased workload necessary to implement and manage new programs such as multi-use pathways, a transit system (if implemented), and management strategies for the Moose-Wilson Road. Short-term impacts on park operations would also be localized, moderate, and adverse due to the workload involved in planning, design, and construction.</p>	<p>Alternative 4 would result in long-term, localized, moderate, adverse impacts on park operations due to the increased workload necessary to implement and manage new programs such as multi-use pathways, a transit system (if implemented), and management strategies for the Moose-Wilson Road. Short-term impacts on park operations would also be localized, moderate, and adverse due to the workload involved in planning, design, and construction.</p>



**TABLE 6
COMPARATIVE SUMMARY OF IMPACTS**

<p>Alternative 1: No Action</p>	<p>Alternative 2: Improved Road Shoulders</p>	<p>Alternative 3: Improved Shoulders / Multi-Use Pathways</p> <p>Cumulative impacts would be long term, moderate, and adverse</p>	<p>Alternative 3a: Preferred Alternative</p> <p>Cumulative impacts would be long term, moderate to major, and adverse.</p>	<p>Alternative 4: Multi-Use Pathways</p> <p>Cumulative impacts would be long term, moderate to major, and adverse.</p>
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CHAPTER 3

Affected Environment

Introduction

This chapter describes the resources and values that Final/Plan EIS alternatives could potentially affect. The NPS selected these resources and values based on public comment and review of environmental statutes, regulations, executive orders, and NPS Management Policies (NPS 2001). Several topics were dismissed in Chapter 1 from further in-depth analysis, including

- Floodplains.
- Wild and scenic rivers.
- Air quality.
- Soundscapes.
- Historic structures and cultural landscapes.
- Ethnographic resources.
- Museum collections.
- American Indian Trust resources.
- Land use.
- Environmental justice.
- Lightscape management.
- Prime and unique agricultural lands.
- Certain threatened and endangered species (whooping crane).
- Certain species of special concern (wolverine, harlequin duck, and trumpeter swan).
- Certain wildlife species (white-tailed deer, bighorn sheep, and fish).
- Energy consumption.
- Wilderness.

Refer to the “Impact Topics Dismissed from Further Analysis” section of Chapter 1 for the specific reasons for dismissal.

The resource descriptions in this chapter are intended to encompass only such information as is necessary to understand the probable effects of the alternatives. Chapter 4, “Environmental Consequences,” describes the potential impacts of the alternatives on each of these resources and values.

Visual and Scenic Quality

The towering granite peaks of the Teton Range are the dominant scenic attribute of Grand Teton National Park. A notable example of fault-block topography is the range’s high alpine environment, which exposes visitors to glacial cirques, glaciers, high angle canyons, tumbling streams, and a series of lakes. Meandering through the valley’s foreground in a southwest direction is the Snake River, which provides a rich riparian habitat for the area’s wildlife. The Snake River terraces are covered with a mix of open sagebrush (*Artemisia* spp.), conifers, and deciduous trees. These scenic resources are among the most spectacular in the western United States and are a primary reason for the region’s popularity as a tourist destination.

Sightseeing, wildlife viewing, and experiencing the wilderness and open space are the most frequently mentioned reasons for visiting the Park (Littlejohn 1998). Ninety-eight percent of visitors reported sightseeing in the Park during their visit; 88 percent reported viewing wildlife; 71 percent took pleasure drives; and 59 percent viewed roadside or interpretive exhibits. The most popular places to visit, as reported in this survey, are South Jenny Lake (72 percent of visitors), Colter Bay (57 percent), and Jackson Lake Lodge (42 percent). Some 96 percent of visitors reported that scenic views were “very or extremely important” to their experience of the Park, while only 57 percent reported the same for recreational activities.

The three types of views within the Park include background, mid-ground, and foreground, as discussed below.

Background Views

These are seen at infinite distance from the viewer. In the Park, high-value background views are long or panoramic views of the Teton Range to the west, and the sagebrush flats to the east.

Mid-ground Views

These focus on elements that occupy the middle of the view plane. Examples of mid-ground views within the Park might be the Snake River valley floor, as seen from U.S. Highway 26/89/191; views of Willow Flats from the Jackson Lake Lodge observation deck; or views of Mormon Row from the Teton Park Road or Antelope Flats Road.



Foreground Views

These are the scenes in closest proximity to the viewer. Examples of foreground views might be the Taggart Corrals along the Teton Park Road; the immediate surroundings of an activity area; or a relatively enclosed setting (e.g., the Moose-Wilson Road), where dense vegetation obscures mid-ground and background views.

The area that would experience impacts encompasses a number of travel routes and destinations that provide exceptional opportunities to view the Park's unique and distinctive scenic resources. For example, the Moose-Wilson Road corridor is known for its natural rural character and potential for viewing wildlife.

Soils

Soils in the Jackson Hole area are a direct result of various cycles of glaciation dating to the Pleistocene era. The glaciers underwent several cycles of advance and retreat in the Park area, directly or indirectly modifying the valley floor terrain and soils, gouging basins (such as the one now occupied by Jackson Lake), and depositing undulating moraines during their recession. As the glaciers retreated, melt-water outwash streams further modified the landscape by transporting glacial debris and redepositing alluvial material.

The project area includes 18 unique soil types based on the Soil Survey of Teton County, Wyoming, Grand Teton National Park (Young 1982). Table 7 provides the characteristics of the most dominant soil types within Grand Teton National Park, while Figure 12 illustrates the locations of these soil types within the Park. Glacial melt-water deposited these generally loamy soils and sustains the Park's dominant vegetative communities. The soils are generally well drained and nearly level to gently sloping.

In contrast to most of the project area where one or two soil types are dominant, the segments between Colter Bay and Jackson Lake Lodge, as well as the segment along the Moose-Wilson Road, represent a mosaic of soil and drainage types. The varied soil conditions support a range of vegetation types, from wetlands to spruce fir forest.

The flat meadows of the valley floor that comprise the bulk of the project area generally comprise Tineman-Bearmouth or Bearmouth gravelly loams or Taglake-Sebud association. These soils developed from the porous quartzite sand and gravel deposited by glacial melt water. Small basins, or kettles, are left in the moraine deposits from glacial outwash material. These glacial outwash soils are generally

very deep and well drained and have less water retention capability than moraine-derived soils. They are generally nutrient-poor and support a fragile sagebrush/grassland community. Vegetation in these areas is easily impacted by use, and revegetation may be difficult after disturbance. Manual methods of reclamation are usually necessary to loosen compacted soil. In these areas, previous vehicular and human uses have eliminated some ground cover.

The Snake River and Cottonwood Creek floodplains consist of more recent alluvial soils, generally from the Tetonville series, which developed when modern streams reworked glacial material. Braided stream channels supporting wetland riparian vegetation (i.e., cottonwood, willows, blue spruce, and sedges [*Carex* spp.]) characterize these areas. Erosion hazard for these soils is minimal.

Soils within the Mormon Row area are composed of two main types: the Youga-Tineman complex on alluvial fans and the Leavitt-Youga complex on stream terraces along the Snake River. Both soils form on nearly level slopes of 0 to 3 percent. The Youga-Tineman soils formed in alluvium at elevations of 6,000 to 7,000 ft (1,828 to 2,133 m) northeast of Blacktail Butte.

The very deep, well-drained Youga soil is composed of silty clay loam, formed in layers approximately 6 inches thick. The Youga soil has a moderate permeability and a high ratio of available water capacity. Surface runoff is slow, and the erosion hazard is slight. The Tineman soils are also very deep and well drained, having formed in alluvium. The surface layer is brown, gravelly loam about 7 inches thick. Permeability is moderate, and the available water capacity is low. Like the Youga soils, surface runoff is slow, and the erosion hazard is slight.



**TABLE 7
DOMINANT SOIL TYPES WITHIN GRAND TETON NATIONAL PARK**

Soil Type	Characteristics
Aquic Cryoborolis-Aquic Cryoboralfs complex	Moderately deep, somewhat poorly drained soils formed on steep soils (30 to 70 percent) in residuum and landslide deposits. In the Park, they are found on the mountainsides east of Lizard Point. It is made up of approximately 50 percent Aquic Cryoborolis, 35 percent Aquic Cryoboralfs, and 15 percent Typic Cryochrepts and Rock outcrop.
Bearmouth gravelly loam	Deep, well-drained gravelly loam soils found in floodplain areas, stream terraces, and fans with slopes ranging from 2 to 8 percent. These soils are formed in alluvium over extremely cobbly or gravelly sand.
Charlos loam	Deep, well drained soils of grayish brown loam at the surface and grayish brown sandy clay loam below. Found throughout the central part of the Grand Teton National Park area.
Cryaquolls-Cryofibrists complex	Nearly level, sandy loam and loam soils in seep areas surrounding springs and old stream oxbows. Boggy or marshy soils exhibiting a deep horizon of organic material.
Greyback-Charlos complex	Very deep, well-drained, nearly level soils found on stream terraces east of Teton Village. Area is approximately 45 percent Greyback gravelly loam and 45 percent Charlos loam.
Grobutte-Thayne Gravelly loams	Deep, well-drained soils composed of approximately 50 percent Grobutte gravelly loam, 20 percent Thayne gravelly loam, 20 percent Greyback gravelly loam, and 10 percent Crow Creek soils and rock outcrop. They are found on south and west facing slopes of mountains and buttes in the southern portions of the Park.
Leavitt-Youga complex	The very deep, well-drained soils are approximately 45 percent Leavitt loam and gravelly loam and 45 percent Youga silty clay loam. They are nearly level soils on alluvial fans and stream terraces.
Sebud complex, 10 to 20 percent slopes	Sloping soils on alluvial fans and foot slopes along the mountain fronts. They are approximately 55 percent Sebud Stony loam, 35 percent Sebud gravelly loam, and 10 percent soil that has more advanced development in the subsoil but otherwise similar to these Sebud soils.
Starman-Owlcan association	Steep and very steep soils on mountainsides of the Teton Range. They are made up of approximately 25 percent Starman very stony loam, 25 percent Owlcan loam, 25 percent Midfork very stony loam, and 25 percent Sheege and Spearhead soils, rock outcrop, and a fine-textured soil associated with shale.
Taglake-Sebud association	Deep, well-drained soils are made up of approximately 75 percent Taglake very stony, sandy loam, 15 percent Sebud stony sandy loam, and 10 percent Walcott soils. These soils are on alluvial fans, till plains, moraines, hills, and mountains.
Tetonia-Lantonia silt loams	Very deep, well-drained, moderately permeable soils on loess-mantled terraces and hills in the southern part of the Park. Area is approximately 45 percent Tetonia silt loam and 45 percent Lantonia silt loam.
Tetonville complex	Deep, poorly drained soils found on flood plains along the Snake River. The soil is made up of 60 percent Tetonville very gravelly sandy loam, 30 percent Tetonville fine sandy loam, and 10 percent Wilsonville and Newfork soils. The soil is subject to occasional brief to long periods of flooding.
Tetonville gravelly loam	Very deep, somewhat poorly drained gravelly loam soil along the Snake River and its tributaries. The soil is subject to occasional brief to long periods of flooding.
Tetonville-Riverwash complex	Nearly level soils and flood plains along the Snake and Gros Ventre Rivers. It is made up of approximately 40 percent Tetonville fine sandy loam, 40 percent Riverwash, and 20 percent Wilsonville and calcareous soils. Seasonal high water table is 1 to 3 ft (0.3 to 0.9 m) during May to July. Surface runoff is slow and erosion hazard is slight.
Tetonville-Wilsonville fine sandy loams	Nearly level soils in old, braided stream channels in flood plains along the Snake River. It is made up of approximately 40 percent Tetonville fine sandy loam, 40 percent Wilsonville fine sandy loam, and 20 percent Tetonville very gravelly sandy loam. Seasonal high water table is 1 to 3 ft (0.3 to 0.9 m) during May to July.
Tineman association	Nearly level to sloping soils on stream terraces and alluvial fans along the Snake River and its major tributaries. It is made up of approximately 40 percent Tineman gravelly loam, 25 percent Tineman gravelly loam-wet, and 35 percent Aquic Cryoborolis and other gravelly or cobbly surfaces.

**TABLE 7
DOMINANT SOIL TYPES WITHIN GRAND TETON NATIONAL PARK**

Soil Type	Characteristics
Tineman gravelly loam	Very deep, well-drained gravelly loam soil is found along the Snake River; soils are on nearly level to steep alluvial fans, stream terraces, mountains, and moraines. Slopes are 0 to 40 percent.
Tineman-Bearmouth gravelly loams	Very deep, well-drained gravelly loam soils formed in alluvium that is 10 to 20 ft (3 to 6 m) deep over extremely cobbly or extremely gravelly sand. These soils are on flood plains, stream terraces, and fans in mountain valleys.
Turnerville silt loam 0-30 percent slopes	Very deep, well-drained soil along the mountain front surrounding the southern part of Jackson Hole. Most of the acreage is forest.
Youga-Tineman complex	Deep, well-drained soils formed from glacial till or outwash materials. It is made up of approximately 55 percent Youga silty clay loam, 35 percent Tineman gravelly loam, and 10 percent Greback, Leavitt, and Adel soils. Generally found on upland hills, plateaus, foot slopes, or fans. Runoff is medium to rapid.

Soil Survey of Teton County, Wyoming, Grand Teton National Park. USDA, SCS, DOI, NPS in cooperation with Wyoming Agricultural Experiment Station. Issued April 1982.

Vegetation

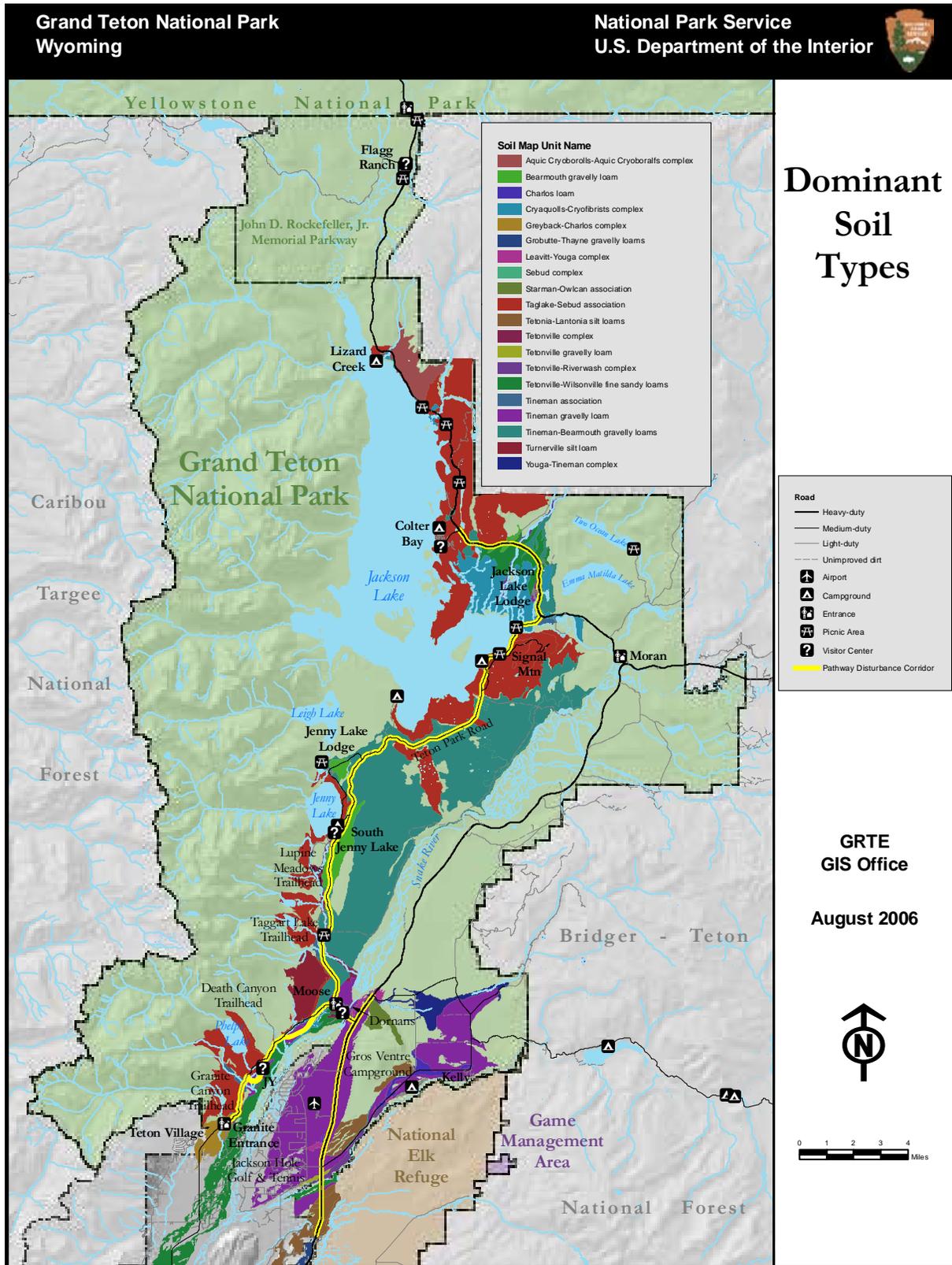
The Teton Range dominates the landscape in the Park and supports montane forests (lodgepole pine [*Pinus contorta*], Douglas-fir, and limber pine [*Pinus flexilis*]); subalpine forests (Engelmann spruce [*Picea engelmannii*], subalpine fir [*Abies lasiocarpa*], and whitebark pine [*Pinus albicaulis*]); and mountain shrub communities (chokecherry [*Prunus virginiana*], serviceberry [*Amelanchier arborea*], Scouler willow [*Salix scouleriana*], and sagebrush) at the lower and mid-elevations. Where vegetated, the higher elevations support grass-, forb-, and shrub-dominated alpine communities. Park roads are primarily located on glacial moraines and outwash plains of the Jackson Hole Valley where sagebrush and lodgepole pine communities dominate. The Snake River bisects the outwash plain, and riparian communities associated with this river and its tributaries support Colorado blue spruce (*Picea pungens*), narrowleaf cottonwood (*Populus angustifolia*), silver buffaloberry (*Shepherdia argentea*) and various willow species. Hydrology associated with Jackson Lake also supports a large and diverse willow community (e.g., Willow Flats). Aspen communities are located in moist upland areas at lower elevations in the Park and are often intermixed with sagebrush steppe and Douglas-fir woodlands. The vegetation along the Moose-Wilson Road is comprised of sagebrush shrubland, conifer forest, grassland meadow, riparian/wetland, aspen, and cottonwood.

Cover Types

The most recent vegetation map and land-cover type classification for the Park was completed in 2005 (Cogan et al. 2005). The mapping and vegetation classification identified and described 207 plant associations that occur in the Park. These associations are represented by 52 different map units. Map units were combined to create the simplified cover types used in this Final/Plan EIS. Table 8 provides a description of the vegetation types in the project area, while Table 9 describes the dominant cover type by major roadways affected by the proposed activities. Figure 13 shows the primary cover types and Figure 14 shows tree density found along transportation corridors in the Park.



FIGURE 12
DOMINANT SOIL TYPES IN THE VICINITY OF THE PROJECT AREA



**TABLE 8
DESCRIPTION OF VEGETATION TYPES FOUND IN THE PROJECT AREA**

Forested Cover Type	Descriptions	Percent of Project Area
Coniferous Forest	Conifer species, including any combination of lodgepole pine, Douglas-fir, subalpine fir, blue spruce, Engelmann spruce, or whitebark pine, dominate the overstory with at least 20 percent cover. Several tree species may be present. The understory may be primarily comprised of grasses and forbs or may include cover with shrubs such as huckleberry (<i>Vaccinium</i> spp.) and russet buffaloberry (<i>Shepherdia canadensis</i>).	3.19
Coniferous Woodland	The overstory is dominated by conifer species, but it is sparse, with less than 20 percent tree canopy cover. The understory is usually dominated by grasses and forbs or may be dominated by sagebrush.	2.18
Deciduous Forest	Sapling to overmature aspen or cottonwood trees dominate the overstory, with at least 20 percent canopy cover and few conifers present; understory consists of shrubs, forbs, and grasses.	0.21
Deciduous Woodland	Sparse cottonwood or aspen overstory is present. Understory usually consists primarily of sagebrush with a mixed forb and grass component.	1.57
Dwarf Shrubland	Short shrubs dominate the vegetation, with greater than 20 percent canopy cover. Most often, the dominant shrub is low sage (<i>Artemisia arbuscula</i>). The community has a minor forb component and includes several different grasses. At elevations above 9,000 ft (2,743 m), the dominant shrub is a willow rather than a sage.	6.58
Herbaceous Vegetation	A combination of forbs and grasses are present, with less than 10 percent cover of shrubs or trees. Herbaceous vegetation can range from wetlands with 100 percent canopy cover to dry hill slopes with less than 20 percent canopy cover of grasses.	3.40
Mixed Forest	Coniferous and deciduous trees co-dominate the overstory, with at least 20 percent cover. Along the Snake River, this is a mix of cottonwood and blue spruce; in more upland areas, it is often lodgepole pine or Douglas-fir mixed with aspen. The understory can vary widely from shrubs to grasses to tall forbs.	0.04
Mixed Woodland	Coniferous and deciduous trees co-dominate the sparse overstory, providing less than 20 percent canopy cover. The understory ranges from shrubs to grasses.	1.11
Shrubland	Sagebrush and antelope bitterbrush (<i>Purshia tridentata</i>) or deciduous shrubs (e.g., chokecherry or serviceberry) are the tallest vegetation layer. Shrub canopy cover can vary from 20 to 80 percent. Diverse forbs and grasses are often present.	43.94
Coniferous Forest	Conifer species, including any combination of lodgepole pine, Douglas-fir, subalpine fir, blue spruce, Engelmann spruce, or whitebark pine, dominate the overstory with at least 20 percent cover. Several tree species may be present. The understory may be primarily comprised of grasses and forbs or may include cover with shrubs such as huckleberry and russet buffaloberry.	3.19
Coniferous Woodland	The overstory is dominated by conifer species, but it is sparse, with less than 20 percent tree canopy cover. The understory is usually dominated by grasses and forbs or may be dominated by sagebrush.	2.18
Sparse Vegetation	Total vegetation cover is less than 20 percent, usually comprised of grasses, forbs, or shrubs. Most often occurring on steep hill slopes, on riparian islands, or in the alpine.	0.25
Barren	Non-vegetated areas, including rock, snow, open water, cobble, and roadways.	37.54
Total		100.00



**TABLE 9
DOMINANT COVER TYPES BY PROJECT AREA ROADWAY**

Road	Cover Type Description
U.S. Highway 26/89/191	<p>Dry sagebrush shrubland is the dominant cover type between the south boundary of the Park and Moose Junction. A cottonwood-dominated riparian zone occurs along the Gros Ventre River. Vegetation along Sagebrush Drive/Spring Gulch Road to Jackson Hole Golf and Tennis is the same as along the main road – sporadic sagebrush and cottonwood.</p> <p>From Moose Junction, the road parallels the Snake River to the east and vegetation varies depending on distance from the river. The southern portion of the road is well above the river in the sagebrush-dominated outwash plain. The road descends through a lodgepole pine forest toward the river near Deadman’s Bar and enters into a mosaic of moister cover types (wet meadow, tall shrub, and cottonwood) interspersed with sagebrush. The road crosses the Buffalo Fork River at Moran and continues east above the river through a mix of dry sagebrush shrubland, agricultural lands, and tall shrub cover types.</p>
Teton Park Road	<p>Beginning at Moose Junction, the road crosses over the Snake River to the town of Moose and then on to Lupine Meadows. Dry sagebrush shrublands are present along the majority of this segment except for the developed area at Moose, small patches of aspen and spruce/fir east of Moose, and tall shrubs and cottonwoods adjacent to Beaver Creek and Cottonwood Creek.</p> <p>Vegetation in the vicinity of the road from Lupine Meadows to North Jenny Lake Junction is predominantly dry sagebrush shrubland. Jenny Lake Loop Road is dry sagebrush shrubland on the east and lodgepole pine forest on the glacial moraine associated with Jenny Lake on the west.</p> <p>From North Jenny Lake Junction, the road winds through sagebrush shrublands and lodgepole pine forests to Jackson Lake Dam. North of the dam, the vegetation consists of wet meadow, moist forb meadow, and tall shrub cover types through an area known as Willow Flats.</p> <p>On the North Jenny Lake to String Lake section, vegetation along the pathway would be the same as that in the North Jenny Lake area – primarily sporadic sagebrush cover with one section of heavily forested vegetation.</p>
North Park Road	<p>At Jackson Lake Junction, the road ascends out of the tall shrub communities of Willow Flats, crosses Christian Creek, and passes Jackson Lake Lodge. Dry sagebrush and lodgepole pine are the dominant cover types north of Jackson Lake Lodge. The road passes through a small portion of tall shrub communities at the north end of Willow Flats and spruce/fir cover types at Pilgrim Creek and Colter Bay. After passing the Willow Flats area on the way to Lizard Creek, the route traverses lodgepole pine forests with occasional wet meadows and aspen groves on the east side of the highway. In some areas, the road is closer to the lakeshore where willows and deciduous forests dominate.</p>
Moose-Wilson Road	<p>The Moose-Wilson Road is dominated by lodgepole pine forest but has dry sagebrush shrubland and scattered aspen cover types on the south end and tall shrub, spruce/fir, and aspen cover types on the north end.</p>

FIGURE 13
DOMINANT VEGETATION IN THE VICINITY OF THE PROJECT AREA

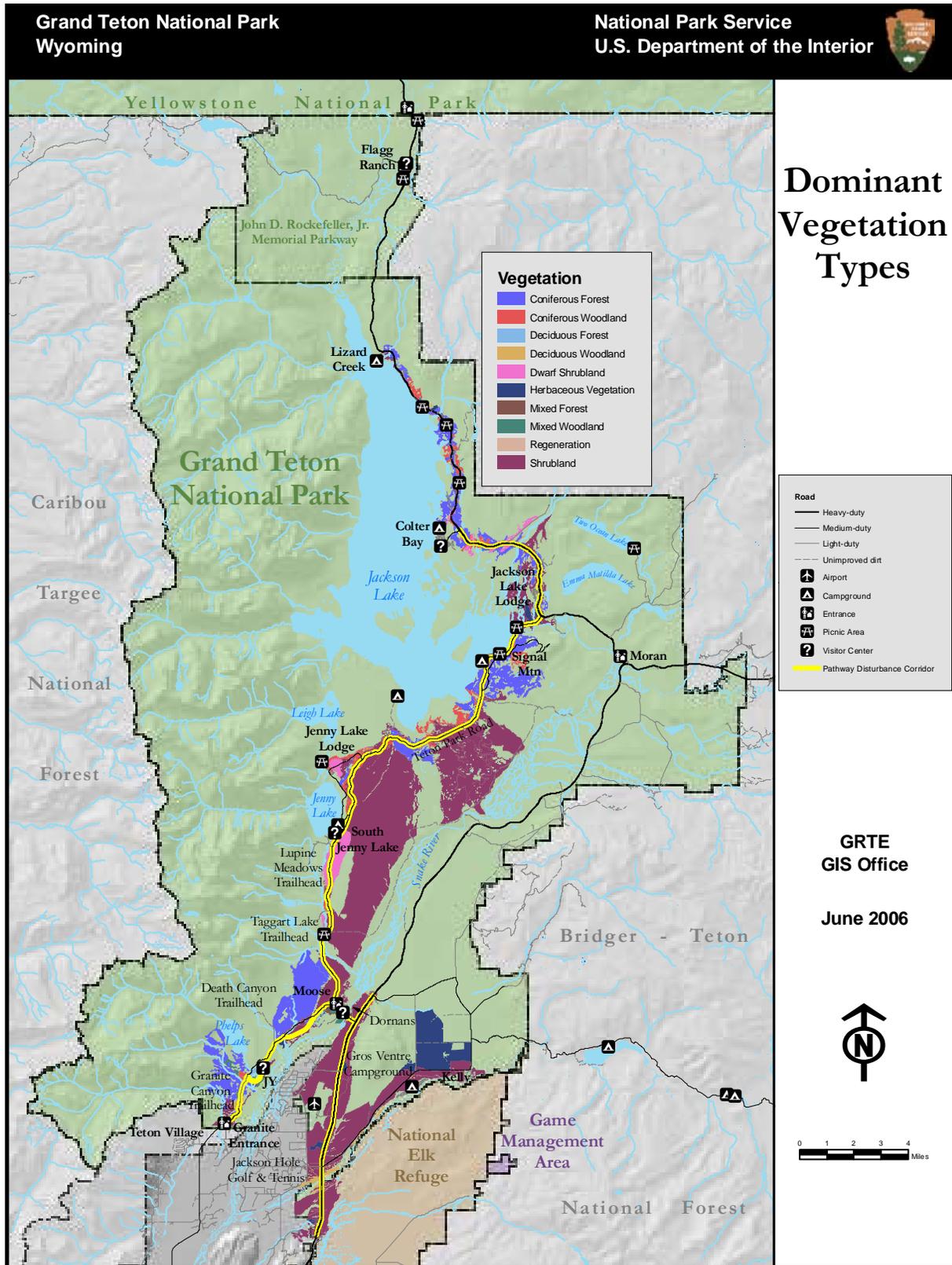
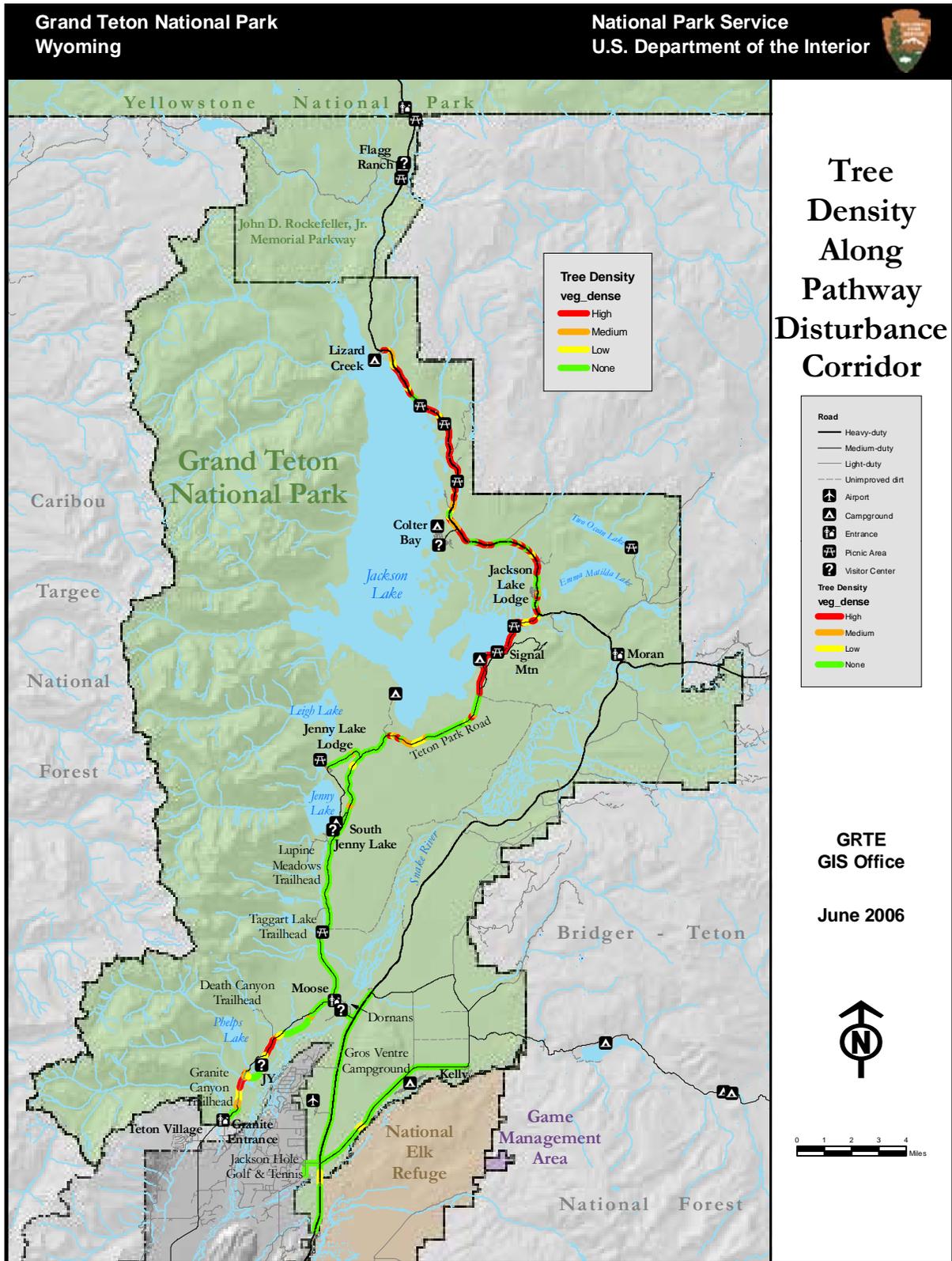


FIGURE 14
TREE DENSITY IN THE VICINITY OF THE PROJECT AREA



Invasive Species / Noxious Weeds

Invasive species are those that are introduced into an area in which they did not evolve and that can cause economic and/or ecological impacts. Exotic plant invaders possess unique characteristics for out-competing other plants and they quickly establish thick stands that threaten native habitats. A noxious weed typically is an official designation of a particular weed within a state. The Wyoming Weed and Pest Control Act of 1973 defines noxious weeds as “the weeds, seeds or other plant parts that are considered detrimental, destructive, injurious or poisonous, either by virtue of their direct effect or as carriers of diseases or parasites that exist within this state, and are on the designated list” (State of Wyoming 1973).

Invasive species and noxious weeds have become an increasing concern in the Park in recent years, and weed control is viewed as a long-term management issue. Noxious weeds primarily occur along roadsides and trails and in other disturbed areas, including construction sites, gravel pits, and recently burned areas within the Park. Roadsides are uniquely vulnerable to invasions by non-native species because of continual disturbance resulting from maintenance activities, vehicular traffic, and runoff. The primary means of noxious weed spread include vehicles, pets, horses, wildlife, and humans (S. Haynes 2002, pers. comm.). Trails are also susceptible to weed infestations since seeds are easily carried and dispersed on shoes, socks, clothing, and pets. Bicycle spokes, tires, and chains can also provide a vector for seed dispersal.

Weeds such as spotted knapweed (*Centaurea stoebe* ssp. *micranthos*), Russian knapweed (*Acroptilon repens*), Dyer’s woad (*Isatis tinctoria*), Dalmatian toadflax (*Linaria dalmatica*), yellow toadflax (*Linaria vulgaris*), marsh sowthistle (*Sonchus arvensis* ssp. *uliginosus*), sulfur cinquefoil (*Potentilla recta*), perennial pepperweed (*Lepidium latifolium*), and leafy spurge (*Euphorbia esula*) are considered the Park’s most invasive and difficult to control. All are adept at colonizing disturbed dry sites, often out-competing native vegetation and, in some cases, spreading into undisturbed areas. Other invasive species common within the Park include musk thistle (*Carduus nutans*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), orange hawkweed (*Hieracium aurantiacum*), common tansy (*Tanacetum vulgare*), St. Johnswort (*Hypericum perforatum*), houndstongue (*Cynoglossum officinale*), woolly mullein (*Verbascum thapsus*), and cheatgrass (*Bromus tectorum*).

Park personnel inventory, monitor, collect test plot data, and control weeds each summer. The most effective method of weed control is to prevent establishment by maintaining optimum biodiversity and cover within native plant communities (Grand Teton National Park 2000). Where noxious weeds have become established, eradication and revegetation with native species is the ultimate goal, although managers never expect to eliminate weeds from the Park completely (S. Haynes 2002, pers. comm.). Various methods to control or reduce the spread of invasive species include herbicide application, hand pulling, biological controls (insect introductions), and mechanical treatments. In 2003, park staff and/or contractors spent 2,242 person hours treating 1,054 acres of weed infestations (NPS 2005). Similar effort has occurred in subsequent years.

Hydrology and Water Quality

The area that would be directly affected by proposed actions includes selected surface water features within the Park, including the Snake River and its tributaries that are adjacent to, crossed by or downstream from proposed actions. The area indirectly affected includes the Snake River Valley aquifer, which is recharged by infiltration of precipitation, streamflow leakage, irrigation water, and inflow from other aquifers. Much of the aquifer exhibits high permeability and interconnection to the rivers and lakes, making it vulnerable to contamination from the facilities, visitor use, and transportation corridors that exist in the recharge areas.

Surface Water

The Snake River, Jackson Lake, and the Leigh/String/Jenny Lake complex are the dominant surface water features within the project area. Several large lakes, fed by mountain drainage, exist outside the project area, but all eventually drain into one of these three main water bodies. The Wyoming Department of Environmental Quality (DEQ) has designated these waters as Class 1 — Outstanding Resource Waters. No further degradation of these waters is allowed and there are restrictions for avoiding all point source discharges.

Jackson Lake is located in the northern half of the Park. It is fed primarily by the Snake River, flowing south from YNP. Numerous other small creeks drain from the surrounding mountains and wilderness areas, including Pilgrim Creek, which enters the lake in the Willow Flats area and is crossed by North Park Road. The natural Jackson Lake was enlarged into a reservoir when the



Jackson Lake Dam was constructed by the BOR in 1907 and again in 1916. The maximum designed water surface elevation is 6,769 ft (2,063 m). Jackson Lake Reservoir provides storage space for 100- and 500-year floodwaters within the BOR's Minidoka Project (a series of six major reservoirs in the upper Snake River Basin). Recreational boating is allowed on Jackson Lake, with active marinas and boat put-ins at Leeks Marina, Colter Bay, and Signal Mountain Lodge. Since 2004, collaboration between the BOR and the NPS has resulted in reservoir releases being managed to, when possible, simulate the natural peak and decline demonstrated by undammed rivers in the Rocky Mountain region; these efforts are intended to benefit native fish, plant, and wildlife habitat along the Snake River downstream from Jackson Lake.

The Snake River reemerges from the southeast end of Jackson Lake at the dam and flows east for approximately 5.0 miles (8.0 km) before turning south and west. For most of its length, the river follows the pattern of a classic braided stream. However, in the area adjacent to Moose, flow is contained within a single channel (Grand Teton National Park 2001b). Farther south, the river returns to a braided form, but its western boundary is contained by a levee maintained by the ACOE. Several intermittent and perennial streams cross the project area and are tributary to the Snake River, including Pacific Creek, Spread Creek, Ditch Creek, Granite Creek, Taggart Creek, Christian Creek, Pilgrim Creek, and Cottonwood Creek. Pacific and Spread Creeks are located east of any proposed improvements under the alternatives considered in this Final Plan/EIS. Recreational raft and float trips occur along the length of the Snake River within the Park with numerous access points provided.

A levee system is located along Pilgrim Creek, just east of Jackson Lake Dam. Following construction of the dam, Pilgrim Creek changed course and flowed below the dam to its confluence with the Snake River. The BOR subsequently built a series of levees to push Pilgrim Creek north into Jackson Lake and alleviate the local flooding problem to the historic town of Moran. Presently there is no maintenance plan for these levees and, left to its own devices, Pilgrim Creek could eventually put the stream in the vicinity of the Teton Park Road; the Willow Flats area could be dissected by an active stream channel and sediments brought in below the dam by Pilgrim Creek could fill-in or destabilize the Oxbow Bend area.

The Leigh/String/Jenny Lake complex is a series of water bodies formed by glacial activity and fed primarily by

mountain drainage. These bodies drain from north to south, flowing from Leigh Lake to String Lake to Jenny Lake. Cottonwood Creek emerges from the southeast end of Jenny Lake and eventually drains into the Snake River. Leigh Lake is outside the scope of the Final Plan/EIS, but String and Jenny Lakes are both included.

Recreational, non-motorized boating is allowed on String Lake with a boat put-in on the south end. Recreational, low horsepower boating is allowed on Jenny Lake with a boat put-in south of the Jenny Lake Visitor area. In addition, a concessioner provides regularly scheduled shuttle trips across the lake between South Jenny Lake and the Hidden Falls Trailhead.

Ground Water

Ground water recharge occurs by infiltration of precipitation, streamflow leakage, irrigation water, and inflow from other aquifers. Water level contours indicate that ground water flows topographically from high areas toward the Snake River and southwest through the valley in the general direction of the river. The data indicate that the water quality of the alluvial valley aquifer is excellent; it supports utilization for drinking water, recreation, and other commercial uses. Much of the aquifer exhibits high permeability and interconnection to the rivers and lakes, making it vulnerable to contamination from the facilities, visitor use, and transportation corridors that exist in the recharge areas.

Wetlands

The ACOE and EPA have defined wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (Environmental Laboratory 1987).

Section 404 of the Clean Water Act addresses activities involving the discharge of pollutants into wetlands. The ACOE and EPA regulate activities involving the discharge of dredged or fill material into wetlands and other waters of the United States using the Section 404 guidelines and permitting process. The NPS has issued Director's Order #77-1 (issued 10/22/98, reissued 10/30/02) based on wetland protection measures described in EO 11990. It states that actions that may alter NPS lands are required “to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect

support of new construction in wetlands wherever there is a practicable alternative.” Open water habitats are also regulated by Section 404 of the Clean Water Act, and, for the purposes of this analysis, are addressed as if they were wetlands.

Ecological processes associated with wetlands and open water habitats provide a variety of environmental maintenance functions on global, regional, and local scales. Disruption of wetland function can alter these processes and ultimately curtail many of these important services. Little research has been conducted on the overall ecological value of wetlands in the Rocky Mountains. However, wetland functions identified in other regions of North America can be applied to park wetlands with some reliability until more specific information is gathered. Ecological benefits believed to be associated with wetlands were compiled by Minta and Campbell (1991) and include: (1) atmospheric, climatological, and meteorological stabilization; (2) groundwater recharge or discharge; (3) flood control; (4) erosion control; (5) water purification; (6) nutrient cycling; (7) primary production; and (8) biotic community support.

Three wetland types, described below, are expected to be present within the project area (Figure 15).

Palustrine Emergent Wetlands

These wetlands are characterized by erect, rooted, herbaceous hydrophytic plants, excluding mosses and lichens. Plant species that dominate emergent wetlands in the Park include sedges, rushes (*Juncus* spp.), spikerush (*Eleocharis* spp.), and various hydrophytic grasses. Palustrine emergent wetlands provide valuable forage for ungulates and avian species, especially during the early growing season when other forages have not yet greened up (Hansen et al. 1996). These wetlands also provide cover for nesting, resting, and foraging waterfowl and upland birds, habitat for small mammals and reptiles, and reproductive habitat for amphibians.

Palustrine Scrub-Shrub Wetlands

These wetlands are dominated by woody vegetation less than 20.0 ft (6.1 m) tall. Plant species may include true shrubs. Scrub-shrub wetlands may represent a seral stage leading to a forested wetland or they may be stable, self-perpetuating plant communities. Palustrine scrub-shrub wetlands in the Park are usually dominated by willows but may also be dominated by alders (*Alnus* spp.), birches (*Betula* spp.), or other shrubs. Scrub-shrub wetlands provide important cover and breeding and foraging habitat for a variety of wildlife species, including moose, neotropical songbirds, and small mammals.

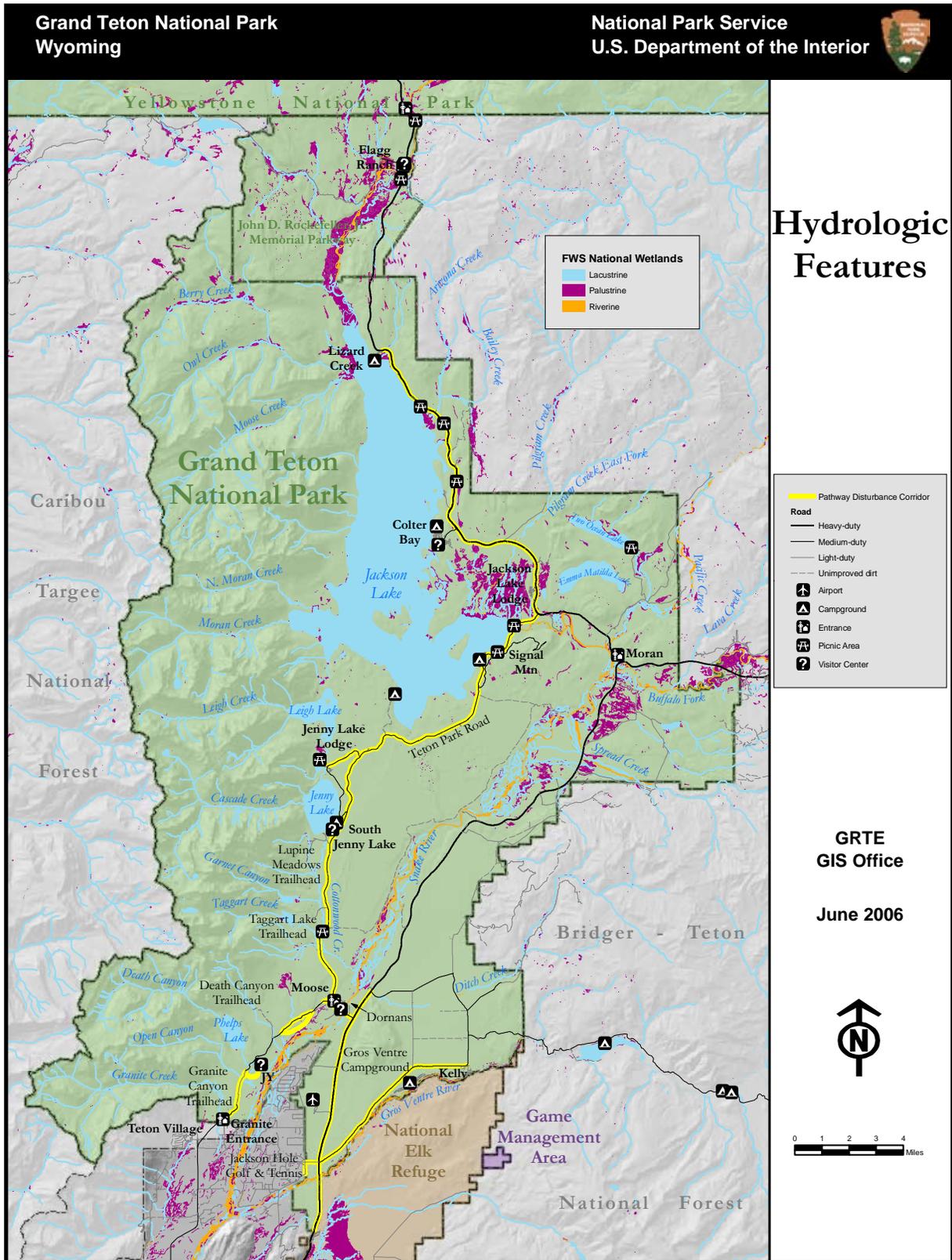
Lacustrine Wetlands

These wetland areas include shallow water, lakes and ponds, and stream channels within which water is present on an annual, but not necessarily permanent, basis. Macrophytic plants are usually present and include a variety of rooted and floating species. Shallow areas of open water habitat provide nesting, cover, and foraging opportunities for a variety of avian species, small mammals, and fish.

Several site-specific wetland assessments and delineations have been conducted for infrastructure-related projects in the Park. However, detailed wetland mapping of the proposed transportation corridors is currently limited. National Wetlands Inventory (NWI) mapping was completed in 1990 by the USFWS and is available for the entire project area (USFWS 1990). The Teton County Soil Survey (Young 1982) and corresponding hydric soils list (USDA 1991) were also used to determine the potential presence of wetlands within the project area. Additionally, the most recent Grand Teton land-cover type classification (Cogan et al. 2005), which includes locations of vegetative cover types typical of wetlands in the project area, contributed to a preliminary assessment of wetland impacts. The primary wetland and open water features found along each major roadway within the project area are presented in Table 10 and depicted on Figure 15.



**FIGURE 15
WETLANDS IN THE PROJECT AREA**



**TABLE 10
DOMINANT WETLAND AND OPEN WATER FEATURES BY PROJECT AREA ROADWAY**

Road	Cover Type Description
U.S. Highway 26/89/191	<p>The road is located primarily in uplands, except where it crosses the Gros Ventre River. Substantial portions of the Gros Ventre River annual flow are appropriated and diverted for irrigation practices, causing river flows to vary greatly. Although NWI mapping does not indicate the presence of wetlands, irrigation practices may provide the hydrological support for palustrine emergent wetlands adjacent to portions of this roadway.</p> <p>From Moose Junction, the road parallels the Snake River on alluvial terraces above the river and is located in uplands until it descends into an extensive wetland mosaic dominated by palustrine emergent and scrub-shrub wetlands northeast of Deadman's Bar Road. As the road continues north, it crosses Spread Creek and the Buffalo Fork River and bisects extensive palustrine scrub-shrub and palustrine emergent wetland mosaics interspersed with uplands.</p>
Teton Park Road	<p>The road is primarily located in and adjacent to uplands. However, it crosses the Snake River near Moose, as well as Cottonwood, Taggart and Beaver Creeks, where palustrine scrub-shrub and palustrine emergent wetlands are present. The Teton Park Road parallels Cottonwood Creek north to the Lupine Meadows turn-off.</p> <p>In the Jenny Lake area, the road is located entirely in uplands, even though portions of Jenny Lake Loop Road lie immediately adjacent to Jenny Lake.</p> <p>From North Jenny Lake Junction, the road is located primarily in uplands, except to the northeast of Jackson Lake Dam, where it bisects large expanses of palustrine scrub-shrub wetlands known as Willow Flats. Palustrine emergent wetlands may also be present in this area but were not mapped by the NWI.</p>
North Park Road	<p>From Moran Junction north, the road crosses Pacific Creek and associated palustrine scrub-shrub wetlands and continues west through an extensive mosaic of palustrine emergent and palustrine scrub-shrub wetlands associated with the Oxbow Bend reach of the Snake River.</p> <p>At Jackson Lake Junction, the road bisects palustrine scrub-shrub and palustrine emergent wetlands associated with Willow Flats and Christian Pond. The road crosses Christian and Pilgrim Creeks before reaching Colter Bay Village and Leeks Marina. Various small, named, and unnamed ponds are located near the road.</p> <p>The section from the dam to Lizard Creek crosses Arizona Creek and Lizard Creek and the adjacent riparian zones.</p>
Moose-Wilson Road	<p>From Moose to the Death Canyon Trailhead, the road is located adjacent to extensive palustrine scrub-shrub and palustrine emergent wetlands associated with Sawmill Pond, a spring discharge at the toe of Beaver Creek Bench, and the Snake River. South of the Death Canyon Trailhead, the road lies entirely in forested uplands, except where it crosses Lake and Granite Creeks.</p>



Once an alternative has been selected, a complete wetland delineation of the project area would be performed that provides more accurate locations of wetlands and open water habitats within the project area that could be affected by project implementation. Wetlands would be delineated by qualified NPS staff or certified wetland specialists and marked before any construction begins. All proposed separated, multi-use pathways and infrastructure improvements (regardless of alternative) would be designed taking into consideration wetland resources, such as constructing cantilevered bridge crossings to avoid wetland impacts.

If potential adverse impacts are identified when project locations and design are finalized, a Wetland Statement of Findings would be prepared. The purpose of a Wetland Statement of Findings is to review the proposed plan in sufficient detail to ensure avoidance, to the extent possible, of short- and long-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. The statement would describe the effects on wetland values associated with the selected alternative and provide a thorough description and evaluation of mitigation measures developed to achieve compliance with EO 11990 and NPS Director's Order #77-1. The overall purpose of the statement is to ensure "no net loss" of wetland functions or values.

Threatened and Endangered Species / Bird Species of Special Concern and Neotropical Migratory Birds / Wildlife

Threatened and Endangered Species

The Park contains five vertebrate species and no plant species listed under the ESA as threatened, endangered, experimental, or candidate species (Table 11).

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle was federally listed as an endangered species in Wyoming in March 1967 under the Endangered Species Preservation Act of 1966 (32 FR 4001) and was re-listed in 1978 under the ESA of 1973 (43 FR 6233). The Pacific States Bald Eagle Recovery Team was formed as a result of the 1978 listing, and a recovery plan was completed in 1986 (USFWS 1986). Grand Teton National Park lies within the Greater Yellowstone Recovery Area (Zone 18 in the Recovery Plan). As a result of the implementation of recovery plans, bald eagles began to increase by the mid-1980s. Consequently, the status of the bald eagle in Wyoming was changed to threatened on July 12, 1995 (64 FR 35999-36010). Recovery goals were subsequently met, and in July 1999, the USFWS announced a proposal to remove the bald eagle from the endangered species list. The public comment period for the proposed delisting of the bald eagle was reopened in 2006. No final action on this proposal has occurred to date. The bald eagle, besides being a "species of special concern" in the Park, is also afforded protection under the 1918 Migratory Bird Treaty Act (16 U.S. Code 703) and 1940 Bald Eagle Protection Act (16 U.S. Code 668).

Between 1970 and 1995, the bald eagle population in the GYA increased exponentially. This growth was attributed to a reduction in the level of environmental contaminants (i.e., DDT) and the protection of nesting habitat (Stangl 1999).

Grand Teton National Park contained 14 known nesting territories and pairs in 2005; however, not all pairs breed in the Park each year (Table 12). Known territories are located along the shorelines of the Snake River, Jackson Lake, and adjacent riparian areas. Bald eagles that nest along the Snake River may remain on their nest territories throughout the year, occasionally leaving for short periods during the non-breeding season to exploit abundant or

**TABLE 11
FEDERALLY LISTED THREATENED, ENDANGERED, AND EXPERIMENTAL WILDLIFE SPECIES OCCURRING OR POTENTIALLY OCCURRING IN THE PROJECT AREA**

Wildlife Species	Common Name	Status
<i>Haliaeetus leucocephalus</i>	Bald eagle	Threatened
<i>Lynx canadensis</i>	Canada lynx	Threatened
<i>Ursus arctos horribilis</i>	Grizzly bear	Threatened
<i>Canis lupus</i>	Gray wolf	Threatened
<i>Coccyzus erythrophthalmus</i>	Yellow-billed cuckoo	Candidate

Data source: USFWS 2002.

ephemeral food sources elsewhere. Eagles feed primarily on fish, waterfowl, and carrion.

Bald eagle management in the Park involves conducting annual nest surveys, establishing seasonal area closures around bald eagle nest sites to protect them from human disturbance, and monitoring of annual nest territory occupancy and productivity. Seasonal area closures usually occur from February 15 until August 15 and involve a one-half-mile (0.8-km) buffer zone around active bald eagle nests to provide protection from human disturbance.

Nest building or repair intensifies in early February, and egg laying occurs in late March or early April, followed by a 35-day incubation period (Stangl 1994; Swensen et al. 1986). Most nesting territories are located along major rivers or lakes within approximately 3.0 miles (4.8 km) of their inlets or outlets or along thermally influenced streams or lakes (Alt 1980). Nests and roosts commonly occur in mature and old growth trees in multi-layered stands of Douglas-fir, cottonwood, and spruce. Nearby food, suitable perches, and security from human activities are important habitat components for both nest and roost sites.

**TABLE 12
BALD EAGLE TERRITORIES AND PRODUCTIVITY IN GRAND TETON NATIONAL PARK
1987-2005**

Year	Occupied Territories	Breeding Pairs	Productive Pairs	Young Fledged	Young / Occupied Territory	Young / Productive Nest
1987	8	8	6	10	1.25	1.67
1988	6	6	5	8	1.33	1.60
1989	8	6	3	3	0.38	1.00
1990	8	7	4	6	0.75	1.50
1991	9	8	5	5	0.55	1.00
1992	9	7	5	10	1.10	2.00
1993	10	8	6	9	0.90	1.50
1994	11	9	8	13	1.18	1.63
1995	11	9	4	5	0.45	1.25
1996	9	7	4	7	0.78	1.75
1997	7	6	3	4	0.57	1.33
1998	8	6	6	9	1.13	1.50
1999	8	6	5	6	0.75	1.20
2000	7	7	4	6	0.86	1.5
2001	11	10	5	5	0.46	1.0
2002	12	12	5	8	0.67	1.6
2003	12	12	7	10	0.83	1.43
2004	11	11	5	6	0.54	1.20
2005	14	14	7	10	0.71	1.42



The nearest bald eagle nests, located approximately 1.25 and 1.75 miles (2.0 and 2.8 km) from the proposed project area, are located along the Snake River. The project area does contain suitable nesting habitat in areas along the Snake River near the Moose Bridge and Jackson Lake Dam. These areas and areas near Cottonwood Creek also contain foraging habitat for bald eagles.

Canada Lynx (Lynx canadensis)

The Canada lynx is a federally threatened species under the ESA as of 2000. Lynx are considered rare in Wyoming (Nordstrom 2003) and are classified as a Species of Special Concern–Native Species Status 1 by the WGFD, indicating that habitat is limited and populations are restricted or declining (WGFD 2005). Historical information suggests that lynx were present but uncommon in YNP from 1880 to 1980. Records of lynx in Wyoming show the highest concentrations of confirmed observations in the northwest corner of the state, including YNP, Grand Teton National Park, and the Teton, Gros Ventre, Absaroka, Beartooth, Wind River, and Wyoming Mountain Ranges (Reeve et al. 1986).

Lynx are solitary carnivores generally occurring at low densities in boreal forests. Distribution and abundance of this species is closely tied to the snowshoe hare (*Lepus americanus*), their primary prey. In Wyoming, lynx occur primarily in spruce/fir and lodgepole pine forests with slopes of 8 to 12 degrees and at elevations from 7,995 to 9,636 ft (2,437 to 2,937 m) (Ruediger et al. 2000). Densely regenerating coniferous forests and regenerating burned areas in mixed species forests provide excellent habitat for snowshoe hares and, therefore, are also important habitat for lynx. Aspen intermixed with spruce, fir, or lodgepole pine (with extensive shrub growth and woody debris) also provides high quality habitat for hares. Sagebrush-grassland cover types support alternative prey for lynx, such as white-tailed jackrabbits, mountain cottontails, and ground squirrels. Dense willow thickets and beaver pond complexes may provide some foraging opportunities. Lynx denning habitat consists of late successional spruce/fir forests on north-facing slopes with relatively high densities of large diameter woody debris. Dispersal corridors, principally continuous conifer forests several miles in width, are critical for lynx travel and dispersal (Tanimoto 1998). Lynx travel corridors may be found in any conifer-covered landscape.

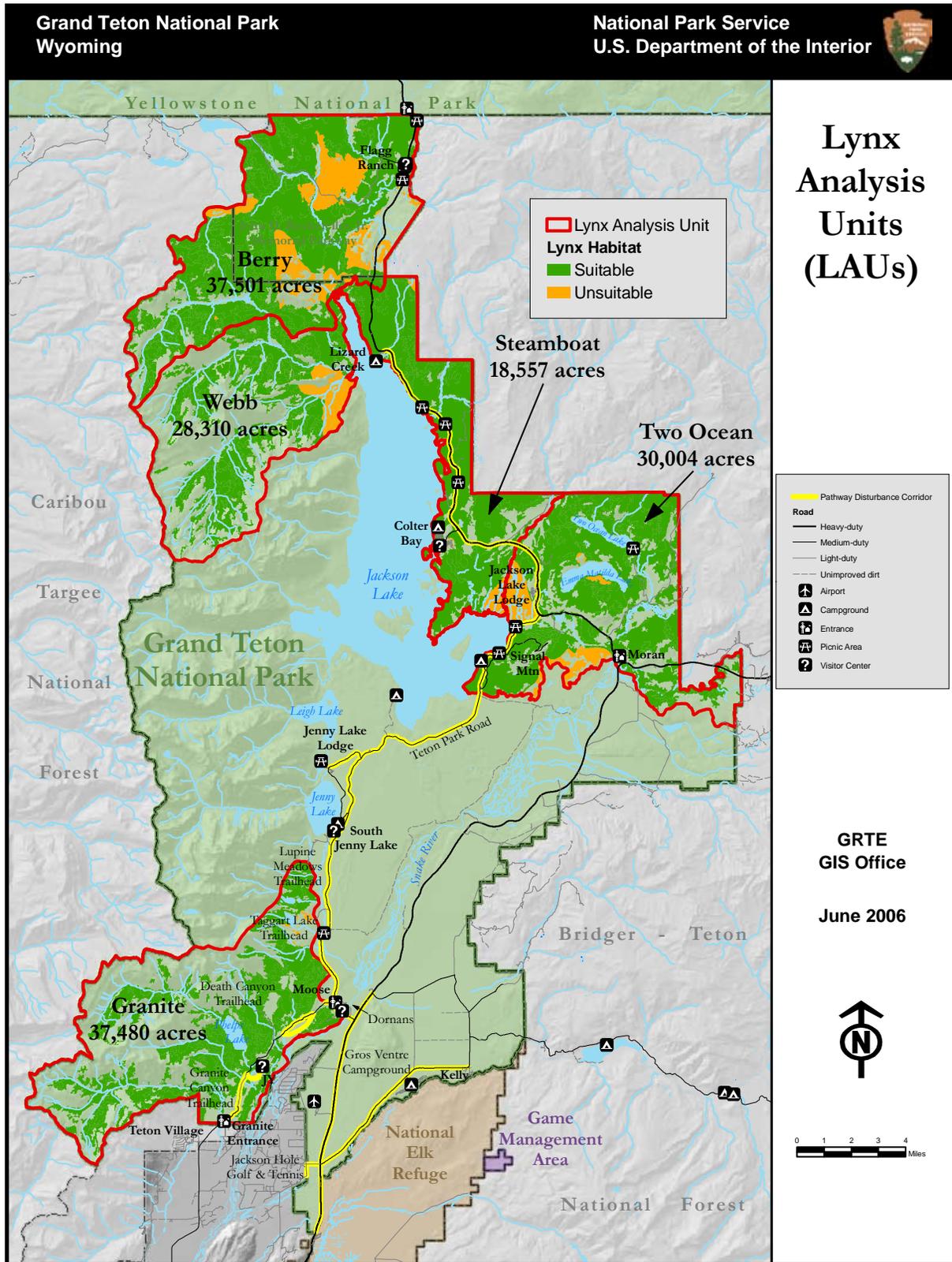
Little information exists on lynx abundance and distribution within Grand Teton National Park. Park records include 12 reports of lynx (Grand Teton National

Park, unpublished data), some of which may not be credible because lynx are easily confused with bobcat (*Lynx rufus*). Two lynx sightings have been reported in the Park in the past 10 years, one at the Murie Ranch in 1992 and one in Moran Canyon in 1998 (D. Cunningham 2002, pers. comm.). McKelvey et al. (2000) documented 22 reports of lynx in the Park between 1917 and 1997, with the majority of sightings occurring in the mid-1970s and early 1980s. Recent efforts to document lynx in Grand Teton National Park and YNP have had limited success. A 105-mile (169-kilometer) snow-track transect survey in the northern Grand Teton National Park and vicinity in 1998 found no evidence of lynx (S. Patla 2000, pers. comm.). Pyare (2002) located possible lynx tracks and a day-bed along Arizona Creek (Steamboat Lynx Analysis Unit [LAU]) and productive snowshoe hare habitat near Grassy Lake Reservoir and Glade Creek (Berry LAU) in Grand Teton National Park during lynx surveys. However, no evidence of lynx was found in 3 years (2000–2002) of systematic hair snaring surveys in the Park's best lynx habitat. In YNP, at least four individual lynx, including two kittens born in different years, have been documented between 2001 and 2004 (Murphy et al. 2004). These researchers concluded that the presence of offspring indicates that resident breeding individuals are present within YNP. During the summer of 2004, a male lynx translocated to Colorado traveled through YNP and Grand Teton National Park (K. Murphy 2003, pers. comm.).

Whether or not lynx currently reside in the Park is unknown. Forest cover types located in the northern, northeastern, and southwestern portions of the Park are within the elevational range and appear to be generally suitable habitat for lynx. Based upon general habitat preferences and existing vegetative cover types, potential habitat for lynx is believed to be present in Grand Teton National Park. Low densities of snowshoe hares, may mean that lynx, if present, would occur at low densities, perhaps only as transients (S. Cain 2002, pers. comm.).

LAUs and potential lynx habitat within Grand Teton National Park are depicted in Figure 16. The five LAUs cover 149,827 acres (60,633 ha) and include approximately 96,000 acres (38,850 ha) of mapped lynx habitat. In addition, important linkage areas connecting larger contiguous blocks of habitat occur within the Park at the base of the Teton Range, connecting the Granite LAU with the Webb LAU on the west side of Jackson Lake, and the Granite LAU to the Two Ocean LAU on the east side of Jackson Lake and along the Snake River corridor.

FIGURE 16
LYNX ANALYSIS UNITS (LAUs)



Other regionally important linkage zones occur around Togwotee Pass and the Teton Wilderness, linking areas in the southern GYA to YNP, at Teton Pass connecting the southern GYA to the Teton Range, and at the head of Granite Canyon connecting the east and west sides of the Teton Range (Claar et al. 2003).

Project area roads traverse three of the five LAUs. The southern portion of North Park Road, which is part of proposed improvements under Alternatives 3, 3a, and 4, occurs within the Steamboat and Two Ocean LAUs, and the Teton Park Road near Jackson Lake Dam occurs within the Two Ocean LAU. The Moose-Wilson Road passes through the low elevation portion of the Granite LAU. Although most of the Teton Park Road from Moose to North Jenny Lake Junction is not within an LAU, it falls within a linkage area.

Grizzly Bear (Ursus arctos horribilis)

Grizzly bears once ranged over most of western North America, from the Arctic Ocean to central Mexico. Although still abundant throughout much of Canada and Alaska, the range of grizzly bears in the lower 48 states is confined to six separate areas in Wyoming, Montana, Idaho, and Washington, covering less than 1 percent of its historic range in the lower 48 states (USFWS 1993). Grizzly bears currently inhabit much of the GYA, including portions of YNP, Grand Teton National Park, and the Bridger-Teton, Shoshone, Caribou-Targhee, Gallatin, and Custer National Forests.

Between 1800 and 1975, the grizzly population in the contiguous United States was reduced from an estimated 100,000 animals to less than 1,000 because of habitat destruction and intensive persecution from livestock interests (USFWS 1982). By 1974, some scientists estimated that fewer than 200 grizzly bears remained in the GYA (Craighead et al. 1995). In 1975, grizzly bears were listed as threatened under the ESA in the lower 48 states. In 1982, a recovery plan for grizzly bear populations in the contiguous United States was completed and implemented (USFWS 1982). Guidelines for grizzly bear recovery were developed in 1983 by the Interagency Grizzly Bear Committee (IGBC [USFS 1986]). The IGBC is comprised of representatives from the NPS, USFWS, USFS, BLM, and the state wildlife agencies of Idaho, Montana, and Wyoming. Recovery zones and population goals were established in the Grizzly Bear Recovery Plan (USFWS 1982) and the Revised Grizzly Bear Recovery Plan (USFWS 1993). These plans established six grizzly bear recovery zones in the contiguous United States, one of which encompasses a portion of the GYA, including much of Grand Teton National Park (Figure 17).

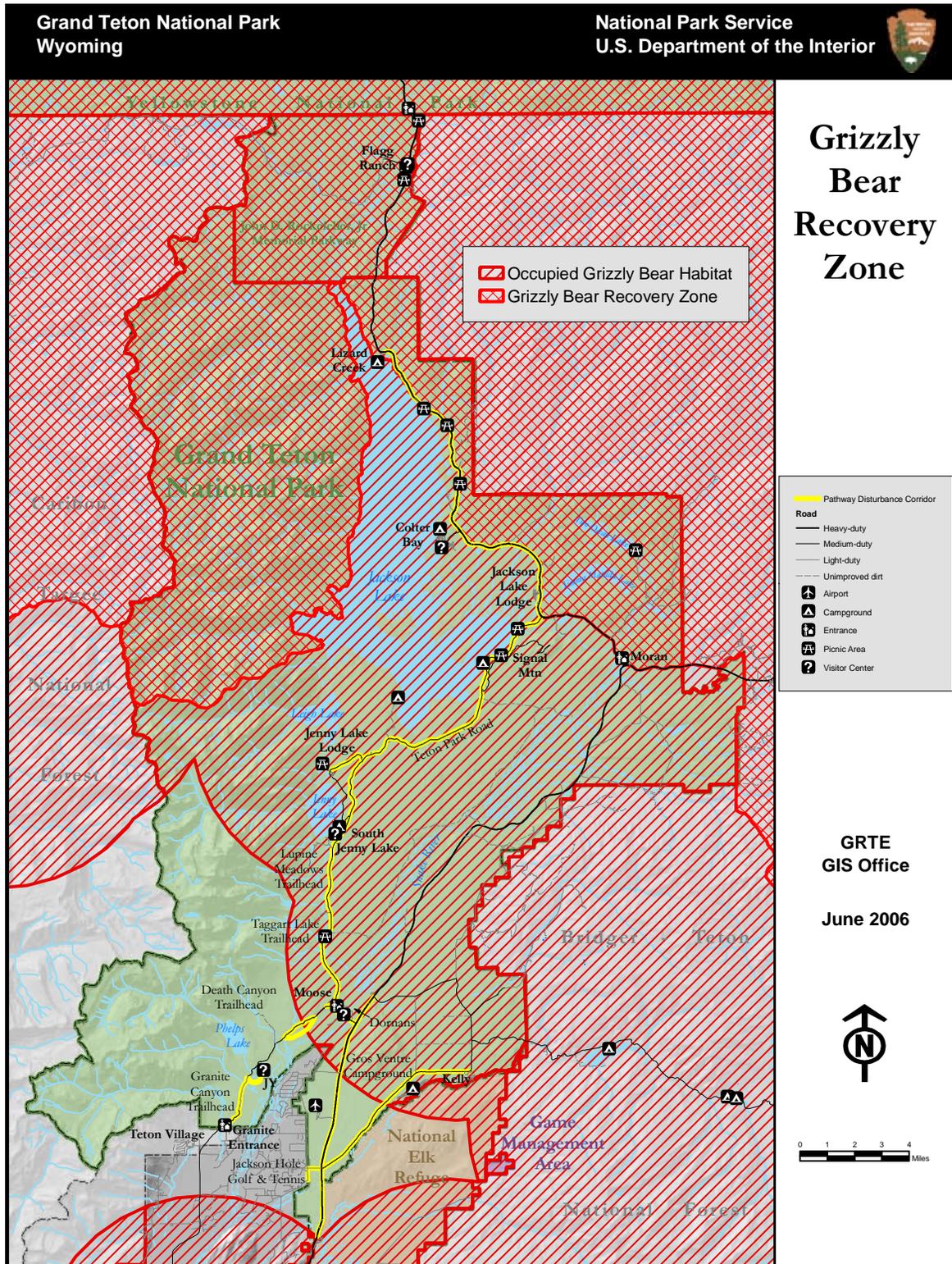
The Revised Grizzly Bear Recovery Plan established measurable population parameters as indicators of population status for the GYA (USFWS 1993). The USFWS would consider removing the GYA population of grizzly bears from threatened species status when these demographic recovery goals are met. The Revised Grizzly Bear Recovery Plan (USFWS 1993) recovery parameters for the GYA are:

- An average of 15 adult females with cubs-of-the-year over 6 years inside the recovery zone and within a 10.0-mile (16.1-kilometer) area.
- Sixteen of 18 Bear Management Units (BMUs) occupied by females with young for 6 years; no two adjacent BMUs shall be unoccupied.
- Known human-caused mortality not to exceed 4 percent of the minimum population estimate based on the most recent 3-year sum of females with cubs.
- No more than 30 percent of this 4 percent mortality limit shall be females. These mortality limits cannot be exceeded during any 2 consecutive years for recovery to be achieved.

After grizzly bears were listed as a threatened species in 1975, population estimates in the GYA continued to decline through the early 1980s (Eberhardt and Knight 1996). Starting in the mid-1980s, annual minimum population estimates have increased approximately 2 to 5 percent (Haroldson et al. 1998, Haroldson et al. 2004), largely due to lower numbers of human-caused grizzly bear mortality, especially of adult female grizzly bears. In 2003, 53 unduplicated females with young were estimated in the GYA (Haroldson et al. 2004), 49 were observed in 2004 (IGBST 2004) and 31 in 2005 (IGBST 2006).

Absolute minimum population estimates for grizzly bears in the GYA, based on counts of adult females with cubs-of-the-year, have increased from a low of 99 in 1979 (Haroldson et al. 1998) to a high of 431 in 2004 (M. Haroldson 2006, pers. comm.). Eberhardt et al. (1994) evaluated population trends based on reproductive and survival rates and estimated a rate of increase of 4.6 percent annually since the mid- to late-1980s. Prior to delisting, habitat-based recovery criteria, a conservation strategy that demonstrates that adequate regulatory mechanisms are in place to ensure long-term protection of grizzly bears in a primary conservation area (PCA), and state plans that outline management strategies outside of the PCA must be developed and approved by the USFWS.

FIGURE 17
GRIZZLY BEAR RECOVERY ZONE IN THE GRAND TETON NATIONAL PARK AREA



All grizzly bear population recovery parameters were achieved for the first time in 1994, but grizzly bear mortality limits were exceeded during the next 3 years (1995-1997). Population recovery parameters were again achieved from 1998-2003 and habitat-based recovery criteria, a conservation strategy (USFWS 2003), and state plans were developed. However, recovery mortality limits were exceeded again in 2004 and in 2005 (Haroldson and Frey 2006). Scientists reviewing the data believe that the mortality thresholds are sufficiently conservative such that even though the previously set objectives have been exceeded, the ecosystem's grizzly bear population continues to be stable or slightly increasing.

On November 15, 2005, the USFWS proposed delisting the Yellowstone Distinct Population Segment (DPS), announcing that based on the best scientific and commercial information available, the recovered population no longer meets the ESA's definition of being threatened or endangered. The state and federal agencies' agreement to implement the extensive conservation strategy and state management plans will ensure that adequate regulatory mechanisms remain in place and that the Yellowstone grizzly bear population will not become an endangered species within the foreseeable future throughout all or a portion of its range. The public comment period for this proposal has ended, and the USFWS will likely issue a final delisting rule in the near future.

Approximately 125,000 acres (50,586 ha) of Grand Teton National Park are within the PCA identified in the Conservation Strategy for the Grizzly Bears in the Yellowstone Ecosystem (USFWS 2003). Development within the PCA is restricted as the strategy requires a no-net-loss of secure grizzly bear habitat based on secure habitat that existed in 1998.

Background

The life history of the grizzly bear is well documented, and ongoing research continues to add substantive details and knowledge to this large dataset. Craighead and Mitchell (1982) characterized essential grizzly bear habitat as space, isolation, sanitation, food, denning sites, vegetation types, and safety. Grizzly bears require large home ranges (50 to 300 square miles for females; 200 to 500 square miles or more for males), encompassing diverse forests interspersed with moist meadows and grasslands in or near mountains. In the spring, bears usually range at lower elevations but can be found at a wide elevational range throughout the non-denning period. Typical den sites are situated on high,

remote mountain slopes where deep snow functions as insulation and persists until spring (Podruzny et al. 2002). Grizzly bears often dig beneath the roots of large trees to create hibernacula.

Food habits of grizzly bears in the GYA have been described by Knight and Knight (1984) and are strongly influenced by seasonal variation in food availability. In general, whitebark pine nuts, graminoids, and ungulates are the most important foods in the grizzly bear's diet, but fish, small mammals, herbaceous vegetation, tubers, fruit, and insects also comprise a portion of their diet (Mattson and Knight 1991). Ungulate carcasses are an important high quality food source for bears (Mattson 1997) and will often attract and hold bears in localized areas for periods of several days to a week or more.

The greatest threat to grizzly bears is human-caused mortality. Grizzly bears can become habituated to humans because of attractants such as garbage, pet foods, livestock carcasses, and improper camping practices. These attractants usually lead to conflicts between people and bears, and the most common outcome is that the bear is ultimately killed. More recently, however, the number of bears killed in conflicts with hunters throughout the ecosystem has increased, adding to numbers associated with unsecured food (Gunther et al. 2004).

Occurrence Within the Project Area

Grizzly bear occurrence in Grand Teton National Park has increased during the past 20 years, most likely in response to increases in bear densities throughout the GYA (Pyare et al. 2004; Schwartz et al. 2002). Grizzly bears are now relatively common in the southern GYA, including the Gros Ventre Mountains southeast of Grand Teton National Park, and are regularly observed in the Teton Mountain Range north of Paintbrush Canyon and the Badger Creek drainage (Grand Teton National Park, unpublished data). Grizzly bears have been observed on the valley floor south of Triangle X Ranch, at Jackson Lake, in Death Canyon, and south of Grand Teton National Park in the vicinity of Teton Village and along the Snake River south of Jackson (Schwartz et al. 2002). In addition, a young male radio-collared grizzly bear used the Bradley-Taggart Lakes and White Grass areas for several weeks in 2005 (IGBST, unpublished data), providing empirical evidence for the continued southward movement of grizzly bears in the Teton Range.

Management of grizzly bears and their habitat in Grand Teton National Park follows IGBC guidelines (USFS 1986) and the Park's Human-Bear Management Plan

(NPS 1989). These guidelines were developed to provide effective direction for the conservation of grizzly bears and their habitat to federal agencies responsible for managing land within the recovery zone. The objectives for managing grizzly bears in Grand Teton National Park (NPS 1989) are to:

- Restore and maintain the natural integrity, distribution, and behavior of grizzly bears.
- Provide opportunities for visitors to understand, observe, and appreciate grizzly bears.
- Provide for visitor safety by minimizing bear/human conflicts, by reducing human-generated food sources, and by regulating visitor distribution.

In order to achieve grizzly bear management objectives in Grand Teton National Park, the Human-Bear Management Plan (NPS 1989) calls for educating the public and providing information on grizzly bear occurrence and how to avoid bear encounters by removing artificial food sources, enforcing regulations, managing and controlling nuisance bears, and continuing to conduct grizzly bear research.

Management of grizzly bears in both the GYA and Grand Teton National Park has been highly successful in promoting grizzly bear recovery and reducing bear-human conflicts (e.g., property damages, incidents of bears obtaining human food, bear-inflicted human injuries) and human-caused bear mortalities in the Park. Recreational and administrative facilities, human activities, and human waste (garbage and sewage) in Grand Teton National Park are managed in a manner that minimizes the potential for human-caused grizzly bear mortalities. Bears that are typically wary of humans will often tolerate people at close distances when carcasses are available due to the high quality of this bear food. Carcasses on or within 330 ft (100 m) of roads may create large “bear-jams” and potentially pose a hazard to bears that could be hit by vehicles while approaching carcasses to scavenge. To reduce these risks, road-killed carcasses of large animals located on and within approximately 330 ft (100 m) of roads are dragged away from roads or are loaded into trucks and hauled to areas away from visitor activity.

Eighteen grizzly bears have been road-killed within the GYA since 1977 (M. Haroldson 2006, pers. comm.), including two within Grand Teton National Park. Additionally, a young male grizzly bear found dead within 330 ft (100 m) of Teton Park Road near Jackson Lake Junction in May 2003 may have been struck by a vehicle. Although the cause of death was undetermined, injuries sustained by the

bear and believed to contribute to its death were, in part, consistent with expected trauma associated with a vehicle collision.

Gray Wolf (Canis lupus)

The northern Rocky Mountain wolf (*Canis lupus irremotus*) was initially listed as an endangered species in 1973 (38 FR 14678). Due to a lack of consensus on taxonomic classification, the entire species (*Canis lupus*) was listed as endangered in the contiguous United States outside of Minnesota, where it was listed as threatened in 1978 (43 FR 9607). Although gray wolves are native to the GYA (Young and Goldman 1944), human persecution resulted in their extirpation by the 1930s (Phillips and Smith 1996).

Fourteen wolves, representing three packs from Alberta, were released into YNP in March 1995, and an additional 17 wolves from British Columbia were released into more widespread locations throughout YNP in 1996. At the same time, additional wolves were released into the central Idaho wilderness. Wolves reintroduced into YNP and central Idaho are classified as “nonessential experimental” according to Section 10(j) of the ESA. However, in national parks and wildlife refuges, nonessential experimental populations are treated as threatened species and all provisions of the ESA apply (50 CFR 17.83(b)). All wolves occurring elsewhere in the State of Wyoming are classified as nonessential experimental (59 FR 60256).

The recovery criterion for wolf restoration is to maintain at least 30 breeding pairs in three northern Rocky Mountain recovery areas (i.e., GYA, central Idaho, and northwest Montana). Once 30 pairs are established and reproducing across the three recovery areas for 3 successive years in an equitable spatial distribution, as defined by the USFWS, the gray wolf would be biologically eligible for removal from the endangered species list in Idaho, Montana, and Wyoming. Recovery criteria were met in 2002 (Smith et al. 2003) and have been retained each successive year. Idaho and Montana have produced State Wolf Management Plans, and these plans have been accepted by the USFWS. As of July 2006, the State of Wyoming was involved in continued litigation with the USFWS over the latter agency’s rejection of the Wyoming Plan. Delisting cannot occur until Wyoming’s plan is approved.

Background

Wolf distribution varies depending upon prey abundance and includes a variety of habitats (e.g., grasslands, sagebrush steppes, coniferous and mixed forests, and riparian and alpine areas). Wolves tend to be flexible in



their habitat needs and are considered habitat generalists. Key components of wolf habitat include the following: (1) a sufficient, year-round prey base of ungulates and alternate prey; (2) suitable and somewhat secluded denning and rendezvous sites; and (3) sufficient space with minimal exposure to humans (USFWS 1987).

Low-elevation river bottoms that are relatively free from human influence provide important winter range for ungulates and wolves. Wolves are especially sensitive to disturbance from humans at den and rendezvous sites during the breeding period. Human activity near den sites can lead to pack displacement or physiological stress, perhaps resulting in reproductive failure or pup mortality (Mech et al. 1991). Indirectly, wolves support a wide variety of other species; common ravens, coyotes, wolverines, mountain lion (*Puma concolor concolor*), and bears feed on the remains of animals killed by wolves. Bald and golden eagles routinely feed on the carcasses of animals killed by wolves during the winter. As apex predators, wolves also help regulate the populations of their prey, ensuring healthy ecosystems and greater biodiversity (Terborgh 1988).

Occurrence within the Project Area

At the end of 2005, at least 325 wolves occupied the GYA (Sime et al. 2006). From 1999 to 2005, the Teton Pack was the only wolf pack using Grand Teton National Park consistently, although observations of other wolves with unknown pack affiliations were regularly reported in the Park. In 2006 there were 10 adult individuals that made up the Teton Pack. The traditional home range of the Teton Pack includes a small portion of Grand Teton National Park, with the remainder of its territory within the Gros Ventre River drainage. However, in 2006 wolf dynamics in the Park changed considerably. The Teton Pack's territory was usurped by a new pack, now known as the Buffalo Pack (consisting of 10-11 adult individuals), which denned in an area traditionally used by the Teton Pack. Two other new packs also denned in the Park in 2006, one in the Pacific Creek area (Pacific Creek Pack made up of 9-10 adult individuals) and another in the south end of the Park (Sage Pack made up of 5 adult individuals). In 2006, the Teton Pack used areas mostly south and east of the Park and is not believed to have denned. Other packs in the area include the Gros Ventre, Flat Creek, and Victor-Driggs Packs.

The Gros Ventre Pack resided in the vicinity of Grand Teton National Park from 1999-2001 and may have ventured into the Park from time to time. However, the pack stopped producing pups after two adult Gros Ventre wolves were killed in control actions in summer 2000. Based on the lack

of visual observations, winter track counts, and reported sightings, the Gros Ventre Pack is believed to have been defunct until 2006.

Wolf activity in Jackson Hole is concentrated in areas with dense populations of big game, and in the winter, wolves frequent elk feed grounds on the National Elk Refuge and in the Gros Ventre River drainage, Elk Ranch, and Buffalo Valley areas, and some parts of the south end of Grand Teton National Park. Thus, wolves are considered present in small numbers throughout the project area.

Wolf management in the Park consists of monitoring wolf population dynamics and gathering ecological data relevant to the species' return to the GYA. To determine territory sizes and locate dens, collared wolves are monitored using both ground-based and aerial telemetry. By observing dens, birthing dates are estimated and the number of pups counted. In addition, wolf deaths are investigated and wolf-prey relationships are documented by observing wolf predation directly and by recording characteristics of wolf prey at kill sites. Collaborative research is ongoing and represents pioneering work on wolf ecology. All management and monitoring activities are closely coordinated with the USFWS.

Roads represent a source of mortality to wolves in the GYA. One wolf, the alpha male of the Teton Pack, was struck and killed by a vehicle on U.S. 287 near the east boundary of Grand Teton National Park in 1999 (Grand Teton National Park, unpublished data). Three other wolves were killed on park roads in 2005 and 2006 near Moran, Spread Creek, and the Park's south boundary. Twelve wolves were killed by vehicles in YNP between 1995 and 2001. Although road-related wolf mortality has not yet led to the demise of an entire pack, road mortality has led to the loss of a breeding wolf, and therefore, a breeding pair in the GYA (i.e., Teton Pack in 1999 and Chief Joseph Pack in 2001). It is reasonable to expect that additional wolves will be struck and killed by vehicles in the Park in the future.

Yellow-billed Cuckoo (Coccyzus erythrophthalmus)

The yellow-billed cuckoo has declined precipitously throughout its range in southern Canada, the United States, and northern Mexico due to habitat loss. It is nearly extinct west of the Continental Divide and is rare in the interior west. Cuckoos are closely associated with broadleaf riparian (i.e., tall cottonwood and willow) forest habitats, which are in decline in most western states.

Yellow-billed cuckoos may occur in the Park but little is known about their status and occupancy in this area.

Suitable cuckoo habitats within the project area include areas along the Snake River, Cottonwood Creek, and Christian Creek. The only sighting of this species reported to the Park was documented in 2001 at Teton Science School's Monitoring Avian Productivity and Survivorship station.

In 1998, an updated ESA petition was filed with USFWS. This petition called for listing cuckoos west of the Continental Divide as either a subspecies (i.e., the western yellow-billed cuckoo) or as a population, which is geographically, morphologically, behaviorally, and ecologically distinct from cuckoo's east of the divide. In addition, the petition asked the USFWS to list the entire species in North American because of ongoing declines east of the continental divide. When the USFWS refused to process the petition, a lawsuit was filed to obtain a review and decision. In February 2000, the USFWS published an initial finding that ESA protection may be needed for western cuckoos, either as subspecies or as a unique population.

Neotropical Migratory Birds and Bird Species of Special Concern

Neotropical Migratory Birds

Neotropical migratory birds that occur in Grand Teton National Park include raptors, passerines, and shorebirds that breed in North America but migrate to Mexico and Central and South America for the winter. In Wyoming, 162 bird species are considered neotropical migrants (Cerovski et al. 2000). Some of these species are also considered species of concern (see following section). Examples of neotropical migratory bird species that are not designated as sensitive and that occur and breed in Grand Teton National Park include, but are not limited to, osprey (*Pandion haliaetus*), chipping sparrow (*Spizella passerine*), ruby-crowned kinglet (*Regulus calendula*), yellow warbler (*Dendroica petechia*), yellow-rumped warbler (*Dendroica coronata*), white-crowned sparrow (*Zonotrichia leucophrys*), western tanager (*Piranga ludoviciana*), western meadowlark (*Strunella neglecta*), green-tailed towhee (*Pipilo erythrophthalmus*), Lincoln's sparrow (*Melospiza lincolni*), and savannah sparrow (*Passerculus sandwichensis*). Neotropical migratory birds migrate from their wintering grounds to Grand Teton National Park or further north between April and early June and then return to their winter habitat from September through early October. Those species that nest in the Park begin breeding between early May and mid-June and may brood young into August.

Neotropical migratory birds are of particular interest to wildlife managers for several reasons. First, neotropical

migratory birds play a major role in the health and functioning of ecosystems, as consumers of insects, dispersers of seeds, and pollinators of flowers (Robinson 1997). Second, neotropical migratory bird populations have experienced declines throughout the last several decades. Many reasons are responsible for these declines including habitat fragmentation and loss, land-use changes in both breeding and wintering habitats (Nicholoff 2003), a reduction in migratory stop-over habitat (Robinson 1997), pollution, and increases in predators and nest parasitism (e.g., domestic cats, brown-headed cowbirds). Lastly, neotropical migratory birds can be used by managers as a tool to monitor effects of land-use practices and landscape changes, as well as the health of a particular habitat or system (Hutto and Young 2002).

All migratory birds in the Park are protected under the Migratory Bird Treaty Act (16 USC 703), enacted in 1918. This Act prohibits the taking of any migratory birds, their parts, nests, or eggs. Removal of nests or nest trees is prohibited but may be allowed once young have fledged and/or a permit from USFWS has been issued.

Bird Species of Special Concern

In conjunction with species classification systems generated by the WGFD, Wyoming Natural Diversity Database (WYNDD), and USFWS, Grand Teton National Park maintains a sensitive bird species list that is used for establishing monitoring priorities and for evaluating project impacts. The WGFD classifies certain non-game bird species as "species of special concern" and categorizes these species into a range of priority groups according to their need for special management. This classification system evaluates species' distributions, population status and trend, habitat stability, and tolerance to human disturbance (WGFD 1996). Birds are also considered species of special concern by the WYNDD if they are "vulnerable to extirpation at the global or state level due to inherent rarity, loss of habitat, or sensitivity to human-caused mortality or habitat disturbances" (WYNDD 2002; Fertig and Beauvais 1999). Migratory Bird Species of Management Concern in Wyoming are designated as such by the USFWS (Cerovski et al. 2000). The Wyoming Field Office of the USFWS has developed this list from the Wyoming Bird Conservation Plan compiled by state and federal agencies, non-governmental organizations, and the public. The Wyoming Bird Conservation Plan identifies "priority species" based on a number of criteria, using the best information available. In many cases, this list reflects identified threats to habitat because no information is available on species population trends.



Two priority groups are designated by the USFWS: Level 1 and Level 2. Level 1 species are those that are clearly in need of conservation action. They include species of which Wyoming has a high percentage of and responsibility for the breeding population, and the need for additional knowledge through monitoring and research. The action and focus on Level 2 species is on monitoring rather than conservation action. Level 2 species include those in Wyoming with a high percentage of and responsibility for the breeding population,

species whose population trend is unknown, species that are peripheral for breeding in the habitat or state, or species for which additional knowledge is needed. Bird species of special concern that occur in Grand Teton National Park and in the project area are listed in Table 13.

**TABLE 13
BIRD SPECIES OF SPECIAL CONCERN IN GRAND TETON NATIONAL PARK
AND THE PROJECT AREA**

Common Name	WGFD Status¹	USFWS Status²	Habitat type
Northern pygmy-owl	NSS4	none	Forests
Northern goshawk	NSS4	Level 1	Forests
Greater sage-grouse	none	Level 1	Sagebrush
Brewer's sparrow	none	Level 1	Sagebrush
Swainson's hawk	none	Level 1	Sagebrush/open fields
Long-billed curlew	NSS3	Level 1	Sagebrush/open fields
Short-eared owl	none	Level 1	Sagebrush
Bald eagle	NSS2	Level 1	Riparian/lakes/rivers
Great gray owl	NSS4	Level 2	Forests
Calliope hummingbird	none	Level 2	Forests
Lewis' woodpecker	NSS3	Level 2	Forests
Williamson's sapsucker	none	Level 2	Forests
Gray flycatcher	none	Level 2	Forests
Rufous hummingbird	none	Level 2	Forests/meadows
Hammond flycatcher	none	Level 2	Forests
American dipper	none	Level 2	Riparian
Sage thrasher	none	Level 2	Sagebrush
Bobolink	NSS4	Level 2	Sagebrush
Western screech-owl	none	Level 2	Forests
Broad-tailed hummingbird	none	Level 2	Forests/meadows
Vesper sparrow	none	Level 2	Sagebrush
Golden-crowned kinglet	none	Level 2	Forests
Brown creeper	none	Level 2	Forests

¹ **WGFD Status:**

NSS2 = Populations restricted or declining in numbers and/or distribution; extirpation in Wyoming is not imminent AND ongoing loss of habitat.

NSS3 = Populations restricted or declining in numbers and/or distribution; extirpation in Wyoming is not imminent AND habitat is restricted or vulnerable but no recent or on-going loss; species is sensitive to human disturbance.

NSS4 = Species is widely distributed; population status and trends within Wyoming are assumed stable AND habitat is restricted or vulnerable but no recent or on-going loss; species is sensitive to human disturbance.

² **USFWS Status:**

Level 1 = Conservation Species.

Level 2 = Monitoring Species.

Bird Monitoring in Grand Teton National Park
Songbirds are monitored each summer in Grand Teton National Park using several techniques. For example, Breeding Bird Surveys are conducted to sample birds that breed and nest in a variety of habitats in the Park. A subsample of 30 sites set up by Dr. Cody, UCLA, located throughout the frontcountry and backcountry are also surveyed annually by park personnel and Dr. Cody. Lastly, a long-term landbird monitoring program, initiated in 2005, surveys landbirds that occur in five different habitat types within the Park: sagebrush, aspen, willow, cottonwood, and high elevation.

Results from these surveys indicate that many bird species of special concern and other neotropical migratory bird species are likely present and breed in and adjacent to the project area including many willow and sagebrush obligate birds (S. Wolff 2004, pers. com). These surveys also show that riparian and wetland habitats generally contain the highest density of bird species in the Park.

Specific surveys were conducted in summer 2005 to document the presence of sensitive bird species along the proposed pathway from Moose to South Jenny Lake Junction. The following three areas were surveyed: (1) Windy Point to Beaver Creek, (2) Cottonwood Creek, and (3) Lupine Meadows Junction. Surveys took place during the breeding season and occurred early in the morning when most songbirds are actively singing. Twenty bird species were observed in and along the proposed pathway, most of which are considered common in the Park. Sensitive bird species that were documented include brewer's sparrow, vesper sparrow, greater sage-grouse, and sage thrasher. Also, numerous bird species were seen and heard along the bridge at Cottonwood Creek. This area contains numerous old and decadent cottonwood trees, and the understory is thick with woody vegetation. Because of these characteristics, this area provides excellent nesting habitat for several songbird species (Wolff 2005). Additional surveys in areas not visited in 2005 may be conducted in subsequent years.

Greater Sage-Grouse (Centrocercus urophasianus)

Greater sage-grouse have declined in number and distribution throughout their range. In the west, reductions of up to 51 percent have been recorded, resulting in numerous petitions for listing sage-grouse under the ESA, including in Wyoming. In January 2005, the USFWS completed its status review of the greater sage-grouse and determined that the species did not warrant protection under the ESA at that time (FR/50 CFR Part 17/Vol. 70,

No. 8, Wednesday, January 12, 2005, Proposed Rules). The exact cause of sage-grouse decline has not been conclusively identified but is thought to be related to permanent loss, degradation, and fragmentation of key habitat, as well as low nest productivity. State and local working groups have initiated conservation planning efforts that focus on providing guidelines for sustaining and/or perpetuating sage-grouse populations through consistent and current management strategies. In Wyoming, the Wyoming Greater Sage-Grouse Conservation Plan (WGFD 2002) outlines these guidelines.

In Grand Teton National Park, survey results show evidence of even greater local declines than those noted in other areas. For example, since the late 1940s, surveys have indicated a 70 percent decline in the number of grouse observed at the Park's lek sites. (Lek sites are mating grounds generally located in open areas such as meadows, low sagebrush zones, ridge tops, and old lakebeds surrounded by denser sagebrush cover.) In addition, over the last 10 years, the number of active leks in the Park has dropped from eight to three. The reasons for these declines are unknown.

Breeding habitat critical for the survival of sage-grouse populations is characterized by sagebrush-dominated rangelands with a healthy herbaceous understory. Lek attendance, nesting, and early brood rearing all occur within breeding habitats; however, vegetation characteristics differ between each of these areas. Breeding activity begins in mid-March when grouse gather on their leks (Connelly et al. 1981). Three leks are active in the Park and are located near Antelope Flats, the Jackson Hole Airport, and east of Timbered Island.

Soon after breeding, females disperse to nesting areas characterized by relatively dense, tall, mature sagebrush stands (Holloran and Anderson 2004; Connelly et al. 2000). Nests are usually shallow depressions lined with grass, twigs, and feathers and generally are constructed under the tallest shrub in the stand (Keister and Willis 1986). Typically, nests are within 2.0 to 4.0 miles (3.2 to 6.4 km) of the lek, but some nests may be more than 12.0 miles (19.3 km) away (Wakkinen et al. 1992; Autenrieth 1981). In Grand Teton National Park, known nests average 2.0 miles (3.2 km) and range from 1.5 to 6.0 miles (2.4 to 9.6 km) from active leks (Holloran and Anderson 2004) and are located throughout Antelope Flats, Ditch Creek, Baseline Flats, Potholes, east of Timbered Island, east of the Jackson Hole Airport, and along U.S. Highway 26/89/191. During the 2005 surveys, a female sage-grouse was documented



nesting approximately 100 m (330 ft) from the project area just east of Lupine Meadows. This nest was monitored several times throughout the summer and appeared to produce young successfully (Wolff 2005).

Female grouse typically return to the same area each year for nesting and brood rearing. In the event that this nesting territory is occupied in the future by sage-grouse, it is recommended that construction activities be avoided during the nesting period (May-July) to prevent disturbance. Additionally, no egg or nest of any migratory, sensitive, or protected bird species should be removed or destroyed at any time; therefore, it is recommended that the project area be surveyed for nests if construction takes place during the breeding season (Wolff 2005).

Early brood-rearing habitat is typically close to nesting sites (Gates 1985) in dense, mature sagebrush stands (Holloran and Anderson 2004). Brood-rearing occurs from June to mid-July. As the summer progresses, hens and their young will also use relatively open sagebrush stands that have good grass and forb cover (Lyon 2000). Adult and young grouse depend not only on forbs for food during the brood-rearing period but also on insects. As sagebrush habitats desiccate, grouse usually move to more mesic sites (Connelly et al. 1988; Gates 1985). Known brood-rearing locations in Grand Teton National Park include Antelope Flats, Baseline Flats, northeast of the Jackson Hole Airport, north of the Gros Ventre Junction, and southwest of Lost Creek Ranch.

Sage-grouse use dense, tall stands of mature sagebrush during the winter for both food and cover. Low sagebrush stands on open windswept knolls are also used as feeding sites. Sage-grouse widely disperse over wintering areas during mild weather but concentrate in areas with exposed sagebrush as snow depth increases. In Grand Teton National Park, major wintering concentration areas include relatively flat south to west facing slopes, such as south of Blacktail Butte. Other areas in the Park used by sage-grouse in the winter include exposed sagebrush along U.S. Highway 26/89/191, the Jackson Hole Airport, Lost Creek Ranch, Potholes, Wolff Ridge, and areas near the Town of Kelly and the Teton Science School (Holloran and Anderson 2004; Holloran 2001).

While vehicle-sage-grouse mortalities occur in Grand Teton National Park, they are infrequently reported to park biologists. Known vehicle-caused sage-grouse mortalities have occurred along U.S. Highway 26/89/191, especially near Jackson Hole Airport Junction, north of the Moose

Entrance Station along the Teton Park Road, and near Windy Point. The number and frequency of grouse-vehicle accidents is unknown but appears to be highest in the spring and summer when birds are traveling from breeding sites to nesting areas.

Portions of the project area contain suitable year-round sage-grouse habitat, particularly areas from Gros Ventre Junction to Moose Junction and from the Moose Entrance Station to Potholes. No leks are directly within the project area but two, the Airport lek and the Timbered Island lek, are one-half and 1.1 miles (0.8 and 1.8 km) from U.S. Highway 26/89/191 and the Teton Park Road, respectively. Radio telemetry data indicate grouse use sagebrush habitats adjacent to U.S. Highway 26/89/191 for nesting, brood-rearing, summering, and wintering (Holloran and Anderson 2004). Other known nesting, brood-rearing, and wintering areas include sagebrush habitats along the east side of the Teton Park Road from the Moose Entrance Station to Potholes. No breeding, nesting, brood-rearing, or wintering habitat is known or likely to occur within the project area north of Potholes.

Wildlife

Grand Teton National Park provides habitat for a variety of wildlife species, including at least 61 mammals, four reptiles, six amphibians, 19 fish, and 299 birds (NPS 2005; NPS 2000). Many of these species are likely to occur in at least some portion of the project area due to the diverse habitat mixture of woodland, riparian-wetland, and sagebrush steppe communities present on the valley floor. Several ungulate species are common in the Park. Information about each of these is provided below.

Rocky Mountain Elk (Cervus elaphus)

Jackson Hole and its vicinity support one of the largest herds of Rocky Mountain Elk in North America. The most recent modeled population estimate for the Jackson elk herd was 12,855 for the biological year ending in May 2006 (WGFD 2006). Summer ranges for Jackson Hole elk are extensive (over 1,000 square miles), with virtually unlimited supplies of forage (Boyce 1989). The availability, abundance, and quality of winter range constrain elk population size in Jackson Hole. Heavy snow accumulation in the mountains and foothills reduces food availability and forces elk to migrate to lower elevations during the winter. Supplemental feeding of large numbers of elk occurs on the National Elk Refuge and WGFD feedgrounds during the winter.

Elk are the most numerous ungulate in Grand Teton National Park. They are highly visible to park visitors and occur at relatively high densities throughout the project area in the summer. Elk reside in both lower and higher elevation habitats throughout the Park, although their distribution and group sizes vary seasonally. Mid- to lower-elevation forested areas and portions of the Snake River riparian zone represent spring calving areas. Within the project area, areas along the Moose-Wilson Road, the Teton Park Road, and Willow Flats are important for elk calving, which peaks around June 1. During calving, cows are often found alone or in small groups. Once calves are capable of staying with their mothers, they join larger nursery bands of other cows, calves, and young bulls. Older bulls usually occur alone or in small groups throughout the summer. Elk are especially visible within the project area in the fall during the rut, which generally begins in late August and extends through November with a peak in breeding behavior from mid-September to mid-October. During evening and early morning hours, elk use the large sagebrush meadows on both sides of the Teton Park Road, especially in the vicinity of Windy Point/Beaver Creek, Timbered Island, Lupine Meadows, and Jenny Lake Junction.

A substantial portion of the Jackson elk herd migrates through the project area during spring and fall movements between summer range (in Grand Teton National Park, on Bridger Teton National Forest lands, and in YNP) and winter range (predominantly on the National Elk Refuge near Jackson). Large numbers of elk move through the Mormon Row hayfields, Antelope Flats, Blacktail Butte, and the Moose-Wilson Road areas of the Park each spring and fall. During migrations, it is not uncommon to observe several hundred elk at one time bedding down, foraging, and/or moving. The migration from winter range to summer range is generally complete by the end of May, and elk are largely absent from the southeastern portion of the project area until the fall migration begins in October and November. Important east-west elk migration routes exist between Moose and the Gros Ventre River, facilitating elk movements from the west side of the Snake River corridor to winter range on the National Elk Refuge. Wacob and Smith (2002) documented two general areas of movement: (1) from the Snake River corridor south of Moose northeast and east towards Blacktail Butte, and (2) from the Snake River corridor south of the airport east towards the Gros Ventre River. Large numbers of elk cross U.S. Highway 26/89/191 between the Snake River overlook (north of Moose) and Gros Ventre Junction. Migration

from summer to winter ranges may occur during a few days or span several weeks depending upon weather, snow accumulations, hunting seasons, and distance traveled.

Roads are a major source of mortality for elk, with elk being the second most commonly road-killed large animal within the Park. Between 1992 and 2005, 323 road-killed elk were documented on park roads (Table 14). Most elk road-kills occur during the summer months. Within the project area, elk mortality hotspots included U.S. Highway 89/191 between Moose and Moran, especially near Blacktail Butte and Triangle X Ranch, the Teton Park Road near Windy point, and North Park Road near Pacific Creek (Biota 2003).

Shiras Moose (Alces alces shirasi)

Shiras Moose are widely distributed throughout Jackson Hole and can be found within the project area anytime of the year. Recent estimates suggest that the moose population in Jackson Hole has declined from a high in excess of 3,500 animals to approximately 1,700 individuals (D. Brimeyer 2003, pers. comm.).

Moose are generally found at higher elevations in the summer and in riparian areas throughout the year. In the Jackson area, they are also frequently observed in sagebrush-steppe habitats during the winter and early spring where they browse on bitterbrush, especially near Airport Junction, Moose Junction, and Antelope Flats near Ditch Creek. The entire Snake River drainage and low elevation portions of the Gros Ventre River drainage within the project area represent either “winter-yearlong” or “crucial moose winter range” (WGFD, unpublished data). Moose densities along the Snake River north of the Gros Ventre River confluence average about five moose per mile (Fralick 1989) but vary both seasonally and annually. Increases may occur during the autumn as the rutting season progresses, during winter when moose move to lower elevations, and during harsh winters. In contrast, moose densities at lower elevations may decrease when winters are mild or where there are high levels of human activity (Minta and Campbell 1991). As with many ungulates, severe winters appear to be a key factor causing population declines. Although willow and spruce forest vegetation types are preferred during winter, moose will select and use other habitat types based on snow depth (Matchett 1985). As winter progresses and snow accumulations become greater, moose make use of older, denser stands of trees with a high conifer component and relatively shallow snow depths (Saether et al. 1989).



The Snake River drainage and the lower elevations of the surrounding mountains are also considered critically important reproductive and maintenance habitat to the Jackson Hole moose population (WGFD, unpublished data). Within the project area, riparian areas along the Gros Ventre River, the Snake River, and Willow Flats are important calving areas for moose. Moose thrive in seral stages of shrub and tree communities (Coady 1982), and environmental disturbances that disrupt existing vegetative patterns and promote the formation of ecotones are generally beneficial to moose (Tefler 1978). Shrub communities interspersed with forest cover and riparian willow stands provide winter range to moose in Wyoming (Houston 1968). Both lowland and upland climax-shrub habitats are heavily used during summer and fall (Van Ballenberghe and Miquelle 1990). Aquatic vegetation is used extensively where available, particularly in early summer.

Roads are a source of moose mortalities, with 115 road-killed moose documented on park roads between 1992 and 2005 (Table 14). Moose-vehicle collisions most commonly occur in the winter. Within the project area,

mortality hotspots for moose occur between the Park south boundary and Moose on U.S. Highway 89/191 and in the vicinity of Willow Flats (Biota 2003).

Mule Deer (*Odocoileus hemionus hemionus*)

Jackson Hole provides year-round habitat for mule deer, and this species is abundant in the Park during non-winter months. The project area and its vicinity are classified as spring-summer-fall mule deer habitat. Primary mule deer summer range is on mountain slopes surrounding the valley, but mule deer can also be found summering within the Snake River floodplain. Mule deer use of lower elevations (e.g., along the Snake River and on the slopes of buttes and foothills) increases dramatically during the spring and fall months as mule deer migrate to and from winter range. Use of specific migration routes by mule deer in Jackson Hole is not common, and migrating deer apparently use whatever routes are available to them in order to get where they want to go (Campbell 1990). General mule deer movement routes are present within the Park (e.g., along the Snake and Gros Ventre Rivers)

**TABLE 14
WILDLIFE SPECIES INVOLVED IN DOCUMENTED VEHICLE COLLISIONS ON
GRAND TETON NATIONAL PARK ROADS FROM 1992-2005**

Ungulate			Non-ungulate		
Species	Number	Percent of Total	Species	Number	Percent of Total
Deer	396	37.6	Coyote	43	4.1
Elk	323	30.7	Black bear	27	2.6
Moose	115	10.9	Owl	12	1.1
Bison	70	6.6	Porcupine	11	1.0
Pronghorn antelope	23	2.2	Beaver	8	0.8
			Badger	4	0.4
			Raccoon	4	0.4
			Pine marten	3	0.3
			Sage-grouse	3	0.3
			Wolf	2	0.2
			Mountain lion	2	0.2
			Otter	2	0.2
			Mallard duck	2	0.2
			Fox	1	0.1
			Raven	1	0.1
Total	927	88.0	Total	125	12.0

and are used by mule deer en route to and from crucial winter range located to the south on the East and West Gros Ventre Buttes. Mule deer winter range is limited in Jackson Hole, and these ranges are generally confined to east-, west-, and south-facing slopes and bottomlands at low elevations in the southern portion of Jackson Hole. Some deer are known to irregularly winter along the Snake River depending upon the severity of the winter and/or the availability of artificial foods intentionally or unintentionally provided by humans outside the Park. The number of deer wintering along the Snake River is unknown but appears to be increasing in response to intentional feeding efforts and recent mild winters.

Roads are a source of mule deer mortalities, with 396 road-killed deer documented on park roads between 1992 and 2005 (Table 14). The majority of deer road kills within the Park occur during the summer. Mortality hotspots occur between the south boundary of the Park and Moose, along North Park Road between Moran and Pilgrim Creek, and in the vicinity of Willow Flats (Biota 2003).

Bison (Bison bison)

A population of bison resides in Jackson Hole and uses portions of the project area. Bison use of the Park usually occurs from spring through fall, and animals typically winter on the National Elk Refuge where they exploit supplemental feed provided to the elk. The Jackson population, including calves, was estimated to be approximately 950 to 1,000 animals in early 2006 (S. Cain 2006, pers. comm.). Because of the availability of supplemental feed on the National Elk Refuge and few sources of mortality, the bison herd will likely continue to increase unless controlled.

Within the project area, bison are frequently found south of Blacktail Butte and east of U.S. Highway 26/89/191. They are also occasionally found east of the Teton Park Road between North Jenny Lake Junction and the Signal Mountain area.

Roads are a source of bison mortalities, with 70 road-killed bison documented on park roads between 1992 and 2005 (Table 14). Most bison mortalities have occurred between North Antelope Flats and Moran.

Pronghorn Antelope (Antilocapra americana americana)

Pronghorn antelope are seasonal residents of the project area. Approximately 150 to 250 pronghorn antelope summer in the Park and Gros Ventre River drainage and generally migrate out of Jackson Hole to winter range in

the Green River Basin, approximately 100 miles (160 km) to the south (Sawyer and Lindzey 2000). Historic records and recent research indicate that pronghorn antelope summering in Jackson Hole have migrated as far south as Rock Springs, Wyoming. Pronghorn antelope have been described as opportunistic migrants, because herds may not migrate to specific wintering areas each year (Minta and Campbell 1991). In fact, not all pronghorn antelope leave Jackson Hole every winter, as evidenced by individuals wintering on the National Elk Refuge and East Gros Ventre Butte during the winters of 1976/77, 1986/87, 1992/93 through 1997/98 and 2005/2006 (E. Cole 2006, pers. comm.; Sawyer and Lindzey 2000; Segerstrom 1997). During most years, however, the majority of any pronghorn antelope that attempt to winter in Jackson Hole do not survive because of deep snow. Pronghorn antelope that do migrate into and out of Jackson Hole generally follow a route along the Gros Ventre River, arrive in Grand Teton National Park in May, and depart by late November (Sawyer and Lindzey 2000; Segerstrom 1997). Pronghorn antelope that summer in the Park do not necessarily return year after year, although these particular animals do exhibit high fidelity to winter ranges (Sawyer and Lindzey 2000).

The highest concentrations of pronghorn antelope summering in Jackson Hole occur within the low-lying sagebrush communities on the east and west sides of the Snake River floodplain (Segerstrom 1997), including Baseline Flats, Potholes, Antelope Flats, and Kelly hayfields (Sawyer and Lindzey 2000). Some of these antelope also spend portions of the summer on the National Elk Refuge (Sawyer and Lindzey 2000). Key fawning areas for pronghorns in the Park include the Kelly hayfields, Antelope Flats area, Potholes, Lupine Meadows, and Elk Ranch. Fawning occurs mid-May to mid-July and represents the time of year when this species is most sensitive to human disturbance (J. Berger 2002, pers. comm.). Breeding territories, which are defended by bucks, are also concentrated in Grand Teton National Park. Reproductive rates for pronghorn antelope in Jackson Hole and the upper Gros Ventre River drainage tend to be lower than the rest of the Sublette pronghorn herd to which they belong. This may be because of stress related to a lengthy migration or because there is a higher percentage of barren females that migrate to the Park (Sawyer and Lindzey 2000). It could also be that pronghorn fawns are more susceptible to predation by coyotes (J. Berger 2002, pers. comm.).



Since 1992, 23 road-killed pronghorn have been documented on park roads (Table 14); however, no mortality hotspots have been identified for this species.

Common Mammals

Mammalian predators inhabiting the project area include coyote, bobcat, mountain lion, black bear, badger (*Taxidea taxus*), long-tailed weasel (*Mustela frenata*), short-tailed weasel (*Mustela ermine*), mink (*Mustela vison*), river otter (*Lutra canadensis*), red fox (*Vulpes vulpes*), pine marten (*Martes americana*), skunk (*Mephitis mephitis*), and bats. Small mammals are abundant within the project area and include Uinta ground squirrel, mice, vole, shrew, chipmunk, tree squirrel, raccoon (*Procyon lotor*), marmot (*Marmota* spp.), porcupine (*Erethizon dorsatum*), beaver, muskrat, northern pocket gopher (*Thomomys talpoides*), and snowshoe hare.

Wildlife-Vehicle Collisions

According to Wildlife Incident Reports compiled by the Park, 927 ungulate and 125 non-ungulate species have been involved in documented vehicle collisions between 1992 and 2005 (Grand Teton National Park, unpublished data; Table 14). Nearly 88 percent of animals involved in wildlife-vehicle collisions on park roads during that time were ungulates and included deer (38 percent), elk (31 percent), moose (11 percent), bison (7 percent), and pronghorn antelope (2 percent). Non-ungulate species involved in reported wildlife-vehicle collisions included coyote, porcupine, grizzly bear, black bear, sage-grouse, owl, mountain lion, badger, raccoon, wolf, otter, fox, pine marten, and beaver. One wolf mortality occurred along the road segment between the south boundary and Moose. The other wolf mortality occurred on sections of park roadway outside of the project area. Two grizzly bears have also been killed on park roads. No other threatened or endangered species are known to have been killed by vehicles along any road sections in the Park.

Biota (2003) identified wildlife-vehicle collision “hotspots” throughout Teton County as part of a Jackson area roadway and wildlife crossing study. Within the project area, ungulate “hotspot” collision areas occur near Gros Ventre Junction, Moose Junction, Windy Point, and in the vicinity of Willow Flats near Jackson Lake Dam (Biota 2003). Many physical, biological, and behavioral factors (e.g., sight distance, road width, vehicle speed, weather, roadside vegetation, habitat, migration routes, population size, and traffic) influence

the frequency of vehicle collisions with ungulates. Most of these factors are dynamic, both temporally and spatially, making it difficult to predict ungulate-vehicle collisions accurately. However, some analysis has been completed on factors affecting ungulate-vehicle collisions in Grand Teton National Park. O’Quinn and Wengeler (1997) examined the correlation between visibility (as an artifact of vegetation and topography) and wildlife-vehicle collision location and found that wildlife-vehicle collisions occurred most often in areas with high visibility. McClellen (1997) investigated light conditions in relation to roadkill incidents in the Park and found that about 60 percent of wildlife-vehicle collisions occurred at dusk, dawn, or night. About 70 percent of ungulate-vehicle collisions occurred between June and September (Figure 18), although collisions with moose were more frequent during non-summer months. Figure 19 shows the number of wildlife-vehicle collisions in the Park between 1992 and 2005.

The rate (number per mile) of ungulate-vehicle collisions during summer months was found to vary depending upon the road. For instance, some of the highest rates of ungulate-vehicle collision in the Park occur on U.S. Highway 89 between Moose and Leeks Marina (on average 7.4 ungulate-vehicle collisions per mile); and on U.S. Highway 89 between Jackson Lake Lodge Junction and Leeks Marina (8.68 ungulate-vehicle collisions per mile).

Under existing road conditions and vehicle speeds, the number of ungulates struck and killed by vehicles on an annual basis is generally less than 1 percent of current populations. Mortalities at this level are unlikely to have a negative impact on ungulate populations.

Reptiles and Amphibians

Several species of amphibians and reptiles are present in the Jackson Hole area (Baxter and Stone 1980) and within the project area. These include the tiger salamander (*Ambystoma tigrinum melanostictum*), northern leopard frog (*Rana pipiens*), Columbia spotted frog (*Rana luteiventris*), western boreal toad (*Bufo boreas boreas*), western chorus frog (*Pseudacris triseriata maculata*), wandering garter snake (*Thamnophis elegans vagrans*), valley garter snake (*Thamnophis sirtalis fitchi*), rubber boa (*Charina bottae*), northern sagebrush lizard (*Sceloporus graciosus graciosus*), and perhaps bullsnakes (*Pituophis catenifer sayi*). The majority of these species commonly inhabit wet areas within the Snake River riparian zone and elsewhere on the valley floor and foothill regions (Koch and Peterson 1995), with the exception of rubber boas that are typically found in mesic forested areas with heavy ground cover (Baxter and

FIGURE 18
THE NUMBER OF UNGULATE-VEHICLE COLLISIONS BY MONTH ON ROADS IN
GRAND TETON NATIONAL PARK

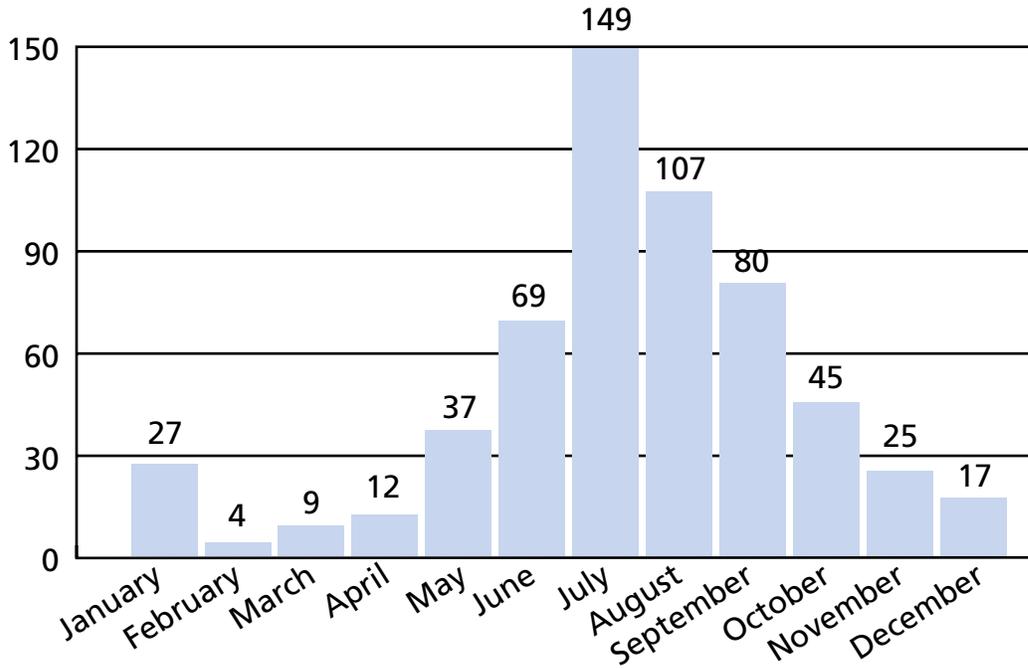
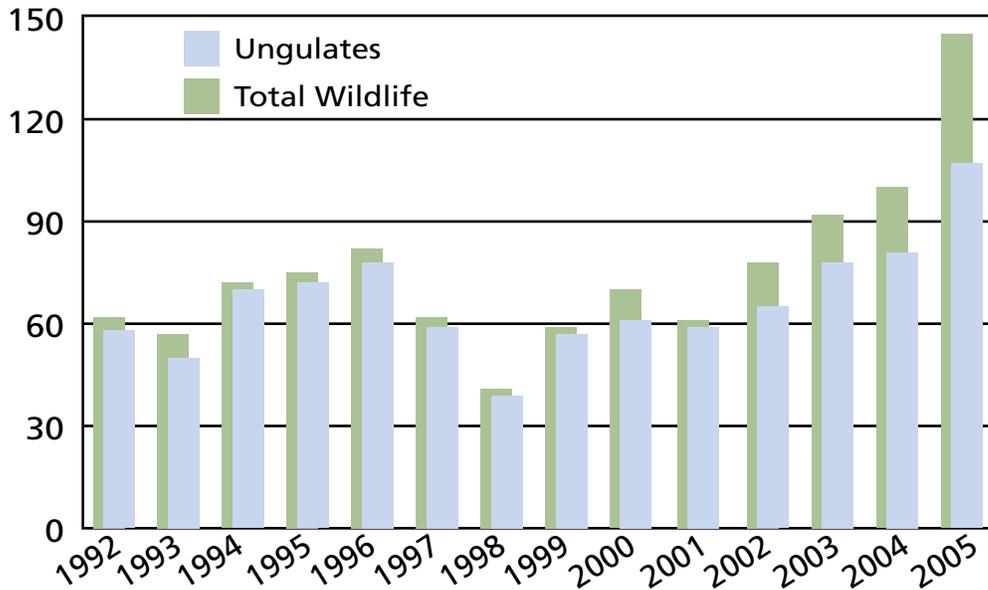


FIGURE 19
DOCUMENTED WILDLIFE/VEHICLE COLLISIONS IN GRAND TETON NATIONAL PARK
BETWEEN 1992 AND 2005



Stone 1980). Populations of most of these species, with the exception of northern leopard frogs and sagebrush lizards, appear healthy and are relatively common in the area.

Western boreal toads are known to occur within both the GYA and Grand Teton National Park. The northern Rocky Mountain population within the GYA, including Jackson Hole and the Park, can be locally abundant but appears to be less widespread than it was in the 1950s (Koch and Peterson 1995). Boreal toads breed in slow moving water along the Snake River and in mesic areas in the foothills, montane and subalpine life zones, willow marshes, and aspen or spruce-fir stands (Baxter and Stone 1980). Boreal toads may move considerable distances from water while foraging and use non-riparian habitats, including forested and sagebrush dominated uplands. Boreal toads feed primarily on ants but their diet also includes adult and larval beetles, moths, and other insects (Baxter and Stone 1980).

Northern leopard frogs were historically present in the Park, but observations confirming their continued existence are lacking (Koch and Peterson 1995). In 1995, an individual leopard frog was documented near Flagg Ranch, the only verified sighting in the Park since the 1950s (Patla and Peterson 2004). It is assumed that this species is extirpated from the Park and does not occur within the project area.

The northern sagebrush lizard is the only lizard species known to occur in the GYA and, specifically, in Grand Teton National Park. Although not often found above 6,000 ft (1,828 m) in the northern Rocky Mountains (Baxter and Stone 1985), it has been documented as high as 8,300 ft (2,529 m) in YNP and Grand Teton National Park in geothermally influenced areas, and as high as 7,000 ft (2,133 m) in non-geothermal areas (Koch and Peterson 1995). Sagebrush lizards have been reported in Grand Teton National Park near the Snake River floodplain, Pilgrim Creek, Bar BC Ranch, and Colter Bay. Although not verified, this species may occur within the project area in small and localized sites. Sagebrush lizards breed in early summer and lay their eggs in loose soil sometime in June. No breeding or nesting areas have been identified in Grand Teton National Park.

Although many species of reptiles and amphibians have been documented along the valley floor and foothill regions of the Park (Koch and Peterson 1995), the project area contains little, if any, suitable breeding habitat. Three wetlands adjacent to the proposed pathway were surveyed for amphibians during the summer of 2005: (1) north of the Beaver Creek housing area, (2) where Taggart Creek crosses the Teton Park Road,

and (3) where the Teton Park Road crosses over Cottonwood Creek (Wolff and Malleck 2005). No amphibians were observed at any of the three survey areas.

The wetlands near Beaver Creek are suitable breeding habitat for amphibians, but no amphibians were observed during surveys. Chorus frogs have been documented in this location in the spring and early summer, indicating that they use this area during the breeding period. Areas adjacent to Cottonwood Creek do not provide suitable breeding habitat for amphibians. The understory along the creek is dense with dead and down and vegetation. Salamanders and other dispersing amphibians and reptiles may use this area after the breeding season. The Taggart Creek area has some potential for breeding amphibians. Beaver ponds adjacent to the road provide slow moving water that is suitable for breeding toads and frogs; however, no amphibians were located during surveys.

Implementation of any projects would avoid wetlands. If avoidance is not feasible, measures would be taken to protect wetlands from damage caused by construction equipment, erosion, siltation, and other activities that potentially could affect wetlands. Because the initiation of these surveys was late in the breeding season, it is recommended that sites of potential impact from the proposed pathway be surveyed earlier in the summer to determine amphibian use during that time.

Cultural Resources

Director's Order #28, "Cultural Resource Management," recognizes the management of five categories of cultural resources: (1) archeological resources, (2) cultural landscapes, (3) ethnographic resources, (4) historic structures, and (5) museum objects. All of these categories, except archeological resources, were dismissed from detailed analysis in Chapter 1.

Archeological Resources

Although less than 10 percent of the lands within Grand Teton National Park have been surveyed, previous archeological surveys within the Park and on adjacent lands suggest a seasonal settlement pattern for the Jackson Hole area. The Park's prehistoric sites represent a wide range of plant, animal, and stone procurement locations, seasonal camps, and plant processing features that represent more than 10,000 years of human use in Jackson Hole.

To date, 194 prehistoric sites are known to exist within the project area, 150 of which have not been evaluated for the NHRP. Thirty-eight have been classified as eligible for

nomination to the National Register and are included in the Jackson Lake archeological district. Two additional sites near Jenny Lake are also eligible, and four prehistoric sites have been evaluated as not eligible for listing (Grand Teton National Park 1990).

Because archeological surveys conforming to the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation have not been completed within many portions of the proposed project areas, additional archeological surveys would be required as site-specific projects are implemented in the future.

Potential and confirmed archeological resources in the project area are as follows:

The Moose-Wilson Road

A cultural resource investigation was completed along the Moose-Wilson Road from the Granite Canyon Entrance Station to Moose in July 2006 to determine its eligibility for listing on the National Register. Documentation was submitted to the SHPO for review for determination of eligibility and the SHPO concurred that the road is eligible for listing. Because the road has been determined eligible for the National Register, the NPS will continue to consult with SHPO before taking any action. Consultation may result in additional mitigation.

Moose Area

University of Wyoming surveys located one large historic site with several rectangular concrete foundations and two prehistoric sites in this area. The archeological field crew hypothesized that the site was used only once for lithic procurement. A recent survey of the Moose Post Office area revealed one new site. The area is believed to be associated with the homestead of Leonard Altenreid. The site consists of a foundation, three depressions, and some isolated historic debris. It is not eligible for the National Register.

Southeast Snake River Location

A recent University of Wyoming archeological survey identified one historic site. The site contains several items of historic debris and is believed to be associated with the homestead of Earl Harris.

Beaver Creek to Lupine Meadows Area

During surveys in the 1970s, five prehistoric archeological sites were identified, all classified as lithic scatters. Virtually nothing is known about these sites, which have not been evaluated for eligibility (Grand Teton National Park 1990). Additional fieldwork and data recovery will be necessary before any construction occurs.

Lupine Meadows Area

Surveys of this area were conducted in the 1970s, and no archeological sites were identified (Grand Teton National Park 1990); however, additional surveys will be needed prior to any construction.

Jenny Lake Area

Three prehistoric sites were recorded in the Jenny Lake area during the 1970s. The best known of these sites is a protohistoric Shoshone site dating to ca. A.D. 1800. This site has not been evaluated for the National Register, and extensive subsurface testing would be required (Grand Teton National Park 1990).

String Lake Area

One prehistoric site has been recorded in this area.

Jackson Lake Dam Area

An archeological survey was conducted during reservoir drawdown for dam repair and the sites identified are now below the elevation of the reservoir (Conner et al. 1987).

Colter Bay Village and Jackson Lake Lodge Area

An intensive archeological survey was performed in and around the Colter Bay Village and Jackson Lake Lodge developments in 1990. No cultural materials were found (Wright 1973). A more detailed investigation will be required prior to any new construction.

Signal Mountain Area

According to a Development/Study Package Proposal, an archeological reconnaissance survey of the Signal Mountain developed area was completed in 1983 and no archeological evidence was found (Connor 1990; Grand Teton National Park 1984).

Mormon Row/Antelope Flats Area

One site has been located near the Mormon Row Historic District and additional investigations could provide insights into the material culture of Mormon Row residents.

Transportation System and Traffic

Roadway System Overview

The affected area for this analysis includes the principal paved and unpaved roadways within the Park, as described below, as well as parking areas located at pullouts, trailheads, and activity centers along these roadway corridors.

There are approximately 140 miles (225 km) of paved and 70 miles (113 km) of unpaved roadway surface within the Park. Key paved roadways include U.S. Highway 26/89/191,



North Park Road (U.S. Highway 89/191/287), and the Teton Park Road. Other paved roads include Gros Ventre Road, most of Antelope Flats Road, most of the Moose-Wilson Road, and various access roads to campgrounds, trailheads, Forest Service lands, etc. Unpaved roadways include a mix of improved (i.e., a portion of the Moose-Wilson Road, Two Ocean Lake Road, and Mormon Row) and unimproved facilities (i.e., RKO Road).

Currently, all paved roadway segments in the Park except one have two through travel lanes (one travel lane in each direction). Some roadway segments include paved shoulders. Lane widths vary from approximately 11 to 12 ft (3.3 to 3.6 m) wide on the main roads but may be somewhat less and variable on secondary roads.

Over most of U.S. Highway 26/89/191, the speed limit is 55 miles per hour (mph), slowing to 45 mph at intersections. On the Teton Park Road and North Park Road, the speed limit is mostly 45 mph. Speed limits on other roadways vary depending on the facility type and location.

The road program for Grand Teton National Park through 2009 consists of one Federal Highway 4R project from Lizard Creek Campground to the Snake River Pit (over Huckleberry Hill); this is on U.S. Highway 89/191/287 or North Park Road. The entire Teton Park Road is in the program as a 3R project, but will be programmed in the next highway/transportation bill. Descriptions of the 3R and 4R projects are provided below. Depending on the outcome of this Final Plan/EIS, the Park can choose to resubmit any of the projects as 4R, which would allow the widening of shoulders.

3R work includes resurfacing, restoration, and rehabilitation. Funds in this category may only be used for work undertaken to extend the service life of an existing road and enhance safety. Work includes the placement of additional surface materials and/or other actions necessary to return an existing roadway, including shoulders, the roadside, and appurtenances, to a condition of structural adequacy. Most 3R work occurs on the existing road bench and generally cannot involve widening beyond the existing road bench or require the construction of new retaining walls, or cuts and fills.

4R work includes road reconstruction or realignment, which consists of altering the geometry of the roadway through widening or modifying the current horizontal and/or vertical alignment. These types of projects are typically much more complex and costly than 3R projects and result in more impacts to resources along the road. The numbers

of roads selected for 4R types of work is limited to only the most critical, high priority segments. Work that will not qualify as 3R work includes paving previously unpaved roads or parking areas, constructing new parking areas or pullouts, widening off the present road bench, realigning and relocating roads (vertical or horizontal realignments), and constructing new bicycling paths.

Vehicle Mix and Vehicle Restrictions

The mix of vehicles in the Park varies by roadway. U.S. Highway 26/89/191 typically experiences the most diverse mix of vehicles, with personal automobiles, motorcycles, RVs, tour buses, inter-city trucks, delivery trucks, and “official” (i.e., NPS and concessioner) vehicles being common. Traffic on the Teton Park Road and North Park Road includes a similar mix, except that the percent of trucks is less because of restrictions on through-trucking. The Moose-Wilson Road is generally open only to personal automobiles. Vehicles with trailers (except for horse trailers), RVs, large tour buses, and trucks are prohibited from using this road. Horse trailers are only allowed to travel the northern section of the Moose-Wilson Road from Moose to Death Canyon Junction and back or to the Granite Canyon Trailhead parking lot from the south and back.

Traffic Volumes

Traffic within the Park is much higher during the summer months than during the rest of the year. Summertime motor vehicle traffic in the Park varies by location, with volumes declining from south to north. For example, average daily traffic on U.S. Highway 26/89/191 in 2005 was around 14,000 vehicles per day between the south boundary and Gros Ventre Junction, 10,500 vehicles between Gros Ventre Junction and Moose, 5,900 vehicles between Moose Junction and Moran Junction, and 3,000 vehicles between Moran Junction and the Park’s east boundary. Average daily traffic on the Teton Park Road is around 6,400 vehicles per day between Moose Junction and Moose, 4,800 vehicles between Moose and Lupine Meadows Junction, 4,400 vehicles between Lupine Meadows Junction and North Jenny Lake Junction, and 3,700 vehicles north of North Jenny Lake Junction.

Exceptions to this general pattern occur on North Park Road and the Moose-Wilson Road. Traffic on North Park Road averages around 5,300 to 5,500 vehicles per day everywhere except for the portion between Jackson Lake Junction and Leeks Junction, where it averages up to 7,800 vehicles per day. Daily summertime traffic on the Moose-Wilson Road averages around 1,600 vehicles on the south end and 2,400 on the north end.

Parking

Overall, there are about 2,000 parking spaces distributed throughout numerous parking areas within the Park. Lots range in size from just a few spaces to more than 400 at Colter Bay. Parking areas at some popular locations, such as South Jenny Lake, sometimes fill to capacity early in the day and stay full through the late afternoon during the peak of the summer season. The Death Canyon Trailhead parking lot also fills early in the day in the peak summer season, with additional vehicles using an overflow area on the roadway shoulders. Taggart Lake, Lupine Meadows, and Granite Canyon are also popular and parking areas fill to capacity at times in the peak summer season, but to a lesser extent than the South Jenny Lake or Death Canyon areas.

The existing roadway, parking, and pedestrian circulation infrastructure in the Moose Headquarters Complex dates back to the early 1960s, a time when park visitation was one-third what it is currently. This circulation infrastructure is used beyond design capacity during the busy summer season. The situation has been further complicated by contemporary developments such as the introduction of temporary modular office buildings for park staff, construction of the new Moose Discovery and Visitor Center, establishing a base of operations for the Western Center for Historic Preservation, and adaptive use of the Murie Ranch. It is anticipated that construction of a pathway through this area would result in even more demand for vehicle parking and increased congestion, consequently impacting visitor satisfaction and safety. In addition, much of the parking area is in a state of disrepair, storm water management is lacking, social trails in riparian habitat are expanding, and emergency response is hampered. The Park intends to correct the situation to the extent that other future project funds allow. Additional compliance may be required.

In 2006, a conceptual design and study process, intended to address all of the aforementioned issues in the Moose Headquarters Complex, was commissioned. The Park is also working with FHWA, as a subpart of proposed pathway alignment, to analyze impacts at the three existing intersections along the Teton Park Road from the Snake River Bridge to the Moose-Wilson Road. Alternative design concepts for the Moose Complex will address the level of service at these intersections, provide enjoyable and safe pedestrian circulation and road crossings, analyze vehicle parking needs, improve emergency response, improve snow and storm water management, consider potential locations for transit hubs (as may be recommended by the

TBP), improve the overall experience for those accessing all the visitor use facilities in the Moose area, and mitigate the impact that the Moose development has on natural and cultural resources.

Public access to the LSR Preserve via a 12-mile network of new walking and horse trails will formally begin in June 2007. A new parking lot will be constructed with a capacity of approximately 50 cars. Traffic volumes along the Moose-Wilson Road are anticipated to increase due to public access to the LSR Preserve and the opening of this new facility, which is a Leadership in Energy and Environmental Design (LEED)-Platinum rated facility, the first such designation in the State of Wyoming and within the entire NPS. Increases in visitation (potentially resulting in parking congestion and traffic) may be reasonably anticipated at this site. It is also anticipated that bicycle rentals will increase at Dornan's after a pathway is constructed along the Teton Park Road and to their property line, adding further parking needs at that site and the nearby Moose Visitor Center parking lots on both the north and south side of the Teton Park Road within the Moose Headquarters Complex.

An observational report of parking conditions was made in July 2005 at two areas within the Park: the South Jenny Lake and String Lake parking areas. Parking congestion occasionally occurs in these areas and parking demand can exceed the number of marked parking spaces. Vehicles were observed parked in locations that did not have marked spaces; in one location, the parking of vehicles in unmarked spaces would have made it difficult for long RVs to maneuver into parking spaces designated for RVs. In addition, passenger cars were observed parked in RV parking spaces (Upchurch 2006).

Based on this observational report, it is apparent that vehicles are parking in unmarked spaces because they are available and they can park "illegally" without obstructing traffic. This suggests that the existing space is not being used efficiently and there is an opportunity to create much more parking in these lots if the space is utilized appropriately (e.g., through re-striping, re-directing traffic flow, allocating sections to compact parking, re-distributing the proportion or number of car spaces to RV spaces, etc.). The other observation that cars were parked in RV spaces because they are open and no car spaces are available is likely an indication that either the proportion of car and RV spaces is disproportionately too high or the location of the RV spaces is not in a strategically appropriate location (Upchurch 2006).



The Park's overall strategy for managing existing parking areas is to strive for no net gain on impervious surfaces and to try to make the best, most efficient use of existing paved areas through modifications. With the proposal of a new pathway system and potential future transit, the Park plans to continue to monitor the most affected and crowded parking areas such that sufficient data are available to determine the actual effects of these new components in the Park. The Park will use this information to determine whether to do larger parking lot re-designs in the future, which is not included as part of this Final Plan/EIS.

This Final Plan/EIS does include, however, minor parking area modifications. These include simple parking lot redesign, reconfiguration of traffic flow, signage, re-striping, allocating sections to compact parking, redistributing the proportion or number of car spaces to RV spaces, and other engineering techniques that could easily improve the efficiency of parking areas and somewhat increase their capacity without increasing the impervious surface in that area.

Several parking areas would be potentially affected by actions proposed in this Final Plan/EIS, including:

1. Multi-Agency Visitor Center Parking Lot (south of park boundary).
2. Dornan's Parking Lot (private property).
3. Moose Visitor Center Parking Lot (existing and new).
4. Windy Point Turnout.
5. Taggart Parking Lot.
6. Teton Glacier Turnout.
7. South Timbered Island Turnout.
8. South Jenny Lake Parking Lot.
9. String Lake Parking Lot.
10. Mountain View Turnout.

The Park's intent is to initially make the best use of the existing space already in place (as mentioned above) and monitor the changes in order to understand what specific modifications are needed to accommodate the new use patterns resulting from new visitor services. All these measures are currently being addressed with the help of FHWA.

Specifically, the portion of the parking lot at South Jenny Lake that is designed for large vehicles utilizes space inefficiently. The lot is the same size as all of the others but has only seven pull-through spaces, which seem to be

utilized at least as much by passenger cars as they are by RVs and/or buses. It is evident that existing space is not being used efficiently and there is an opportunity to create much more parking in these lots if one or more of the minor modifications mentioned above are executed.

The Park plans to continue to work with FHWA on a simple engineering survey and redesign of three of the four main parking lots that would serve as pathway parking nodes: Taggart Lake, South Jenny Lake, and String Lake. Simple redesign constrained to the existing footprint, and changes within this footprint to landscaping, curbing, traffic flow, and striping, would make more efficient use of existing paved surfaces providing more parking and better traffic flow. A comprehensive traffic flow study and efficient redesign of the Moose Headquarters Complex is proposed to start in fiscal year (FY) 2007, after the new Moose Discovery and Visitor Center opens and new traffic flow and parking patterns begin.

The TBP will analyze parking to some extent in that the introduction of a transit system could reduce the need for an unknown number of parking spaces (whether existing or needing to be built). Pathways are not likely to reduce the amount of automobile traffic from visitors to the Park; however, some people may put their bicycle on a bus to get to an area to begin riding. They may also use the bus to access a pathway instead of driving their car; thus, the reduction in need for parking spaces at trailheads, etc.

Transit Service

Transit service in Grand Teton National Park is provided by various private operators, including tour bus and shuttle services, and taxi and car shuttles. No public transit is currently offered to the Park or between points in the Park.

Tour Bus and Shuttle Services

Alltrans/National Park Tours

Alltrans, Inc. and National Park Tours are affiliated companies providing a variety of bus and shuttle services in Jackson Hole and the surrounding intermountain region. The combined bus and shuttle fleet consists of over 30 vehicles, including passenger vans, 35-ft Grumman shuttles, 40-ft regional transit system buses, and over-the-road coaches.

Alltrans, Inc. specializes in contracted winter and summer shuttle services in and around Jackson. The company also operates a year-round shuttle between Jackson and the airport. During peak travel seasons, the airport shuttle is scheduled to meet every departing and arriving plane. During the off-seasons, the shuttle runs on a more limited schedule.

National Park Tours is an affiliate of the Gray Line Network. The company specializes in day tours of YNP and Grand Teton National Park, private charters, tour destination management, and customized tours throughout the intermountain west. The tours of Grand Teton National Park and YNP originate daily from Teton Village and operate via locations in Jackson before proceeding north to the Parks.

Grand Teton Lodge Company

Grand Teton Lodge Company provides shuttle transportation for its guests, employees, and the public from May to October each year. The company operates a fleet of about 10 vehicles, ranging in size from minivans to 45-passenger buses. Summer scheduled services include a shuttle running between the Jackson Lake Lodge and Jackson three times per day (with stops at the Jenny Lake Lodge and South Jenny Lake). The company also provides five scheduled trips between Colter Bay and Jackson Lake Lodge from 7:00 a.m. to 5:00 p.m. daily. In addition, it operates charter shuttle service by advance reservation between its facilities and the Jackson Hole Airport.

Callowishus Park Touring Company

The Callowishus Park Touring Company provides tours through YNP and Grand Teton National Park. The tours operate up to six times per week during the summer, depending on demand. The company operates two vehicles: a nine-passenger van and a five-passenger sports utility vehicle. Passenger pick-up and drop-off occur in and around Jackson and at the intersection of U.S. Highway 89/26 and Gill Avenue.

Teton Science School

The Teton Science School wildlife expeditions offer year-round wildlife viewing trips around Jackson Hole. During summer, the school operates up to five trips per day. The fleet consists of four vehicles, including a 10-passenger van and three six-passenger Suburbans. Passenger pick-up and drop-off takes place at the school and lodges (if requested).

River Float Shuttles

Thirteen concessioners are authorized to operate river floats in the Park. Because of the need to transport float groups up-stream either before or after float trips, all of the concessioners use a shuttle service of one form or another. Some provide service directly from Jackson or lodges in the Park, while others require clientele to drive to the starting point (e.g., Moose) prior to boarding a shuttle for the trip to the boat launch location.

Other Concessioner Shuttles

Several of the other concessioners offer shuttles for guest transportation to activity locations, the airport, town, etc.

Taxis and Car Shuttles

Taxi Service

There are several taxi operators in the Jackson Hole region. One of the most important markets for these operators is travel to and from the airport. Transportation of hikers, anglers, and river floaters, as well as tourists of YNP and Grand Teton National Park, also represents at least a portion of the taxi business.

Car Shuttles

Three companies in the Jackson Hole area offer a car-shuttle service for hikers. The service allows hikers to travel from one trailhead to another. The clients simply leave their car at the origin and the car-shuttle driver drives it to the destination.

Jenny Lake Shuttle Boat

The Jenny Lake Shuttle Boat operates from mid-May to September between the Cottonwood Creek boat dock and the west side of the lake. Jenny Lake Boating operates the shuttle, which departs from each terminal about every 20 minutes. The company also offers a scenic lake tour once per day.

Jenny Lake Boating operates five boats with a capacity of around 19 passengers each. The boats are used for both the shuttle and tour services. The company also rents canoes and kayaks to park visitors.

The majority of shuttle users purchase round-trip tickets. People who purchase one-way tickets typically hike half way around Jenny Lake and ride the shuttle back. In the summer of 2005, ridership on the Jenny Lake Shuttle Boat totaled 127,762 people. The peak ridership month was July, when 44,098 people rode the shuttle.

Non-Motorized Travel

Bicycling has become an increasingly popular activity in the Park despite the lack of designated bicycle lanes and bicycle paths. Evidence of the interest in bicycling occurs each spring prior to opening the Teton Park Road to motor vehicles. After the road is cleared of snow by April 1, it remains closed to motor vehicles until May 1. During this time, it is available for non-motorized uses (i.e., bicycling, walking, and rollerblading). The popularity of these activities, especially with local residents, is evident on most days, and during nice weather, the Taggart Lake parking lot is often filled beyond capacity, with the overflow continuing down the road toward Beaver Creek.



There is currently no system of off-road multi-use pathways available to bicyclists and pedestrians in the Park. Moreover, there are relatively few roads within the Park with the type of wide shoulders preferred by bicyclists. However, several of the low-traffic volume roads in the Park are popular with bicyclists (i.e., Antelope Flats Road, Mormon Row, Jenny Lake Scenic Loop, and Gros Ventre Road). Bicycles are allowed only on paved and unpaved roads unless otherwise posted. Bicycles are not allowed on hiking trails or in backcountry areas.

Bicycle tours and rental bicycles are available to park visitors. For example, bicycles are available for rental at Dornan's and are also available for guests of Jenny Lake Lodge. A limited number of bicycle racks are available at some trailheads and campgrounds.

Most trips made on foot in the Park (other than hiking trips) occur in and around major activity areas. Pedestrians within the activity areas often tend to walk through parking lots or on social trails. Inadequate signing and a lack of clearly identifiable walking paths contribute to this activity, which results in unnecessary auto travel and competition for parking spaces.

Public Transportation

There is currently no true public transportation in the Park. A TBP is being developed as part of this Final Plan/EIS to determine whether it is feasible to begin a public transportation system in and around Grand Teton National Park. The TBP will provide an analysis of potential ridership; routes, stops and schedules; capital and operating costs; infrastructure and rolling stock needs; funding sources and leveraging opportunities; and coordination and partnership opportunities and will follow on previous planning efforts within Grand Teton National Park, as well as Jackson and Teton County, Wyoming.

The TBP will provide the Park with specific information necessary to support a decision on whether to institute a transit system in the Park, and if so, how to operate it effectively and efficiently. This TBP will answer the following questions:

1. What type of transit services may be "workable" in the Park?
2. What coordination is required with other entities (START, Grand Teton Lodge Company, etc.)?
3. What will transit's effect be on parking, traffic, etc.?

Objectives of the TBP include the following:

1. Review current public transportation systems in National Parks to determine models of financing and operations that exist in other locations.
2. Determine what type or types of service would be feasible. Options include fixed-route, demand responsive, flex route, or other service options.
3. Create budgets and other financial estimates that indicate the cost of capital equipment, operational expenses, and any needed facility improvements, including shelters and the associated maintenance costs. Document funding sources that could be invested in the potential transit system.
4. Investigate opportunities to coordinate/collaborate with existing public transportation providers in the area, including both public and private organizations.
5. Provide recommendations on how to proceed with the implementation of a public transportation system in Grand Teton National Park. A recommendation may be that no service is necessary.

Traveler Safety

With 140 miles (225 km) of paved roads and 70 miles (112 km) of unpaved roads, Grand Teton National Park experiences an average of approximately 157 motor vehicle accidents each year (1994-2003). The majority of these accidents is minor and/or results in property damage only; however, about 14 percent result in personal injury. There have been seven traffic fatalities since 1994, two of which were bicyclists. Also of concern are collisions between motor vehicles and wildlife (see Table 14) because there are large numbers of elk, deer, moose, and bison present in the Park.

Pedestrian Crossings

Pedestrian crossings occur at many locations within the Park, primarily within the developed activity areas. Although scenic pull outs have been well designed for accommodating pedestrians and photographers, visitors frequently pull to the side of roads at other locations. Often these stops result in visitors crossing the highway on foot to view wildlife.

Bicycle Riding Along Roadways

Opportunities exist for bicycling throughout the Park; however, bicycles are limited to the same roadways used by automobiles. While bicycling is permitted on park roads, not all visitors are comfortable with sharing the road with high-speed motor vehicle traffic. Road shoulders vary in width from almost non-existent to 5.0 ft (1.5 m). The

inherent and perceived risks of bicycling on road shoulders may discourage some visitors from bicycling altogether, and may adversely affect the experience for others by requiring them to concentrate on traffic and their own safety rather than on the scenic views. Although rare, accidents have the potential to be serious, as represented by the two fatalities in recent years.

Visitor and Employee Use and Experience

Park Visitation Trends

Over the past decade, the total number of recreational visits to Grand Teton National Park has ranged from 2.5 to 2.8 million people per year. The total visitation to the Park, including non-recreational visits, is approximately 4 million persons annually. Most of the non-recreational visits consist of vehicles traveling through the Park on U.S. Highway 26/89/191. While visitation has grown somewhat during winter and spring, it has remained constant during summer and fall (Figure 20).

Approximately 80 percent of all visits to the Park occur between June 1 and September 30, with July and August as the peak months for visitation. Visits during these months

in recent years have averaged around 24 and 21 percent of the annual total, respectively. Between 1994 and 2005, the average daily number of visitors to the Park in July and August was about 20,000 and 18,000, respectively (Figure 21).

In 2005, approximately 5,000 visitors per day spent the night in the Park during July (Figure 22). Overnight visitor facilities include seven campgrounds including two with RV hookups, five lodges, a dude ranch, a hostel-style accommodation, and a 66-unit tent village. Campgrounds are located at Gros Ventre (372 sites), South Jenny Lake (50 sites), Signal Mountain (87 sites), Colter Bay (350 tent/RV sites and the 112 hook-up site RV park), Lizard Creek (61 sites), and Flagg Ranch (75 tent and 100 RV hook-up sites). The lodges include Jenny Lake Lodge (37 units), Signal Mountain Lodge (79 units), Jackson Lake Lodge (385 units), Colter Bay Cabins (166 units), and Flagg Ranch Resort (92 units). Triangle X Ranch and Climbers Ranch operate the dude ranch and hostel-style accommodations, respectively, while Grand Teton Lodge Company runs the tent village, and Grand Teton Lodge Company, Signal Mountain Lodge, and Flagg Ranch Resort operate camping facilities.

**FIGURE 20
RECREATIONAL VISITS BY YEAR AND SEASON**

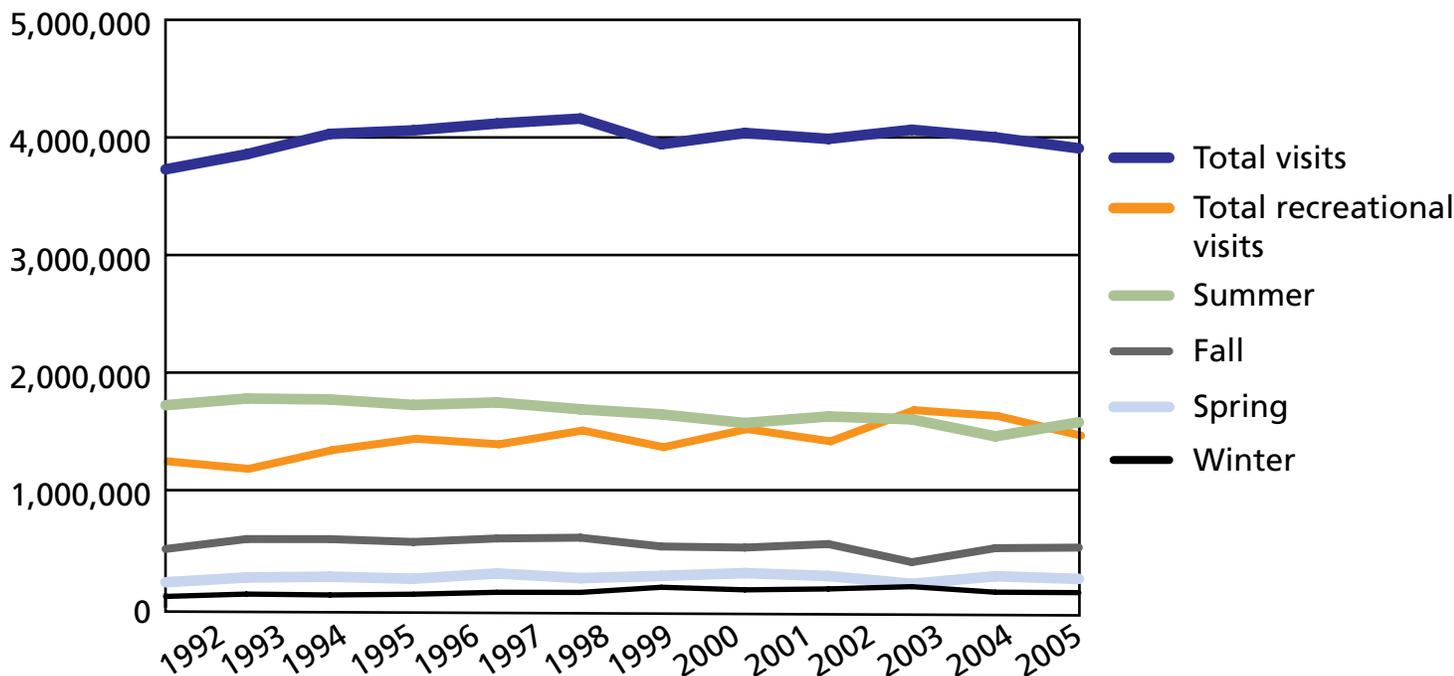


FIGURE 21
AVERAGE DAILY RECREATIONAL VISITS (1994-2005)

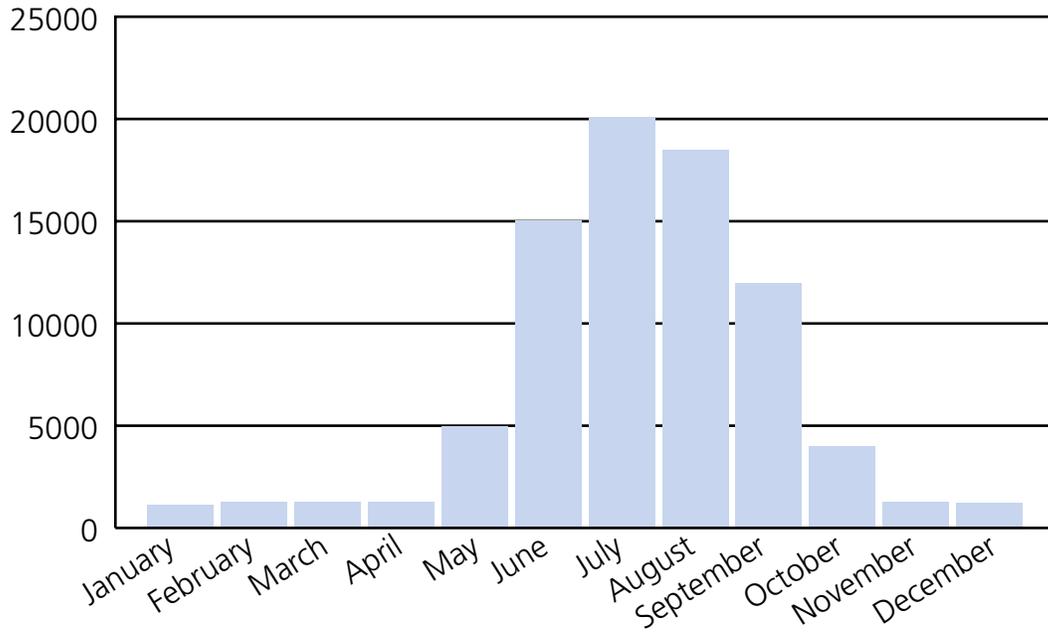
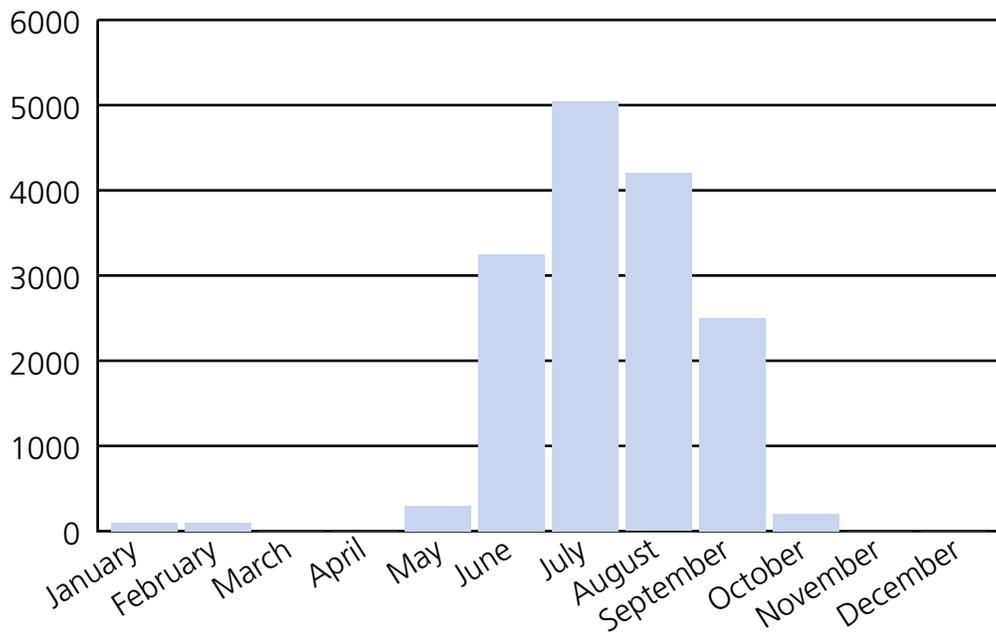


FIGURE 22
VISITORS STAYING OVERNIGHT IN THE PARK, 2005



Visitor Profiles

A survey of visitors in Grand Teton National Park conducted by Littlejohn in July 1997 found that a large proportion of park visitors travel in groups of five or fewer people. Around 88 percent of survey respondents fell into this category. Only about 2 percent of visitors responded that they were traveling with organized tour groups (Littlejohn 1998 [Figures 1 and 3]).

Analysis of the survey data reveals that, for visitors traveling in groups of five or fewer people, the average group size was around 2.8 (Grand Teton National Park 2002). This finding is consistent with the results of surveys conducted in support of this Final Plan/EIS during the summer of 2001, which found that the average occupancy of vehicles traveling inbound to the Park at the Moose Entrance Station was around 3.0 people (Grand Teton National Park 2002).

The 1997 survey data indicate that visitors stay an average of 2 days in the Park. About 45 percent of respondents reported staying less than 1 full day. Among visitors who reported staying in the Park for more than 1 day, the average length of stay was around 3.5 days. According to 2002 survey data, the typical visitor stayed about 4.5 days in the Jackson Hole area, with about 3.3 days spent visiting Grand Teton National Park. The 2002 survey estimated that 92 percent of the visitors are non-local (Loomis and Caughlan 2004).

Visitor Activities

Visitors engage in a wide variety of recreational activities in Grand Teton National Park. Some forms of recreation can be classified as “passive” in character and require comparatively little prior knowledge of the Park, advance planning, or specialized equipment. Examples of passive recreational activities include sightseeing, casual wildlife viewing, casual walking or strolling, shopping, riding the Jenny Lake shuttle boats, and picnicking. Other activities are more “active” in nature and typically require at least some advance knowledge of activity sites or services, some degree of advance planning, and some amount of specialized equipment. Examples of common active recreational activities include longer-distance hiking, backpacking, bicycling, camping, river floating, private boating, canoeing, kayaking, rock climbing, fishing, photography, bird watching, and horseback riding.

Review of the 1997 survey data indicates that the five most common activities include viewing scenery (98 percent), viewing wildlife (88 percent), driving for pleasure (71

percent), stopping at roadside exhibits (59 percent), and shopping (38 percent). These results suggest that a majority of current park visitors limit their activities to the passive rather than the active end of the scale. Only 4 percent of visitors indicated that they engaged in bicycling while visiting the Park.

In summer 2002, a survey found that the most popular recreational activities participated in during summer at Grand Teton National Park differed slightly for non-local and local visitors; bison viewing, hiking, driving for pleasure, and elk viewing were the most popular activities for non-locals, and hiking and boating were the most popular activities for locals. The survey reported that 93 percent of non-locals participated in sightseeing and 70 percent of this group participated in hiking, bison viewing, and driving for pleasure, while 56 percent of locals participated in hiking and sightseeing with the next highest percent (54.5 percent) participating in boating (Loomis and Caughlan 2004).

The survey used a four-point scale to gauge the relative importance of recreation activities. The numbers reflect the average importance on an ordinal scale where one is not important, two is somewhat important, three is important, and four is very important. Thus, the relative magnitude of the numbers provides a useful indicator of the relative importance of a recreation activity in terms of attracting people to the Jackson Hole area. Viewing the mountains was the highest rated recreation activity (3.81 for non-locals and 3.56 for locals). Viewing wildlife in general, and elk and bison in particular, were the next most important reasons for non-local recreation trips in the Jackson Hole area (3.26 and 3.06, respectively) and bicycle/mountain bike riding was rated as 1.54 by non-local visitors and 2.31 by locals (Loomis and Caughlan 2004).

Visitor Travel and Recreational Destinations

The most popular places to visit in the Park include South Jenny Lake, Jackson Lake Lodge, Colter Bay Village, Moose Complex, and points along the Snake River. Other locations that regularly attract visitors include the Moose-Wilson Road, Signal Mountain Summit Road, Signal Mountain Activity Area, Flagg Ranch, String Lake, Antelope Flats/Kelly area, Cunningham Cabin, Menor’s Ferry area, and Two Ocean/Emma Matilda Lakes area.

Visitor Experience and Attitudes

The responses to several questions in the Littlejohn (1998) survey give insight into visitor perceptions and attitudes toward the experience of being in Grand Teton



National Park. When asked to rate the importance of five park features on a scale ranging from “not important” to “extremely important,” 96 percent of park visitors indicated that scenic views were either “very” or “extremely” important to them. Eighty-seven percent indicated native plants and animals as either “very” or “extremely” important to them (Table 15). While 57 percent felt recreational activities were “very” or “extremely” important, 22 percent felt that they were only “somewhat” important or “not” important at all.

Eighty-six percent of park visitors indicated that other visitors and activities did not interfere with their visit.

Among the 14 percent of visitors who indicated other visitors interfered with their enjoyment of the Park, the most frequently mentioned sources included poor driver behavior, crowding, and noise.

Finally, the 1997 survey asked visitors whether they would “support visitor use restrictions and/or reservation systems” as a means of providing a high quality visitor experience and protecting park resources. Forty-seven percent of visitors responded to this question with a “yes,” while another 32 percent were not sure. About 21 percent responded “no.”

TABLE 15
SURVEY RESULTS ON VISITOR ATTITUDES TOWARD FIVE PARK FEATURES

	Percent of Total			
	Not or Somewhat Important	Moderately Important	Very or Extremely Important	Don't Know
Native Plants and Animals	4	8	87	1
Scenic Views	1	2	96	0
Recreational Activities	22	20	57	2
Solitude	13	23	62	2
Quiet	11	23	65	1

Visitor Access and Circulation

Currently, the most common form of visitor access to Grand Teton National Park is the private or rented automobile. For this project, a survey of Jackson Lake Lodge guests was conducted in which 100 percent of survey respondents reported having arrived in the Park either in their own or a rented car, sport utility vehicle, pickup, or van. The camper surveys conducted at the Colter Bay and Gros Ventre campgrounds show similar results (82 percent and 89 percent, respectively). There were no “bicycle campers” in the campgrounds on the survey days (Grand Teton National Park 2002).

Visitors who pass through the Moose Entrance Station also travel mostly by automobile. In the summer 2001 Vehicle Intercept Survey, travel in automobiles accounted for 97 percent of all visitor trips through the Moose Entrance Station. Travel by RV accounted for around 2 percent of visitor trips, while travel by motorcycle, bicycle, taxi, tour bus, or shuttle bus accounted for the remaining 1 percent (Grand Teton National Park 2002).

Similarly, within activity areas, visitors often drive to places rather than walk. This is true even when distances between travel origins and destinations are relatively small. For example, many campers in the NPS campground at Colter Bay drive to the lakeside rather than walk, even though the distance is less than 1,500 ft (457 m) in many instances. Factors that may explain this behavior include a lack of formalized and safe pedestrian facilities and a lack of signs and other way-finding devices. Lack of formalized and safe pedestrian facilities is particularly problematic, as it means that pedestrians frequently must travel through parking lots or along roadsides to reach travel destinations. It also means that social trail formation is more common than it might otherwise be which contributes to resource degradation.

Bicycles are allowed on park roads; however, there is currently no system of multi-use pathways available for bicyclists. Road shoulder widths vary throughout the Park, and the lack of wide shoulders on some segments may discourage some visitors from bicycling or reduce the enjoyment of the activity due to concerns about personal

safety. However, several of the low-volume roads in the Park have proven popular with bicyclists, particularly those riding as part of organized tour groups. Popular low-volume roads include Antelope Flats Road, Gros Ventre Road, and Mormon Row. Indicators of the existing visitor demand for bicycling include the number of bicycle tour groups per season, bicycles per inbound vehicle, bicycles per visitor group, and bicycles per capita among the visitor population. Data collected by the Park Business Resources Division show that organized bicycling tours have numbered approximately 180 per season in recent years, with tour group sizes averaging around 11 or 12 people each (or roughly 1,980 to 2,160 people in total) (K. McMahill 2002, pers. comm.).

Estimates of the other indicators may be derived from the survey data collected during the summer of 2001. For example, the Vehicle Intercept Survey at Moose found that about 2.3 percent of all in-bound vehicles carried one or more bicycles, with the ratio between the total number of bicycles and the total number of vehicles equal to about 0.029 to 1.000. The surveys at Colter Bay and Gros Ventre campgrounds found that about 22 and 23 percent of camper groups, respectively, had one or more bicycles. The Colter Bay and Gros Ventre surveys also found that there were about 0.57 and 0.69 bicycles per campsite and 0.19 and 0.26 bicycles per camper on average, respectively.

Park and Concession Employees

Major employers in Grand Teton National Park include the NPS, park concessioners, and the Jackson Hole Airport. Smaller employers include Dornan's, Teton Science School, Grand Teton Natural History Association, and University of Wyoming – NPS Grand Teton Research Center.

There are approximately 2,280 people who work in the Park during the summer. Winter employment totals around 590 people. Approximately 80 percent of the NPS employees live inside Grand Teton National Park or the JDR Memorial Parkway, and about 43 percent live within walking distance of their worksites. Clusters of residences within the Park are located at Colter Bay (24 percent), Moose (14 percent), Beaver Creek (14 percent), Highlands (7 percent), Lupine Meadows (5 percent), Moran Junction (4 percent), Flagg Ranch (3 percent), and various others (9 percent). Residential locations outside of the Park include Jackson (17 percent of employees), Buffalo Valley (1 percent), areas in Idaho (1 percent), and various others (1 percent). Key NPS work sites include Moose, Beaver

Creek, Lupine Meadows, South Jenny Lake, Colter Bay, and Moran Junction (NPS 2002).

Nearly all concession employees live inside the Park – most within a short distance of their work-sites. The exceptions include some managerial employees who live in places such as Jackson, Buffalo Valley, and Wilson. Key employment locations for concessioners include the Moose area (float trip operators), Climbers Ranch, Lupine Meadows, South Jenny Lake, Jenny Lake Lodge, Signal Mountain Lodge, Jackson Lake Lodge, Colter Bay, Triangle X Ranch, and Flagg Ranch Resort (Charlier Associates 2001). Dornan's is also a major private employment site (though not concession operated). With over 1,000 employees, Grand Teton Lodge Company is by far the largest non-NPS employer in the Park. Its responsibilities include operation of Gros Ventre Campground; Jenny Lake Store, Lodge, and Campground; Jackson Lake Lodge; and all of the activities at Colter Bay (including general store, laundry, restaurants, campground and RV park, Colter Bay Cabins, Colter Bay Tent Village, gas stations, and marina). Signal Mountain Lodge is the next largest employer, with about 150 employees. Triangle X Ranch is third largest, with around 70 employees (Charlier Associates 2001).

Employee Access and Transportation

Employee surveys were conducted during the summer of 2001 in support of this Final Plan/EIS. The surveys were intended to answer questions regarding the travel influences, patterns, and preferences of three distinct employee populations: those of the NPS, Grand Teton Lodge Company, and Signal Mountain Lodge. The survey questions asked respondents to provide information on such things as mode of travel to work, residence location, availability of a driver's license, availability of an automobile, availability of a bicycle, and so forth. The surveys also gave respondents an opportunity to provide open-ended comments on any transportation-related issues. A total of 203 NPS employees (around 60 percent of all employees) completed a survey form. Among this group, approximately 50 percent reported that "driving alone" was their typical mode of travel to work. Other reported travel modes included walking (31 percent), riding a bicycle (10.5 percent), carpooling (7.5 percent), and riding a motorcycle (0.5 percent). Around 98 percent of NPS employees reported access to an automobile or motorcycle. People who lived within a mile or so of their work sites tended to travel more by bicycle and foot compared to those who lived farther away (NPS 2002).



Approximately 158 employees of Grand Teton Lodge Company completed the survey. Modes of travel to work included walking (45.5 percent), driving alone (25 percent), riding a bicycle (20 percent), carpooling (6.5 percent), riding the bus (2 percent), and riding a motorcycle (1.5 percent) (NPS 2002). Grand Teton Lodge Company provides transit service for its employees between Colter Bay and Jackson Lake Lodge, as well as round-trip service to Jackson three times a day. The pattern of responses of Grand Teton Lodge Company employees to the survey tends to reflect the fact that many (particularly those in certain employment categories, such as housekeeping, maintenance, and food service) are not residents of the United States. A large number of employees are from Mexico and Central and South America, while others are from Eastern Europe. Their lack of access to transportation options raises questions about basic mobility and employee satisfaction, particularly considering that their work locations are relatively isolated. For example, in the open-ended comment section of the survey, many employees reported having difficulty traveling to and from Jackson to go shopping, attend church services, etc. (NPS 2002).

Social and Economic Environment

Region of Influence

The socioeconomic region of influence is a two-county area encompassing Teton County, Wyoming, and neighboring Teton County, Idaho. The two-county area determination is based on the location of Grand Teton National Park and the inextricable linkages between visitors attracted to the Park and the economic and social structures of these two counties. In recent years, visitation to Grand Teton National Park has averaged approximately 2.7 million recreational visits. Over 80 percent of the annual visitation to the Park occurs from May through September.

Historically, the local tourism industry was centered in Jackson and catered primarily to a transient visitor population. This transient demand gave rise to an extensive base of visitor-oriented shopping, lodging, and other hospitality establishments and services in Jackson and the surrounding area. There are more than 4,800 lodging rooms, cabins, and other short-term accommodations in the valley (Jackson Hole Chamber of Commerce 2001-2002). Over time, the region's exceptional scenic, wildlife, and outdoor recreation opportunities have gained worldwide recognition and stimulated strong seasonal and second-home development. Such development has become

a driving force in the local economy, spawning a wide range of economic changes, including extensive new real estate development, rapidly rising real estate values, and changes in the composition of the visitor and resident populations. In turn, those changes have fostered concerns regarding open space in Teton County, the linkage between and community interest in sustainable development, economic prosperity, and quality of life.

A consequence of these trends has been the development of a strong economic interdependency between the two Teton counties. That interdependency has evolved over time, primarily in conjunction with a substantial work force commuting into Teton County, Wyoming, from its neighbor. This commuting pattern is one response to housing availability and affordability constraints in Jackson and Teton County, Wyoming, as the area's popularity as a year-round tourism and resort area has grown. This section highlights key economic and social characteristics and trends in the two Teton counties. The primary emphasis is on Teton County, Wyoming, where the most direct relationship between the Park and community exists.

Population, Demographics, and Mobility

The population of Teton County, Wyoming, increased by 63 percent between 1990 and 2000 (Table 16). About 46 percent of the total resided in the Town of Jackson, the sole incorporated municipality in the county. The remaining residents lived in several unincorporated communities, large-tract rural subdivisions, and other outlying areas of the county.

Based on the inventory of lodging accommodations and large number of seasonal residences, the summer population of Teton County, Wyoming, is likely 2 to 2.5 times its resident population. In July, that peak includes almost 7,000 overnight visitors and employees living in the Park.

The population of Teton County, Idaho, increased by 74 percent between 1990 and 2000, and by another approximately 24 percent between 2000 and 2005. Driggs and Victor, the largest towns in Teton County, Idaho, registered populations of 1,132 and 870 residents, respectively, in the 2000 census.

TABLE 16
TETON COUNTY ACTUAL POPULATION GROWTH, 1990-2000, AND ESTIMATED 2005 GROWTH

	Town of Jackson	Teton County, WY	Teton County, ID
1990 – Census	5,127	11,173	3,439
2000 – Census	8,647	18,251	5,999
2005 – Census estimate	*8,825	19,032	7,467
Growth, 1990 to 2005	3,698	7,859	4,028
Percent Growth	72%	70%	117%
* 2003 estimate Sources: U.S. Census Bureau, (a) and (b)			

The average household size in Teton County, Wyoming is 2.36 persons (compared to a statewide average of 2.48 persons) and 2.87 persons in Teton County, Idaho. With a median age of 35.0 years, the population of Teton County, Wyoming, tends to be older than the 31.3 year median of its Idaho neighbor but younger than the statewide average of 36.2 years (U.S. Census Bureau (c)). The differences in household sizes and ages reflect many factors, including the effects of limited housing availability and affordability in the Jackson area in promoting families, particularly those with children. Many families reside elsewhere and at least one household member commutes to work. The area’s amenities and popularity have also prompted retirement-related migration in Teton County, Wyoming.

Housing

The employment and income data provide insights into economic conditions in the region. For many working households and those on fixed incomes, a high cost of living offsets many of the benefits of high wages in Teton County, Wyoming. Local housing costs, driven by a combination of a constrained supply and strong demand, are a major contributor to high living costs. Supply constraints reflect the limited amount of private land in the county. Of the total 2.7 million acres (1.1 million ha) in Teton County, Wyoming, 97 percent is public land, most of which is managed by the federal government. Private lands total only about 76,000 acres (30,750 ha) acres; of that, about 13,600 acres (5,500 ha) are under conservation easements that preclude further development. Consequently, the amount of developable land available to meet residential, commercial, local community service, and other uses is limited.

In 1990, the housing stock of Teton County, Wyoming, numbered 7,060 dwelling units. About one-third of the total was in Jackson. Between 1990 and 2000, the housing

stock increased by 45 percent with the net addition of 3,207 units. About half of the increase occurred within Jackson. In 2000, the housing stock of Teton County, Idaho, totaled 2,632 dwelling units. That total represented a 60 percent expansion compared to the total in 1990. Of the nearly 13,000 total housing units in the two counties, the 2000 census tallied only 657 units actually for sale or rent in the two-county region.

Renters occupied 58 percent of all housing units in Jackson, compared with 43 percent owner-occupancy. Owner-occupancy was the norm elsewhere in the region, with owners occupying 67 percent of occupied units in Teton County, Wyoming, and 74 percent of such units in Teton County, Idaho.

Housing value and monthly rent data from the 2000 census provide insights into the relative housing affordability in the two counties. Based on samples of owner-occupied and renter-occupied dwelling units, the median value of an owner-occupied unit in Teton County, Idaho, is \$133,000. Although higher than the comparable statewide medians of \$96,600 for Wyoming and \$106,300 in Idaho, that value is about 63 percent below the \$364,400 median value in Teton County, Wyoming. However, housing values for non-rental units in Teton County, Wyoming, exclude the many seasonal or recreational use units, which are among those with the highest values.

The likelihood that actual housing values are even higher than reported in the census is suggested by local real estate market data. Sales prices for typical single-family residences ranged from \$150,000 to \$995,000 in 1999, with prices of luxury or “trophy” homes as high as \$7.5 million.

Monthly rents in Teton County, Wyoming, are higher than those in Teton County, Idaho, and the corresponding statewide averages. The median gross monthly rent



reported for Teton County, Wyoming, was \$707 per month in 2000. The median in Teton County, Idaho, was 15 percent lower at \$603, and the comparative statewide averages for Wyoming and Idaho were \$437 and \$515, respectively. A major source of the variance is the large share of rentals in Teton County, Wyoming, with monthly rents of \$1,000 or more.

Local Communities

The affected area for this analysis includes the developing areas of Teton County, Wyoming, surrounding Grand Teton National Park to the east and south; YNP to the north; and the Teton crest, with several small communities on the “Idaho side,” including the western-most portions of Teton County, Wyoming, as well as Teton County, Idaho, to the west.

Lifestyles and Social Conditions

The area’s extensive wildlife and natural resources, outstanding scenic vistas, outdoor recreational opportunities, and western heritage contribute to lifestyles and social conditions valued by residents and visitors alike. Population and economic growth and new development, spurred by individuals seeking to share in or benefit from the area’s increasing popularity, brought about both opportunity and conflict.

Rapid growth was diminishing the small town values and western heritage cherished by so many. Housing had become so scarce that it was forcing some residents to leave the community. Development was beginning to disrupt open ranchlands and natural resources. Improvements in the valley’s infrastructure – transportation, sanitary sewer, parking – lagged sharply behind population and visitation growth (Teton County Planning Department 2000).

Through a community visioning process, “Residents expressed a strong desire to retain a rural western character and a sense of true community. They wished to maintain a socially and economically diverse population...” and were “...committed to preserving open space, affordable housing, and wildlife.”

Guiding principles adopted in the plan were to “...create a sustainable visitor-based economy, not dependent upon growth, and an economy that reflects the unique ...character of Jackson and the outdoor recreational opportunities of Teton County ...” and “...provide property owners and local businesses with as much flexibility as possible in the use and development of their property” (Teton County Planning Department 2000).

The vision also included the preservation of scenic vistas, wildlife diversity and abundance, and good schools and other public infrastructure and services to support community life.

Over the course of time, residents, elected officials, local government entities, civic and community groups, businesses, and other organization have all engaged in efforts focused on realizing dimensions of the vision. Achievements include substantial investment in new infrastructure, including government administrative facilities, schools, the library and hospital, and the START bus system. Local government employment has expanded in response to increasing demand for services. Major expansions of the business community have occurred. Efforts to protect open space and wildlife habitat have resulted in more than 13,000 acres of private land being covered by conservation easements to limit future development. However, a lack of consensus exists in the community with respect to specific goals and objectives expressed in the vision or how best to reconcile the inevitable differences in priorities or conflicts that arise during implementation. Major topics of ongoing interest include affordable housing, land use and the development of rural lands, transportation, the management of Grand Teton National Park and other public lands in the area, how to balance the interests of residents and visitors, and the relationship between Jackson and Teton County in economic, social, and political terms.

Regional Transportation Plan

Teton County, in conjunction with the Town of Jackson, shares a regional comprehensive plan. The plan was updated in 2000 with the addition of Chapter 8, “Regional Transportation Plan.” This plan provides a forecast of future growth and development within the planning area.

A principal focus of the plan is to reduce and manage the impacts of traffic growth occurring in the valley because of population growth and commercial development. The plan sets policies and programs designed to limit traffic growth through a combination of mode shift and land use strategies. Specifically, the plan sets a goal of reducing single occupant vehicle travel to 42 percent of daily person trips, down from 55 percent in 1996. By 2020, “alternative modes” (i.e., walking, bicycling, and transit) would account for 28 percent of daily person trips, up from 15 percent in 1996. The plan also sets policies to focus future development in the existing town as part of a “town as heart” initiative.

Other land use policies included in the plan are the continued use of conservation easements to avoid traffic growth in certain corridors and steering of development into “mixed use villages” suitable for development of improved transit service and pathway networks. One of the most important intended outcomes of the plan is a reduction in forecast 2020 vehicle traffic on key area roadways (many of them state highways) in order to avoid future multi-lane construction projects to the extent possible.

The Regional Transportation Plan calls for a “systematic expansion of the public transit system in Teton County.” Both public and private transit providers are to play a role in this expansion. Transit services that are to be considered as part of this expansion include (among others):

Transit service to popular Grand Teton National Park sites, and provisions for integrating with future Grand Teton National Park transit systems; and, use of the proposed Multi-Agency Campus (MAC) site as a regional transit node and for additional parking opportunities in North Jackson (Regional Transportation Plan, p. 8-30).

The regional pathways program, providing routes for walking and bicycling, is another major emphasis of the plan. The plan states that:

The Town, County, and WYDOT street and roadway systems will be designed to safely accommodate and encourage pedestrian and bicycle use as important modes of travel. A system of separated pathways connecting major origins and destinations in Teton County will be incorporated into the transportation system.

The Town, County, and WYDOT will coordinate with public land management agencies to connect the pathway system and on-street pedestrian/bicycle facilities with pathway and trail systems on federal lands, including Grand Teton National Park, the National Elk Refuge, and the Bridger-Teton and Targhee National Forests” (Regional Transportation Plan, p. 8-33).

Finally, the plan sets average daily traffic in summer and level of service goals for regional arterial roadways, including roadways that provide access to Grand Teton National Park.

Transit Development Plan — START

The Jackson/Teton County Transit Development Plan: 2000-2005 and Long Range was adopted by Teton County and Jackson in June 2000 (Teton County 2000). The Jackson/Teton County Transit Development Plan (TDP) was based on an evaluation of current operations of the START public bus system, including relationships between the START cost structure, routes, service levels, fleet requirements, and other factors. The TDP met state and federal requirements for transit planning to support eligibility for federal transit assistance.

Based on extensive public involvement and on policies articulated in the Jackson Regional Transportation Plan, the TDP provided service recommendations and a financial plan for implementation. The recommendations were based on realization of the 2020 Regional Transportation Plan goals (including a goal of 5 percent of daily person trips on transit) and defined a phased implementation program with a detailed operations plan for the first 5 years (2000–2005). In the first 5 years, the TDP calls for expansion of local route service, including higher frequency service on existing routes as well as additional routes. The TDP recommends initiation of commuter services, including connections to Alpine and over Teton Pass.

Specific TDP elements relevant to Grand Teton National Park include:

Initiate Public Transit Service Between Jackson and Grand Teton National Park (Colter Bay). A limited, public transit service should be initiated between Jackson (MAC) and the Colter Bay area of Grand Teton National Park during the peak summer season. In addition to helping to reduce auto congestion, this service will enhance economic activity in Jackson by encouraging multi-day stays in the community and by increasing the community’s ability to market itself as a “base camp” for visits to the park (TDP, p. 111).

MAC Transit Center. The provision of an efficient transit network in the Jackson Hole region requires an attractive and operational-efficient transit center. The MAC project proposed to be located in north Jackson is recommended as the most feasible location for this central transit center. The facility should accommodate up to six regular route buses at one point in time and should provide heated interior waiting space, restrooms, and a transit information center ...This facility will allow convenient, direct transfers between [local routes] and the Grand Teton National Park route, and will be the terminus for commuter services (TDP, p. 113).



Transit ridership on START routes has grown considerably in recent years. During July 2002, START carried 27,500 rides, up from 10,500 in July 1999. Much of the growth in summer ridership is due to implementation of the Town Square Express – a local route recommended in the TDP. Winter (ski season) ridership on the START system totaled 130,000 rides in 1999 and grew to 204,000 rides in 2002. Again, much of the growth was due to the Town Square Express operating within Jackson.

Jackson Hole Pathways Program

The Jackson Hole Pathways Program is a jointly-funded independent Department of the Town of Jackson under the direction of the Town Administrator. The Pathways Program has adopted the following objectives:

Improve facilities – Systematically complete the Pathways Improvement Program list of on-road and off-road improvements for bicycling, walking, horseback riding, and Nordic skiing.

Increase use – Double the percentage of transportation trips made by bicycling, walking, and other non-motorized modes by 2015.

Enhance safety – Decrease the number of bicycle and pedestrian accidents and multi-user trail conflicts by 10 percent.

Meet needs of all levels of bicyclists – Create a comprehensive network of on-road and off-road facilities that connect neighborhoods and provide safe, convenient access to schools, employment centers, and other destinations, and that are integrated with the roadway and transit systems.

Meet needs of pedestrians, including persons with disabilities – Make all streets and intersections “pedestrian-friendly” and accessible.

Meet needs of equestrians – Create a network of trails and trail access points that connect horse-friendly areas of the county with public lands and provide safe, convenient access to major equestrian destinations.

Meet needs of Nordic skiers – Create a network of winter Nordic trails and trail access points that provide close to home Nordic skiing opportunities on public and private lands.

Increase safety through promoting education and enforcement – Play a constructive role in facilitating the creation of education programs by providing teacher training, curriculum materials, and other support services,

and in facilitating enforcement programs with law enforcement officials, the public, and decision makers.

Encourage and promote bicycling and walking – Shift 10 percent of transportation trips to bicycle and walking modes by 2015; conduct a promotion campaign for bicycling and walking transportation trips.

The Pathways Program has built a network of off-road multi-use pathways radiating outward from Jackson, and has worked with other agencies to build additional pathways. A pathway has recently been completed along Wyoming Highway 390 from its junction with Wyoming Highway 22 to the Park boundary. The Pathways Program has also identified a connection from the town north along U.S. Highway 89/26 to Moose as one of its highest priority segments.

Forecasted Future Growth and Commercial Development

The community’s recent land development pattern has been characterized as residential development that has been spread, somewhat uniformly, over a large area with commercial services concentrated in Jackson and a few, relatively small development nodes in the county. This pattern is expected to continue, in accordance with the currently adopted Land Development Regulations for Jackson and Teton County, Wyoming.

Comprehensive land-use plan forecasts indicate that greater amounts of residential development will occur in the county than in the town over the next 20 years. People living and working in such dispersed development patterns are dependent upon automobiles for transportation. These land use patterns are difficult to serve with alternative modes of transportation (i.e., transit, walking, and biking) and are major contributing factors to projected future traffic congestion.

About 400 building permits are approved each year in rural Teton County, most for residential development. The most active areas of development outside of Jackson are the “South Park” area, southeast of town between the Snake River and the Gros Ventre Range, and the “West Bank” area, including the unincorporated village of Wilson, scattered development along Wyoming Highway 390, and Teton Village just south of the Park. Some continued development is also occurring in and around Jackson Hole Golf and Tennis, just south of the airport, and in Buffalo Valley to the east of the Park along Togwotee Pass Road (U.S. Highway 287).

Based on residential development rates and trends in geographical preferences, by 2020, the community will contain about 12,489 homes; 40 percent of which will be located in Jackson and 60 percent in the unincorporated areas of the county. This is equivalent to an estimated population of 27,600 by the year 2020.

This 2020 forecast represents about 54 percent of total residential development potential in the unincorporated county according to current zoning. As for Jackson, the remaining residential development potential under current zoning and land development regulations is anticipated to be built out before the year 2020, based on the historical trend of residential development growth.

Commercial development, analyzed by employee numbers, is concentrated in Jackson. The community offered about 15,600 jobs in 1996. The Town of Jackson contained businesses that represented about 77 percent of the jobs; unincorporated areas of the county contained the other 23 percent. Based on commercial development trends, by 2020 the community will offer about 27,300 jobs, with Jackson containing 74 percent of the jobs and the unincorporated county containing the remaining 26 percent. These forecasts of commercial development represent about 87 percent of the total commercial development potential according to current zoning.

Within Jackson, recent land development patterns for community commercial services have been moving away from downtown Jackson southward along West Broadway and U.S. Highway 89. As such, the last remaining vacant parcels in west Jackson and in the Jackson Business Park have been developed or approved for development within the last 5 years.

The development area likely to have the most direct relationship with the Park and its transportation program is Teton Village, situated at the base of the Jackson Hole Mountain Resort along Wyoming Highway 390, about 1.0 mile (1.6 km) south of the Granite Canyon Entrance Station. A resort master plan for this area was approved by Teton County in 1998, and the area is at approximately 60 to 70 percent of the approved buildout. Teton County approved an application in 2005 by another landowner, with lands adjacent to Teton Village, for an expansion of the resort master plan, which includes additional dwelling units and commercial space. In addition to the currently approved master plan, the expansion could add several hundred housing units and slightly over 80,000 ft² of commercial space to the resort.

The build out of Teton Village is not explicitly tied to any specific actions being considered by the Park. Clearly, the Moose-Wilson Road provides a direct connection in the summer between Teton Village and the Park, and provides an alternative route to the regional airport via the Park's roadways. However, Teton County has not, in its review and approval of the Teton Village master plan, assumed that the Moose-Wilson Road would be improved in any way or kept open for traffic in the winter months. The county's approval of the resort master plan, and expansion of that master plan, assumes that the Moose-Wilson Road continues to exist in its current state – both in terms of design and in terms of operation and maintenance. Traffic impact studies completed for these projects (and for specific developments within the resort area) assume that the resulting traffic connects elsewhere in Teton County via Wyoming Highway 390 to the south.

Similarly, the county has not contemplated that a direct transit connection would be established between Teton Village and destinations within the Park or other destinations requiring travel through the Park. The extensive evaluation of transit service to Teton Village over the past 5 years has focused on a transit connection between Teton Village and Jackson via Wyoming Highway 390 to the south.

Park Operations

The Grand Teton National Park operational budget for FY 2006 was approximately \$10.1 million, including funds for staff salaries, supplies and materials, and other operational needs. This amount does not include other funds, such as those for construction or special projects, which are allocated on a year-by-year, project-by-project basis.

The Park staff consists of approximately 150 permanent employees and about 200 seasonal employees, most of whom are employed during the busy summer season. The Park staff is organized into several divisions, including Ranger Activities, Interpretation, Science and Resource Management, Facility Management, Business Resources, and Administration.

The Facility Management Division is the largest operational unit in the Park, with a budget of approximately \$3.9 million. The division is responsible for planning, design, construction, operation, and maintenance of all roads, trails, buildings, and utility systems in the Park. The second largest operational unit in the Park is the Ranger Activities Division, with an annual budget of approximately



\$2.0 million. Rangers are responsible for providing visitor services and resource protection, including the management of programs such as law enforcement, wildland and structural fire, search and rescue, fee collection, emergency medical services, and a joint fire/law enforcement/dispatch center with USFS. The division maintains a 24-hour per day operation during the busy summer season; however, hours of operation are reduced at other times of the year, when park activities have decreased.

The Division of Interpretation is responsible for operating park visitor centers and providing a wide variety of informational and educational programs to park visitors. These include guided walks, campfire programs, roving interpretation, and other services, as well as issuing permits for backcountry camping and boating. The division also manages the planning and design of media-based interpretation, such as brochures, site bulletins, wayside exhibits, and other materials.

The Division of Science and Resource Management performs a wide variety of duties associated with stewardship of the Park's natural and cultural resources. This includes research, wildlife and vegetation management activities, control of noxious weeds, and programmatic duties related to ensuring compliance with applicable laws, policies, and regulations.

Development of additional facilities or new operational responsibilities would require a corresponding increase in staffing and budget. Management of new facilities (i.e., multi-use pathways) would require both routine and cyclic maintenance in order to ensure that the new facilities are maintained in good condition. Such maintenance is necessary, not only to ensure that the facilities continue to serve the purpose for which they were constructed but also to reduce life-cycle costs, which would ultimately increase if not properly maintained. Similarly, operational activities associated with new facilities and programs would include additional ranger patrols, production of new informational and interpretive materials, control of invasive weeds along pathway corridors, nuisance bear management, maintenance and repair of road shoulders and pathways, and management and oversight of transit services. Increases in park staff levels in order to address the additional operational requirements also require a corresponding need for housing, vehicles, office space, and administrative services.



CHAPTER 4

Environmental Consequences

Introduction

This chapter describes the methods and assumptions used to analyze impacts of the alternatives described in Chapter 2 and presents the results of the impact analyses. For each alternative, the direct, indirect, and cumulative environmental effects are analyzed for each impact topic presented in Chapter 3.

Methodology and Assumptions for Assessing Impacts

Analysis of the environmental consequences of the alternatives proposed in this document includes an examination of several factors for each resource, including type of impact, duration of impact, and context and intensity of impact. The discussion for each impact topic includes threshold definitions and an analysis of the impacts of each alternative, followed by an assessment of cumulative impacts and a conclusion.

The NPS assumed that the Final Plan/EIS would be in effect for the next 5 to 10 years, during which time there would be a slight to modest increase in visitation and a slight increase in traffic volumes. These assumptions are based on past visitor trends, which show relatively stable visitation numbers since 1993, even during years when the surrounding communities were experiencing a much higher growth rate. Traffic volume assumptions result from the visitation prediction. The NPS understands that several factors would affect visitation and traffic volumes, including general population growth, population growth in the states that contribute the most visitors to the Park, the general state of the economy (especially the cost of fuel), general demographics, and recreational preferences.

Type of Impact

Impacts can be beneficial or adverse, direct or indirect, or cumulative. Beneficial impacts are those that involve a positive change in the condition or appearance of a resource or a change that moves the resource toward a desired condition. Adverse impacts involve a change that moves the resource away from a desired condition or detracts from its appearance or condition. Direct impacts are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by an action and occur later or farther away from the resource but are still reasonably foreseeable. Cumulative impacts

are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

Context, Intensity, Duration

Impacts are described as to their context, intensity, and duration. Context generally refers to the geographic extent of impact (e.g., localized, widespread, or regional). In general, localized impacts have been described by relevant road segment for each alternative (i.e., south boundary to North Jenny Lake Junction, North Jenny Lake Junction to Colter Bay, and the Granite Canyon Entrance Station to Moose). Impact intensity is the magnitude or degree to which a resource would be beneficially or adversely affected. The thresholds used to assess intensity of impact for each resource topic are defined under each impact topic heading. Impact duration refers to how long an impact would last. For the purposes of this Final Plan/EIS, duration of the impact is also specified separately for each impact topic.

Area of Analysis

The area of analysis for impact assessment is defined separately for each impact topic and is identified at the end of the impact thresholds definitions for each topic. The area of analysis serves as the geographic basis for assessment of impacts resulting from the actions proposed under each alternative, as well as cumulative impacts, and includes areas surrounding the Park (as appropriate) for the topic discussed.

Cumulative Impacts

A cumulative impact is described in CEQ regulations (§1508.7) as “the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.” Cumulative impacts can result from individually minor, but collectively major, actions taking place over a period of time.

This analysis addressed the cumulative impacts of each alternative by considering the effects of the alternative combined with the effects of past, present, and reasonably foreseeable future actions identified in and around the project area. The methodology section for each topic identifies the area of analysis, which also applies to the cumulative analysis. Generally, this includes the front



country area of the Park; surrounding communities are also included for some topics. The NPS also identified projects occurring within the jurisdictional areas of Jackson and Teton Village through correspondence and phone calls with county and city governments and federal land managers. Projects include any planning or development activity that was currently being implemented or would be implemented in the reasonably foreseeable future that would contribute to cumulative impacts within the designated areas of analysis for this Final Plan/EIS. Appendix C provides a comprehensive list of such projects.

Impairment Analysis and Unacceptable Impacts

The NPS Management Policies (2001) require analysis of potential effects to determine whether actions would impair park resources. The fundamental purpose of the NPS, established by the Organic Act and reaffirmed by the General Authorities Act (as amended), begins with a mandate to conserve park resources and values. The NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values.

However, the laws do give the NPS the management discretion to allow impacts to park resources and values, when necessary and appropriate, to fulfill the purposes of a park as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS management discretion to allow certain impacts within the Park, it limits that discretion by the statutory requirement that the NPS must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible Park Manager, would harm the integrity of park resources or values. An impact to any park resource or value would constitute impairment, but an impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value, for which conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the Park.
- Key to the natural or cultural integrity of the Park.
- Identified as a goal in the Park's long-term planning or NPS planning documents.

An impact would be less likely to constitute impairment to the extent that it is an unavoidable result, which cannot be further mitigated, of an action necessary

to preserve or restore the integrity of park resources or values. Impairment would result from the NPS activities in managing the Park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the Park. This chapter includes a determination on impairment for all natural and cultural resource impact topics defined in Chapter 1. Impairment analysis and determinations are not required for visitor use and experience (unless the impact is resource-based), park operations, or socioeconomic environment (including economics, employment, housing, and land use).

Adverse impacts determined to have moderate or below (i.e., no impact, negligible, or minor) intensities are not analyzed further (relative to the impairment standard) because of their relatively low magnitude. All major adverse impacts are evaluated using the three-bulleted criteria above. Discussion of impairment is presented in the conclusion section for each impact topic.

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the NPS will also avoid impacts that it determines to be "unacceptable." These are impacts that fall short of impairment but are still not acceptable within a particular park's environment. Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values; however, that does not mean the impact is unacceptable or that a particular use must be disallowed. Unacceptable impacts are impacts that, individually or cumulatively, would:

- Be inconsistent with a park's purposes or values.
- Impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the Park's planning process.
- Create an unsafe or unhealthy environment for visitors or employees.
- Diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values.
- Unreasonably interfere with park programs or activities; an appropriate use of the Park; the atmosphere of peace and tranquility; or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the Park.

In its role as steward of park resources, the NPS must ensure that acceptable park uses would not cause impairment of, or unacceptable impacts on, park resources and values. When proposed park uses and the protection



of park resources and values come into conflict, the protection of resources and values must be predominant. A new form of park use would be allowed within a park only after a determination has been made in the professional judgment of the Park Manager that it will not result in unacceptable impacts. The NPS will always consider allowing activities that are appropriate to the Park, although conditions would preclude certain activities or require that limitations be placed on them.

Visual and Scenic Quality

Methods and Assumptions

Locations of proposed pathway and shoulder improvements and locations of key viewpoints were identified, and view corridors were considered relative to these locations. Also considered was the length of time that an improvement would be seen by the viewer based on the width of the view corridor and the speed at which the viewer would be traveling.

Effects of Alternative 1 — No Action

Grand Teton National Park is world renowned for its spectacular scenery and views of the Teton Range, Jackson Hole, and native wildlife. Views of the Park from within developed areas, road corridors, parking areas, or other locations where development exists typically include some elements of that development; however, under Alternative 1, no additional development would occur in the various viewsheds. Separate entrance lanes would be constructed; however, these would lie in areas that are already developed and would not impact visual resources. Variable messaging

signs and improved signage for pedestrian and wildlife safety would be installed. These signs would be designed and sited in current transportation corridors to minimize their visual intrusion.

The NPS expects visitation to increase slightly over the next 5 to 10 years, resulting in slight increases in motor vehicle traffic. Consequently, views from along road corridors or parking areas could include additional vehicles, and parking areas and turnouts could become busier.

Recognizing the sensitivity of the area in terms of its wildlife and scenic values, the Park proposes to implement adaptive management strategies on the Moose-Wilson Road to help retain the road's existing character. Currently, the accumulation of dust on vegetation adversely affects some foreground views. Because proposed strategies would maintain approximately the same existing traffic volumes on the Moose-Wilson Road, the amount of dust would not likely increase. Overall, Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts on visual quality.

Cumulative Impacts

Cumulative impacts to visual and scenic quality would include additional development and/or modification to the manmade environment undertaken to enhance visitor experience. Within the Park, these projects include construction of a new visitor center at Moose, replacement of the Moose Entrance Station, construction related to the LSR Preserve, upgrades to the Jenny Lake Lodge visitor accommodations and employee housing facilities, reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of

Impact Threshold Definitions	
Negligible	Visitors would likely be unaware of any effects associated with implementation of the alternative.
Minor	Alterations in views would be slight but detectable, would affect few visitors, and would not appreciably limit or enhance visual resources identified as fundamental to the Park's purpose and significance.
Moderate	Many visitors would likely be aware of the effects associated with implementation of the alternative; some changes to visual resources identified as fundamental to the Park's purpose and significance would be apparent.
Major	Most visitors would be aware of the effects associated with implementation of the alternative; changes to visual resources identified as fundamental to the Park's purpose and significance would be readily apparent.
Duration	Short term — effects last 2 years or less.
	Long term — effects last longer than 2 years.
Area of Analysis	Travel routes and destinations within the Park boundary.

Yellowstone, replacement of the Snake River Bridge near Flagg Ranch, and the chip-and-seal project from Moran to Jackson Lake Lodge.

These projects would result in short-term impacts on visual quality during periods of construction. Foreground views in localized areas could include construction equipment, fencing, stockpiled materials, and other intrusions into the natural setting. Construction-related visual impacts would be short term, localized, moderate, and adverse.

The impacts described under Alternative 1, combined with impacts of other actions that could affect visual and scenic quality within the Park, would result in long-term, localized, negligible to minor, adverse cumulative impacts to visual quality. Short-term, localized, moderate, adverse cumulative impacts would occur at locations of construction projects during the period of construction.

Conclusion

Alternative 1 would result in long-term, localized, negligible to minor, adverse effects on visual quality. Cumulative impacts would generally be long term, localized, negligible to minor, and adverse, with short-term, localized, moderate, adverse impacts occurring during brief periods of construction.

Because there would be no major, adverse impacts to visual and scenic quality, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's visual and scenic quality and no unacceptable impacts.

Effects of Alternative 2 — Improved Road Shoulders

In general, the effects of Alternative 2 on visual quality would be similar to those described for Alternative 1, with the exception that road shoulders would be improved to 5 ft (1.5 m) on the Teton Park Road between Moose and Signal Mountain Lodge. This alternative would result in the permanent removal of 13.3 acres (5.4 ha) of vegetation; however, this would occur in areas already disturbed by existing roads, and thus would have a minimal impact on visual resources. In addition, informational kiosks, improved signage for pedestrian and wildlife safety, and six variable messaging signs would be installed in several locations. However, these would be designed and sited to minimize their visual intrusion. Separate entrance lanes would be constructed that lie in areas that are already developed,

and therefore would not impact visual resources. Limiting motorized traffic along Signal Mountain Road would improve the scenic quality along the road for non-motorized users.

Construction of the shoulder improvements, separate entrance lanes, and kiosks or additional signs would result in short-term impacts on visual resources during construction. Visitors would be aware of construction equipment, fencing, stockpiled materials, and other intrusions into the natural setting. Because weather conditions in the Park may preclude staging construction during less-busy seasons, and because some of these areas would be difficult to make inaccessible to visitors while construction is underway, construction-related visual impacts would be short term, localized, moderate, and adverse to the affected road corridor, and would affect both visitors and employees. Long-term effects on visual quality from Alternative 2 would be localized, negligible to minor, and adverse.

Cumulative Impacts

Cumulative impacts under Alternative 2 would be essentially the same as those described for Alternative 1. Overall, the impacts of these related actions, in conjunction with the impacts of Alternative 2, would result in negligible to minor, long-term, adverse cumulative impacts to visual quality within the Park. Moderate, short-term, adverse cumulative impacts to visual resources would occur at the locations of construction projects, during the construction period, and for up to a 1-year recovery period following construction.

Conclusion

Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts on visual quality, with short-term, localized, moderate, adverse impacts during construction of improved shoulders. Cumulative impacts would generally be long term, negligible to minor, and adverse, with short-term, moderate, adverse impacts occurring during periods of construction.

Because there would be no major adverse impacts to visual and scenic quality, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's visual and scenic quality and no unacceptable impacts.



Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

The 23.3 miles (37.3 km) of multi-use pathways outside the road corridor (i.e., 9.4 miles [15.0 km]) from the south boundary to Antelope Flats Road, 10.6 miles [17.0 km] from Moose Junction to North Jenny Lake Junction, and 3.3 miles [5.3 km] from the Granite Canyon Entrance Station to the LSR Preserve) under this alternative would be a new feature, intruding into the foreground views as seen from the affected road corridors, and would be visible by motorists most of the time.

Under this alternative, 5,200 to 7,100 trees in total would be removed and 63.8 acres (25.8 ha) of vegetation permanently removed. The effects from the south boundary to North Jenny Lake Junction would be minor because the views in this area are mainly of the forested areas in the distance and the high peaks of the Teton Mountains.

Construction of a multi-use pathway along a portion of the Moose-Wilson Road could require the removal of 2,925 to 3,725 trees, depending on the specific design, and could alter the existing character of the road corridor where the views are of the foreground rather than distant vistas. Although the pathway would be designed and sited to minimize tree removal and impacts on the visual quality of the area, the new development introduced into the view corridor and the change in character of the views would be obvious to most visitors resulting in moderate to major adverse impacts depending on distance of the pathway from the road.

Improving the shoulder between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]) would also affect visual resources, but to a lesser degree (negligible to minor effects) than pathways because improvements would occur in a previously disturbed area immediately adjacent to the existing road.

The Moose-Wilson Road would be realigned in two areas and the existing alignments would be abandoned and restored to natural conditions. Pavement would be removed, and the roadbed would be regraded and revegetated with the intention of restoring aspen and wetland habitat in this area. The aspen, cottonwood, and mixed deciduous-coniferous forests and wetlands located along this section of the Moose-Wilson Road provide unique habitat for wildlife and distinct vegetative communities. The area to be restored differs importantly from the surroundings, and the road passing through it currently affects its wildlife habitat value. Concurrent to the restoration, two new segments of road would be constructed to replace the sections being

removed, primarily in areas of sagebrush meadow. The new construction would introduce development onto alignments that are not currently developed, but which are near other development (i.e., nearby structures, power lines, other roads). Overall, realignment of the road would result in a change in the viewshed, but the long-term net effect would be localized, minor, and could be considered either beneficial or adverse depending on the point of view of the observer.

Formalizing social trails would reduce resource impacts in non-designated areas and improve visual resources. Other elements of Alternative 3, including the construction of separate entrance lanes and installation of signage for pedestrian and wildlife safety, variable messaging signs, and informational kiosks, would have impacts on visual quality similar to those described in Alternative 2. Overall, actions under Alternative 3 would result in long-term, localized, minor to moderate, adverse impacts on visual quality.

Cumulative Impacts

Cumulative impacts under Alternative 3 would be similar to those described for Alternative 2 but with the added impacts of the pathways and realignment of the Moose-Wilson Road. Overall, the impacts of these related actions, in conjunction with the impacts of Alternative 3, would result in long-term, minor to moderate, adverse cumulative impacts to visual quality within the Park. Short-term, moderate, adverse cumulative impacts to visual resources would occur at the locations of construction projects, during the construction period, and for up to a 1-year recovery period following construction.

Conclusion

Alternative 3 would result in long-term, localized, minor to moderate, adverse impacts on visual quality, primarily because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. Improving the shoulder between North Jenny Lake Junction and Colter Bay and realignment of the Moose-Wilson Road would also contribute to the adverse impacts but to a lesser degree. Short-term, localized, moderate, adverse impacts would result during realignment and construction of improved shoulders and pathways. Cumulative impacts would be long term, minor to moderate, and adverse, with short-term, moderate, adverse impacts during periods of construction.

Because there would be no major, adverse impacts to visual and scenic quality, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the

natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's visual and scenic quality and no unacceptable impacts.

Effects of Alternative 3a — Preferred Alternative

The 22.5 miles (36.0 km) of multi-use pathways outside the road corridor (i.e., 9.4 miles [15.0 km]) from the south boundary to Antelope Flats Road, 10.6 miles [17.0 km] from Moose Junction to North Jenny Lake Junction, 1.5 miles [2.4 km] from North Jenny Lake Junction to String Lake, and 1.0 mile [1.6 km] on Sagebrush Drive and Spring Gulch Road) and the 18.8 miles (30.3 km) of multi-use pathways within the road corridor (i.e., 15.5 miles [25.0 km] from North Jenny Lake Junction to Colter Bay and 3.3 miles [5.3 km] from the Granite Canyon Entrance Station to the LSR Preserve) under this alternative would be a new feature intruding into the foreground views, as seen from the affected road corridors, and would be visible by motorists most of the time.

From the south boundary to North Jenny Lake Junction, the effects from construction of multi-use pathways outside the road corridor would be minor because the views in this area are mainly of the forested areas in the distance and the high peaks of the Teton Mountains. Pathway spurs are proposed in two areas along this segment: North Jenny Lake Junction to String Lake and along Sagebrush Drive and Spring Gulch Road. While impacts to visual resources in these areas would be greater than under Alternative 3, the effects would still be minor.

Construction of multi-use pathways within the road corridor between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]) would have moderate effects on visual resources because of the vegetation removal required in this area. In addition, due to the terrain, pathway construction in this area would require cut and fill actions and retaining walls and guardrails could possibly be installed.

Construction of a multi-use pathway within the road corridor along a portion of the Moose-Wilson Road could require the removal of 2,150 to 2,900 trees, depending on the specific design, and could alter the existing character of the road corridor where the views are of the foreground rather than distant vistas. Although the pathway would be designed and sited to minimize tree removal and impacts on the visual quality of the area, the new development introduced into the view corridor and the change in character of the views would be obvious to most visitors, resulting in moderate to major adverse impacts.

Under this alternative, 17,900 to 23,075 trees in total would be removed and 82.9 acres (33.5 ha) of vegetation permanently removed. Overall, these actions would result in long-term, localized, moderate, adverse impacts on visual quality.

Effects to visual resources from formalizing social trails and realignment of the Moose-Wilson Road would be the same as those described for Alternative 3. Other elements of Alternative 3a, including the construction of separate entrance lanes and installation of signage for pedestrian and wildlife safety, variable messaging signs, and informational kiosks, would have impacts on visual quality similar to that described in Alternative 2.

Cumulative Impacts

Cumulative impacts under Alternative 3a would be essentially the same as those described for Alternative 3 but with the added adverse impacts of the more extensive pathway system, especially in forested areas. Overall, the impacts of these related actions, in conjunction with the impacts of Alternative 3a, would result in long-term, moderate to major, adverse cumulative impacts to visual quality within the Park. Short-term, moderate, adverse cumulative impacts to visual resources would occur at the locations of construction projects, during the construction period, and for up to a 1-year recovery period following construction.

Conclusion

Alternative 3a would result in long-term, localized, moderate, adverse impacts on visual quality, largely because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. Short-term, localized, moderate, adverse impacts would result during construction. Cumulative impacts would be long term, minor to major, and adverse, with short-term, moderate, adverse impacts from construction activities.

The main differences between Alternatives 3 and 3a are as follows: Under Alternative 3a, pathway spurs are proposed in two areas (North Jenny Lake Junction to String Lake and along Sagebrush Drive and the Spring Gulch Road), and a pathway inside the road corridor would be constructed rather than improving the shoulder from North Jenny Lake Junction to Colter Bay. Impacts to visual resources in these areas would be greater under Alternative 3a.

Because there would be no major, adverse impacts to visual and scenic quality, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the



natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's visual and scenic quality and no unacceptable impacts.

Effects of Alternative 4 — Multi-Use Pathways

The 42.6 miles (68.4 km) of multi-use pathways outside the road corridor would be a new feature intruding into the foreground views, as seen from the affected road corridors, and would be visible by motorists most of the time.

From the south boundary to North Jenny Lake Junction, the effects from construction of multi-use pathways outside the road corridor would be minor because the views along this segment are mainly of the areas in the distance and the high peaks of the Teton Mountains. Construction of multi-use pathways outside the road corridor between North Jenny Lake Junction and Colter Bay would have moderate effects on visual resources because of the vegetation removal required in this area. Although the pathway would be designed and sited to minimize tree removal and impacts on the visual quality of the area, the new development introduced into the view corridor would be obvious to most visitors depending on the distance of the pathway from the road (moderate adverse impacts). Along this segment, 21,725 to 23,550 trees would be removed and 28.0 acres (11.3 ha) would be permanently disturbed.

Construction of a multi-use pathway outside the road corridor along the entire the Moose-Wilson Road could require the removal of 6,375 to 7,575 trees, depending on the specific design, and could alter the existing character of the road corridor where the views are of the foreground rather than distant vistas. Although the pathway would be designed and sited to minimize tree removal and impacts on the visual quality of the area, the new development introduced into the view corridor and the change in character of the views would be obvious to most visitors depending on the distance of the pathway from the road resulting in moderate to major adverse impacts.

Under this alternative, 29,950 to 33,775 trees in total would be removed and 85.1 acres (34.4 ha) of vegetation permanently removed. This would result in long-term, localized, moderate to major, adverse impacts on visual quality.

Effects to visual resources from formalizing social trails and realignment of the Moose-Wilson Road would be similar to those described for Alternative 3 but greater than those for Alternative 3a. Other elements of Alternative 4,

including the construction of separate entrance lanes and installation of signage for pedestrian and wildlife safety, variable messaging signs, and informational kiosks, would have impacts on visual quality similar to that described in Alternative 2.

Cumulative Impacts

Cumulative impacts under Alternative 4 would be essentially the same as those described for Alternative 3 but with the added adverse impacts of the more extensive pathway system outside the road corridor, especially in forested areas (North Jenny Lake to Colter Bay and along the entire the Moose-Wilson Road). The impacts of these related actions, in conjunction with the impacts of Alternative 4, would result in long-term, moderate to major, adverse cumulative impacts to visual quality within the Park. Short-term, moderate, adverse cumulative impacts to visual resources would occur at the locations of construction projects, during the construction period, and for up to a 1-year recovery period following construction.

Conclusion

Alternative 4 would result in long-term, localized, moderate to major, adverse impacts on visual quality, largely because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. Short-term, localized, moderate, adverse impacts would result during construction. Cumulative impacts would be long term, minor to major, and adverse, with short-term, moderate, adverse impacts from construction activities.

The main differences between Alternative 3a and Alternative 4 are as follows: Alternative 4 includes the construction of multi-use pathways outside the road corridor rather than within the road corridor from North Jenny Lake Junction to Colter Bay, and construction of multi-use pathways outside the road corridor along the entire the Moose-Wilson Road rather than just to the LSR Preserve, as proposed under Alternative 3a. In addition, the pathway spurs to String Lake and along Sagebrush Drive and Spring Gulch Road would not be constructed under Alternative 4.

Because there would be no major, adverse impacts to visual and scenic quality, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's visual and scenic quality and no unacceptable impacts.

Soils

Methods and Assumptions

Five measures of soils impact are considered in this analysis: soil removal, soil compaction, soil restoration, erosion, and the area of disturbance relative to the area of analysis (i.e., Grand Teton National Park). Activities that may result in impact to soils include improving shoulders, road realignment, and pathways construction.

Impacts to soils were assessed by examining the soils information and mapping for Grand Teton National Park (see Chapter 3). Disturbances were estimated based on the length and estimated width of the proposed pathways or shoulders in each area transected. Impacts from improved road shoulders were estimated by applying an estimated 5-ft (1.5-m) width of permanent vegetation disturbance and a 5-ft (1.5-m) width of temporary construction-related disturbance (i.e., extension of existing shoulders on both sides). Impacts from construction of multi-use pathways were estimated by applying a 14-ft (4.2-m) width of permanent vegetation disturbance plus a 14-ft (4.2-m) width of temporary, construction-related disturbance (i.e., heavy machinery use, grading, or stockpiling) per pathway. The pathways are designed to mitigate soil erosion due to runoff with the inclusion of 2-ft gravel sections on each side of the paved pathway. In all cases, precise pathway locations and exact specifications have not been determined. As a result, some amount of error in disturbance estimates is expected.

Effects of Alternative 1 — No Action

Under Alternative 1, there would be no direct impacts to soils from construction of multi-use pathways or improved road shoulders. However, there would be continued impacts to soils where visitors pull off roadways or parking lots onto adjacent unpaved areas or create social trails. Continued road maintenance may also result in a small loss of soils if repairs or widening occurs adjacent to the existing roadbed, and some impacts to soils could occur from creation of separate entrance lanes. These activities would result in soil compaction and associated loss of productivity along roadways and at the developed activity areas. For example, an extensive social trail network has developed at South Jenny Lake. Compaction also occurs because of vehicles parking on the entry drive shoulder, especially during the popular summer months. An extensive social trail network is also apparent at Colter Bay. Alternative 1 would include installation of roadside variable messaging signs and signage for pedestrian and wildlife safety at locations within and outside the Park. These signs would be located on existing disturbed grounds at roadway shoulders and major intersections, and thus would involve no additional permanent disturbance.

Continued short- and long-term, localized, adverse impacts would be negligible to minor because these impacts would be limited to relatively small and often previously disturbed areas.

Impact Threshold Definitions	
Negligible	Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soil productivity or fertility would be slight.
Minor	The effects to soils would be detectable. Effects to soil productivity or fertility would be relatively small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and likely successful.
Moderate	The effect on soil productivity or fertility would be readily apparent and result in a change to the soil character over a relatively wide area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
Major	The effect on soil productivity or fertility would be readily apparent and would substantially change the character of the soils over a large area in and outside of the Park. Mitigation measures to offset adverse effects would be needed and would be extensive; their success could not be guaranteed.
Duration	Short term — recovers in less than 3 years.
	Long term — requires more than 3 years to recover.
Area of Analysis	Within park boundary.



Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park have the potential to adversely impact soils. These projects include construction of a new visitor center at Moose, replacement of the Moose Entrance Station, construction of the LSR Preserve, rehabilitation of the White Grass Ranch infrastructure, upgrades to the Jenny Lake Lodge visitor accommodations and employee housing facilities, reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone, replacement of the Snake River Bridge near Flagg Ranch, and the chip-and-seal project from Moran to Jackson Lake Lodge. All of these developments would occur in areas where human activities are already concentrated, thus minimizing impacts to soils in previously undisturbed areas. Furthermore, all work would be done using mitigation measures that call for preservation of topsoil and reclamation of disturbed areas with native vegetation. Widening North Park Road would result in the permanent loss of approximately 33 acres (13 ha) of soils along an existing road corridor within the Park. All construction would incorporate mitigation measures to preserve soils and provide for soil and vegetation reclamation.

The impacts of these related actions, in conjunction with the impacts of Alternative 1, would result in negligible to minor, long-term, adverse cumulative impacts to soils within the Park. Alternative 1 would contribute a negligible increment to the overall cumulative impact.

Conclusion

Alternative 1 would result in short- and long-term, localized, negligible to minor, adverse impacts on soils due to the continued use of social trails and illegal off-road parking. Cumulative impacts would be long term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to soils, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's soil resources and no unacceptable impacts.

Effects of Alternative 2 — Improved Road Shoulders

Under Alternative 2, impacts to soils would occur from the same causes as described for Alternative 1, including continued off-road parking and use of social trails,

occasional road maintenance, and construction of separate entrance lanes, with resultant short- and long-term, localized, minor, adverse impacts. Alternative 2 would also include direct and adverse impacts relating to improving shoulders along approximately 17.8 miles (28.6 km) of the Teton Park Road to 5 ft (1.5 m) from Moose Junction to Signal Mountain Lodge. The improvement of road shoulders along the Teton Park Road would permanently remove approximately 13.3 acres (5.4 ha) of primarily gravelly loam soils and cause temporary disturbance of another 13.3 acres (5.4 ha) where construction equipment would be used adjacent to the main work area. Impacts would be short term, localized, adverse, and minor because impacts would not affect a wide area of the Park and areas bordering the shoulders would be revegetated.

Visitor information kiosks would be installed within activity areas on existing disturbed ground and would not result in new net disturbances. Alternative 2 would also include installation of improved signage for pedestrian and wildlife safety and six roadside variable messaging signs at locations within and outside the Park. These signs would also be located on existing disturbed grounds at roadway shoulders and major intersections, and thus would involve no additional permanent disturbance.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would adversely impact soils described under Alternative 1 would also apply to Alternative 2. Overall, impacts of these actions (in conjunction with impacts of Alternative 2) would result in long-term, negligible to minor, adverse impacts to soils within the Park. Alternative 2 would contribute only a negligible amount to overall cumulative impacts.

Conclusion

Alternative 2 would result in short- and long-term, localized, minor, adverse impacts to soils due to continued use of social trails, illegal off-road parking, and construction of improved shoulders along a portion of the Teton Park Road. Cumulative impacts would be long term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to soils, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's soil resources and no unacceptable impacts.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Actions proposed under Alternative 3 would reduce the use of off-road parking and creation of social trails near roadways that have been causing long-term, negligible to minor, adverse impacts to soils in localized areas around the Park. The construction of multi-use pathways and improved shoulders and improvement of selected social trails in developed areas would result in a permanent loss of soils; however, because these areas have already been disturbed, new impacts would be limited.

Construction of multi-use pathways outside the road corridor along approximately 23.3 miles (37.3 km) of roads would permanently remove soils (approximately 63.8 acres [25.8 ha], mainly gravelly loam) and cause temporary disturbance to approximately 63.8 additional acres (25.8 ha). Overall, 5,200 to 7,100 trees would be removed under this alternative.

From the south boundary to North Jenny Lake Junction, the effects to soils from pathway construction outside the road corridor would be minor. The majority of this area is relatively flat and is comprised of mainly shrub cover type; therefore, erosion from the site is expected to be low. Construction of a multi-use pathway along a portion of the Moose-Wilson Road could require the removal of 2,150 to 2,900 trees, depending on the specific design, and could result in increased soil erosion in some areas, resulting in minor to moderate effects.

Improving road shoulders along the Teton Park Road and North Park Road between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]) would permanently remove approximately 4.1 acres (1.7 ha) of gravelly loam soils and cause temporary disturbance of another 4.1 acres (1.7 ha) where construction equipment would be used adjacent to the main work area. Effects to soils would be minor and less than pathway construction in this area because construction disturbance would occur in a previously disturbed area immediately adjacent to the existing road.

The Moose-Wilson Road would be realigned in two areas and the existing alignments would be abandoned and restored to natural conditions. Pavement would be removed and the roadbed would be regraded and revegetated with the intention of restoring aspen and wetland habitat in this area. This would result in the restoration of approximately 5.0 acres (2.0 ha) of soils along the abandoned road alignment (where pavement

would be removed and the area graded and reseeded). Approximately 3.9 acres (1.6 ha) of soils would be redisturbed along the new alignment, which follows an old roadbed. In the long term, restoration of habitat in this area would result in negligible to minor, localized, beneficial impacts to soil resources.

Separate entrance lanes would be constructed in areas that are already developed, and therefore would result in minor impacts during construction. Visitor information kiosks would be installed within activity areas on existing disturbed ground and would not result in new net disturbance. Alternative 3 would also include installation of improved signage for pedestrian and wildlife safety and six roadside variable messaging signs at locations within and outside the Park. These signs would also be located on existing disturbed grounds at roadway shoulders and major intersections, and thus would involve no additional permanent disturbance.

Creation of the pathway system would discourage social trail development, and information at kiosks and additional signs would direct visitors to stay on designated routes. However, creation of such a pathway system could also result in additional social trails in areas where views or wildlife are outstanding. Interpretive exhibits would be installed in these areas to call attention to the resource and remind visitors to stay on the designated pathway.

Long-term, localized, negligible, beneficial impacts are expected to result from visitors using established pathways. However, the creation of the paved pathways and shoulders would result in direct, long-term, localized, moderate, adverse impacts confined to areas of multi-use pathway development, which would be located in relatively undisturbed areas off the main roadways. Short-term, localized, minor, adverse impacts would occur where construction disturbs soils, which would then be reclaimed and revegetated. Long-term adverse impacts in these areas would be negligible.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would adversely impact soils would be the same as for Alternative 1. The impacts of these related actions, in conjunction with the impacts of Alternative 3, would result in long-term, minor to moderate, adverse cumulative impacts to soils within the Park. Alternative 3 would contribute only a small amount to overall cumulative impacts.



Conclusion

Alternative 3 would result in short- and long-term, localized, minor to moderate, adverse impacts to soils, as well as long-term, localized, negligible, beneficial impacts to soils, primarily because of the construction and eventual use of a multi-use pathway system and improved road shoulders, as well as the improvements and delineation of social trails. Short-term, localized, minor, adverse impacts would occur at locations of construction projects. Cumulative impacts would be long term, minor to moderate, and adverse.

Because there would be no major, adverse impacts to soils, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's soil resources and no unacceptable impacts.

Effects of Alternative 3a — Preferred Alternative

Actions proposed under Alternative 3a would reduce the use of off-road parking and creation of social trails near roadways that have been causing negligible to minor, long-term, adverse impacts to soils in localized areas around the Park. The construction of multi-use pathways and improvement of selected social trails in developed areas would result in a permanent loss of soils; however, since these areas have already been disturbed, new impacts would be limited.

The main differences between Alternative 3 and Alternative 3a are as follows: Alternative 3a includes the addition of pathway spurs in two areas (North Jenny Lake Junction to String Lake and along Sagebrush Road and Spring Gulch Drive), construction of a pathway within the road corridor rather than a widened shoulder from North Jenny Lake Junction to Colter Bay, and construction of a pathway within the road corridor along a portion of the Moose-Wilson Road rather than outside the road corridor.

Construction of multi-use pathways outside the road corridor (along approximately 22.5 miles [36.0 km]) and pathways within the road corridor (along approximately 18.8 miles [30.3 km]) would be a new feature and would permanently remove soils (approximately 76.0 acres [31.0 ha], mainly gravelly loam) and cause temporary disturbance to approximately 76.0 additional acres (31.0 ha). Overall, 17,900 to 23,075 trees would be removed under Alternative 3a.

From the south boundary to North Jenny Lake Junction, the effects from construction of multi-use pathways outside the road corridor would be the same as described for Alternative 3 (i.e., minor and localized), except for the two pathway spurs. The spurs are proposed in two areas along this segment: North Jenny Lake Junction to String Lake and along Sagebrush Drive and the Spring Gulch Road. While impacts to soils in these areas would be greater than under Alternative 3, the overall effects would still be minor and localized.

Construction of road features and pathways within the road corridor between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]) would have moderate localized effects on soils because of construction within the road corridor. Due to the terrain, pathway construction in this area would require cut and fill actions and retaining walls could possibly need to be installed. In addition, some degree of vegetation removal within the road corridor would likely be required in this area that could result in increased soil erosion. Widening and construction of paths in this section would permanently remove approximately 25.0 acres (10.0 ha) of gravelly loam soils and cause temporary disturbance of another 25.0 acres (10.0 ha) where construction equipment would be used adjacent to the main work area.

Construction of a multi-use pathway within the road corridor along a portion of the Moose-Wilson Road could require the removal of 2,150 to 2,900 trees, depending on the specific design, and could affect soils. Less vegetation removal would be required than under Alternative 3 because the pathway would be constructed within rather than outside the road corridor. Although the pathway would be designed and sited to minimize effects, soil disturbance would occur and could result in soil erosion in some areas. Adverse effects are expected to be short term, minor and localized.

Similar to Alternative 3, the north end of the Moose-Wilson Road would be realigned in two locations: (1) from one-third mile north of Death Canyon Road to Sawmill Pond Overlook and (2) in the vicinity of the junction with the Teton Park Road. This would result in the restoration of approximately 5.0 acres (2.0 ha) of soils along the abandoned road alignment, where pavement would be removed and the area graded and reseeded. Approximately 3.9 acres (1.6 ha) of soils would be redisturbed along the new alignment, which follows an old roadbed. In the long term, restoration of habitat in this area would result in localized, negligible to minor, beneficial impacts to soil resources.

Separate entrance lanes would be constructed in areas that are already developed, and therefore would result in minor impacts during construction. Visitor information kiosks, improved signage for pedestrian and wildlife safety, and six roadside variable messaging signs would be located as in Alternative 3, and thus would involve no additional permanent disturbance. Creation of the pathway system would discourage social trail development, and information at kiosks and additional signs would direct visitors to stay on designated routes. However, creation of such a separated pathway system could also result in additional social trails in areas where views or wildlife are outstanding. Interpretive exhibits would be installed in these areas to call attention to the resource and remind visitors to stay on the designated pathway.

Long-term, localized, negligible, beneficial impacts are expected to result from visitors using established pathways. However, creation of the pathways and shoulders would result in direct, short- and long-term, localized, moderate, adverse impacts, confined to areas of multi-use pathway development, which would be located in relatively undisturbed areas off the main roadways. Short-term, localized, minor, adverse impacts would occur where construction disturbs soils, which would then be reclaimed and revegetated. Long-term adverse impacts in these areas would be negligible.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would adversely impact soils would be the same as for Alternative 1. The impacts of these related actions, in conjunction with the impacts of Alternative 3a, would result in long-term, minor to moderate, adverse cumulative impacts to soils within the Park. Alternative 3a would contribute a moderate amount to overall cumulative impacts.

Conclusion

Alternative 3a would result in short- and long-term, localized, moderate, adverse impacts to soils, as well as long-term, localized, negligible, beneficial impacts to soils, primarily because of the construction and eventual use of a multi-use pathways system, as well as the improvements to and delineation of social trails. Short-term, localized, minor, adverse impacts would occur at locations of construction projects. Cumulative impacts would be long term, minor to moderate, and adverse.

Because there would be no major, adverse impacts to soils, for which conservation is (1) necessary to fulfill specific

purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's soil resources and no unacceptable impacts.

Effects of Alternative 4 — Multi-Use Pathways

Actions proposed under Alternative 4 would reduce the use of off-road parking or creation of social trails near roadways that have been causing negligible to minor, long-term, adverse impacts to soils in localized areas around the Park. The construction of multi-use pathways and improvement of selected social trails in developed areas would result in a permanent loss of soils; however, because these areas have already been disturbed, new impacts would be limited.

The main differences between Alternative 3a and Alternative 4 are as follows: Alternative 4 includes the construction of multi-use pathways outside the road corridor rather than within the road corridor from North Jenny Lake Junction to Colter Bay, and construction of multi-use pathways outside the road corridor along the entire the Moose-Wilson Road rather than just to the LSR Preserve. In addition, the pathway spurs to String Lake and along Sagebrush Road and Spring Gulch Drive would not be constructed under Alternative 4.

Construction of multi-use pathways outside the road corridor along approximately 42.6 miles (68.4 km) of roads would be a new feature and would permanently remove soils (approximately 81.0 acres [33.0 ha], mainly gravelly loam) and cause temporary disturbance to approximately 81.0 additional acres (33.0 ha). Under this alternative, 29,950 to 33,775 trees would also be removed, compared to a range of 17,900 to 23,075 under Alternative 3a, and 5,200 to 7,100 under Alternative 3.

From the south boundary to North Jenny Lake Junction, the effects from construction of multi-use pathways outside the road corridor would be the same as for Alternative 3 (i.e., minor and localized). Construction of multi-use pathways outside the road corridor between North Jenny Lake Junction and Colter Bay would have moderate localized effects on soils because of the potential for removal of large amounts of vegetation in this area that could lead to soil erosion. Construction of improved road shoulders between Signal Mountain Lodge and Jackson Lake Dam (2.0 miles [3.2 km]) would permanently remove



approximately 0.9 acres (0.4 ha) of gravelly loam soils and cause temporary disturbance of another 0.9 acres (0.4 ha) where construction equipment would be used adjacent to the main work area. Although a greater number of acres of vegetation would be impacted on this section (i.e., North Jenny Lake Junction to Colter Bay) under Alternative 4 than either Alternatives 3 or 3a, less soil disturbance would occur compared to Alternative 3a because far less cut and fill would be required with construction of multi-use pathways outside the road corridor.

Construction of a multi-use pathway outside the road corridor along the entire the Moose-Wilson Road could require the removal of 6,375 to 7,525 trees, depending on the specific design, and could result in increased soil erosion in some areas, resulting in minor to moderate effects.

Similar to Alternatives 3 and 3a, the north end of the Moose-Wilson Road would be realigned in two locations: (1) from one-third mile north of Death Canyon Road to Sawmill Pond Overlook and (2) in the vicinity of the junction with the Teton Park Road. This would result in the restoration of approximately 5.0 acres (2.0 ha) of soils along the abandoned road alignment, where pavement would be removed and the area graded and reseeded. Approximately 3.9 acres (1.6 ha) of soils would be redisturbed along the new alignment, which follows an old roadbed. In the long term, restoration of habitat in this area would result in localized, negligible to minor, beneficial impacts to soil resources.

Separate entrance lanes for the Moose Entrance Station would be constructed in areas that are already developed, and therefore would result in minor impacts during construction. Visitor information kiosks, improved signage for pedestrian and wildlife safety, and six roadside variable messaging signs would be located as in Alternatives 3 and 3a, and thus would involve no additional permanent disturbance. Creation of the pathway system would discourage social trail development, and information at kiosks and additional signs would direct visitors to stay on designated routes. However, creation of such a separated pathway system could also result in additional social trails in areas where views or wildlife are outstanding. Interpretive exhibits would be installed in these areas to call attention to the resource and remind visitors to stay on the designated pathway.

Long-term, localized, negligible, beneficial impacts are expected to result from visitors using established pathways. However, creation of multi-use pathways and improved shoulders would result in direct, long-term, localized,

moderate, adverse impacts, confined to areas of multi-use pathway development, which would be located in relatively undisturbed areas off the main roadways. Short-term, localized, minor, adverse impacts would occur where construction disturbs soils, which would then be reclaimed and revegetated. Long-term, adverse impacts in these areas would be negligible.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would adversely impact soils would be the same as for Alternative 1. The impacts of these related actions, in conjunction with the impacts of Alternative 4, would result in long-term, minor to moderate, adverse cumulative impacts to soils within the Park. Alternative 4 would contribute a moderate amount to overall cumulative impacts.

Conclusion

Alternative 4 would result in long-term, localized, moderate, adverse impacts to soils, as well as long-term, localized, negligible, beneficial impacts to soils, primarily because of the construction and eventual use of a multi-use pathways system, as well as the improvements to and delineation of social trails. Short-term, localized, minor, adverse impacts would occur at locations of construction projects. Cumulative impacts would be long term, minor to moderate, and adverse.

Because there would be no major, adverse impacts to soils, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's soil resources and no unacceptable impacts.

Vegetation (including Plant Species of Special Concern)

Methods and Assumptions

Vegetation impacts considered in this analysis include loss of native vegetation permanently removed because of transportation infrastructure construction and maintenance, as well as the expected expansion of weed populations and associated weed control and monitoring along new pathways. In addition, impacts to plant species of special concern are addressed in this section.

Impacts to vegetative cover types were assessed using the same general approach as applied to soils. Information gathered on park vegetation cover types is described in

Chapter 3, including the type of vegetative cover found along the road corridors that would be disturbed under the proposed alternatives. Disturbances were estimated based on the length and expected width of the proposed pathways or shoulders in each area transected. Impacts from improved road shoulders were estimated by applying an expected 5-ft (1.5-m) width of permanent vegetation disturbance and a 5-ft (1.5-m) width of temporary construction-related disturbance (i.e., extension of existing shoulder on both sides). Impacts from construction of separated multi-use pathways were estimated by applying

a 14-ft (4.2-m) width of permanent vegetation disturbance plus a 14-ft (4.2-m) width of temporary, construction-related disturbance (i.e., heavy machinery use, grading, or stockpiling). For estimating the number of trees removed, a 16-ft (4.8-m) pathway was used (14 ft plus 1-ft tree clear zone on either side). In all cases, precise pathway locations and exact specifications have not been determined. As a result, some amount of error in disturbance estimates is expected.

Impact Threshold Definitions	
Negligible	No native vegetation would be affected, or some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations. The effects would be on a small scale.
Minor	The alternative would temporarily affect some individual native plants and would also affect a relatively minor portion of that species' population. Mitigation to offset adverse effects could be required and would be effective.
Moderate	The alternative would affect some individual native plants and would also affect a sizeable segment of the species' population over a relatively large area. Mitigation to offset adverse effects could be extensive but would likely be successful.
Major	The alternative would have a considerable effect on native plant populations and would affect a relatively large area in and outside of the Park. Mitigation measures to offset the adverse effects would be required and would be extensive; success of the mitigation measures would not be guaranteed.
Duration	Short term – recovers in less than 3 years.
	Long term – requires more than 3 years to recover.
Area of Analysis	Within park boundary.

Plant Species of Special Concern	
Negligible	A small number of individual plants and/or a small amount of their respective habitat would be adversely affected via direct or indirect impacts associated with a given alternative. Populations would not be affected or the effects would be below a measurable level of detection. Mitigation measures would not be warranted.
Minor	Effects to individual plants and/or their respective habitats would be more numerous and detectable. Populations would not be affected or the effects would be below a measurable level of detection. Mitigation measures would be needed and would be successful in reducing adverse effects.
Moderate	Effects to individual plants and their habitat would be readily detectable, with consequences occurring at a local population level. Mitigation measures would likely be needed to reduce adverse effects and would likely be successful.
Major	Effects to individual plants and their habitat would be obvious and would have substantive consequences on a regional population level. Extensive mitigation measures would be needed to reduce any adverse effects; their success would not be guaranteed.
Duration	Short term: Impact lasts 1 to 5 years and can be easily reversed.
	Long term: Impact lasts 6 or more years and cannot be easily reversed.
Area of Analysis	Within park boundary.



Effects of Alternative 1 — No Action

Under the No Action Alternative (Alternative 1), there would be no direct impacts to vegetation from construction of new transportation or information kiosks/signs. Impacts to vegetation would be limited and occur only where continued road maintenance activities would temporarily disturb vegetation near work locations and in areas where visitors pull off the road or use social trails. Maintenance activities would require revegetation and other mitigation to control dust, noxious weeds, and erosion of the soil base. Impacts to vegetation near roadways, parking lots, and along social trails would continue from localized trampling, which would result in breakage, loss of productivity, and eventual loss of vegetation in certain areas. These actions, plus the limited disturbance from road maintenance, would result in long-term, localized, negligible to minor, adverse impacts to vegetation, mainly confined to areas that have already been disturbed.

Plant Species of Special Concern

No individuals or populations of federally listed plants are present in Grand Teton National Park. Three plant species of special concern would be present within the project area. The largeflower triteleia (*Triteleia grandiflora*) grows within 5 ft (1.5 m) of the Moose-Wilson Road, and the flat-top broomrape (*Orobanche corymbosa*) grows along a dirt road south of Moose. Under Alternative 1, several management strategies would be tested along the Moose-Wilson Road, such as restrictions on motorized vehicles, potential closures, etc. Before any actions are taken that could adversely affect the area bordering the road, a rare plant survey would be conducted prior to implementation of the decision. Therefore, no (or negligible) direct or indirect effects to these plant species of special concern are expected to result from implementation of Alternative 1. Current use of the road and associated increased generation of dust would not adversely impact sensitive plants growing along or in the vicinity of the Moose-Wilson Road.

The third species of special concern, Teton wirelettuce (*Stephanomeria fluminea*), may occur along the streambanks of the Snake River or its tributaries on the eastern side of the project area. Alternative 1 would not affect this species since no actions are proposed for these areas.

Cumulative Impacts

Several recent, current, and planned projects within the Park would adversely affect vegetation. These projects include construction of a new visitor center at Moose,

replacement of the Moose Entrance Station, construction related to the LSR Preserve, upgrades to the Jenny Lake Lodge visitor accommodations and employee housing facilities, reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone, replacement of the Snake River Bridge near Flagg Ranch, and the chip-and-seal project from Moran to Jackson Lake Lodge. All of these developments would occur in areas where human activities are already concentrated, thus minimizing impacts in previously undisturbed areas. Furthermore, mitigation measures would be implemented that preserve topsoil, reclaim with native vegetation, and control erosion, noxious weeds, and possible spills of oils or other fuels used in construction equipment. Widening of North Park Road would result in the permanent loss of approximately 33.0 acres (13.0 ha) of vegetation along an existing road corridor within the Park. All of these projects would also result in the permanent loss of vegetation along existing road corridors or on developed sites and short-term construction-related disturbance where vegetation is disturbed; however, reclamation/replanting would occur in those areas.

The ecosystem is experiencing a long-term drought (with drier winters and wetter summers), which contributes to the establishment and survival of non-native plant species, especially in areas of high foot, horse, and vehicular traffic, as well as on lands disturbed for construction or other reasons. This park, YNP, and other jurisdictions have documented a continued increase in the number and distribution of exotic or invasive plant species during the past two decades. Part of this increase is a likely result of increased data collection and problem identification; however, there is a long-term need for exotic plant monitoring and control efforts on behalf of the Park and neighboring landowners and managers.

No cumulative effects to federally listed plant species are expected from implementation of Alternative 1 because none are present. No cumulative effects to plant species of special concern are expected from implementing Alternative 1 because the two species potentially present near the Moose-Wilson Road would not be adversely affected, and no actions are proposed in the area preferred by the third species.

The impacts of past, present, and future actions, in conjunction with vegetation impacts resulting from Alternative 1, would result in long-term, minor, adverse cumulative impacts to vegetation in the Park. Alternative 1 would contribute a negligible increment to overall cumulative impacts.

Conclusion

Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts from the degradation of native vegetation in and near areas with concentrated human use and areas of social trails and off-road parking and trampling. No (or negligible) direct or indirect effects to plant species of special concern are expected to result from implementation of Alternative 1. Cumulative impacts to vegetation would be long term, minor, and adverse.

Because there would be no major, adverse impacts to plant species, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's vegetation resources and no unacceptable impacts.

Effects of Alternative 2 — Improved Road Shoulders

Under Alternative 2, impacts to vegetation would occur from the same actions as described for Alternative 1, including continued off-road parking and use of social trails and occasional road maintenance, with resultant negligible to minor direct adverse impacts. Alternative 2 would also include direct, adverse impacts related to the widening of the Teton Park Road. This widening would permanently remove approximately 13.3 acres (5.4 ha) of vegetation immediately adjacent to existing road shoulders, which consists mostly of a low cover of grasses and forbs, including both native and exotic species (see Table 19). Adjacent vegetation would consist of mostly dry sagebrush shrubland with small areas of riparian shrubs and cottonwoods along creek or river crossings. Some coniferous trees and associated understory species would be affected between Jenny Lake and Signal Mountain. Areas next to the existing shoulder that would be temporarily disturbed (an estimated additional 13.3 acres [5.4 ha]) by the construction crews would be revegetated using native grasses and weed-free seed; therefore, impacts from these actions would be long term, localized, negligible to minor, and adverse.

Visitor information kiosks would be installed within activity areas on existing disturbed ground and would not result in new net disturbance. Under Alternative 2, roadside variable messaging signs would be installed at locations within and outside the Park. These signs would also be located on existing disturbed grounds at roadway shoulders and major intersections, and thus would constitute no additional permanent disturbance.

All construction would be monitored for noxious weed invasion. The spread of noxious weeds results in long-term impacts, which would be kept at the minor level due to monitoring and treatment. Noxious weeds could spread into areas that are disturbed during construction of multi-use pathways and widening of road shoulders. This impact is expected to be minor, adverse, and localized, but long-term, with prompt revegetation of disturbed areas and implementation of measures to control noxious weeds (i.e., annual monitoring and appropriate manual, chemical, or biological control). However, long-term monitoring of all travel corridors and disturbed zones would be required as part of the Park's ongoing efforts to control the spread of non-native plant species.

Plant Species of Special Concern

No direct or indirect effects to federally listed plants are expected to result from implementation of Alternative 2 due to their absence in Grand Teton National Park. The plant species of special concern reported to be present in the Moose-Wilson Road vicinity would be impacted by options tested in this area, similar to Alternative 1. A rare plant survey would be conducted prior to implementation of Alternative 2 and appropriate mitigation measures taken if these or other rare plants are found within the disturbance area. The plant species found along the Snake River and its drainages would not be affected by actions in Alternative 2. Therefore, adverse impacts to these species would be negligible.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would adversely impact vegetation would be the same as for Alternative 1. The ecosystem is experiencing a long-term drought (with drier winters and wetter summers), which contributes to the establishment and survival of non-native plant species, especially in areas of high foot, horse, and vehicular traffic, as well as on lands disturbed for construction or other reasons. This park, YNP, and other jurisdictions have documented a continued increase in the number and distribution of exotic or invasive plant species during the past two decades. Part of this increase is a likely result of increased data collection and problem identification; however, there is a long-term need for exotic plant monitoring and control efforts on behalf of the Park and neighboring landowners and managers.



No cumulative effects to federally listed plant species are expected from implementation of Alternative 2 because none are present; no cumulative effects to plant species of special concern are expected from implementing Alternative 2 because the two species (largeflower triteleia and flat-top broomrape) potentially present near the Moose-Wilson Road would not be adversely affected; and no actions are proposed in the area preferred by the third species (Teton wirelettuce).

Overall, impacts of past, present, and future actions, in conjunction with impacts of Alternative 2, would result in long-term, minor, adverse impacts to vegetation within the Park. Alternative 2 would contribute a minor amount to overall cumulative impacts.

Conclusion

Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts to vegetation due to continued use of social trails, illegal off-road parking, and construction of shoulders along a portion of the Teton Park Road, with short- and long-term, localized, minor, adverse impacts associated with construction. Adverse impacts to plant species of special concern would be negligible. Cumulative impacts to vegetation would be long-term, minor, and adverse.

Because there would be no major, adverse impacts to plant species, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's vegetation resources and no unacceptable impacts.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Alternative 3 would result in the permanent removal of approximately 63.8 acres (25.8 ha) of vegetation, including 5,200 to 7,100 trees, of which 625 to 1,175 would be over 12 inches in diameter (Table 17). Additionally, 1.4 acres (0.57 ha) of wetlands would be impacted under this alternative (Table 18). Alternative 3 would result in removal of 5.5 acres (2.2 ha) of forests, 40.4 acres (16.3 ha) of shrublands, and 17.6 acres (7.1 ha) of grasslands or barren areas (see Table 19).

In areas where many trees are removed, additional trees could succumb to root damage caused by soil movement during construction or because opening up the tree canopy

would make remaining trees more susceptible to wind throw. Construction areas would be monitored during and after construction activity for hazard trees; in subsequent years, a minor increase could occur in the number of trees needing to be removed for human safety adjacent to roads and pathways. Overall, the construction of the pathways described above and resultant removal of vegetation and trees would result in long-term, localized, moderate, adverse impacts to vegetation.

Construction of new shoulders along the Teton Park Road and North Park Road from North Jenny Lake to Colter Bay would permanently remove approximately 14.9 acres (6.0 ha) of vegetation and cause temporary disturbance of at least another 14.9 acres where construction equipment is used adjacent to the main work area. Roadside vegetation that would be affected by shoulder widening would be a low cover of mostly grasses and forbs, including both native and exotic species, as the shoulder widening would not intrude into adjacent vegetation types. Much of the area along the roads that would be affected consists of dry sagebrush shrubland; however, from Jenny Lake Junction north to Signal Mountain and Jackson Lake Dam, and also closer to Colter Bay, the roadway often passes through lodgepole pine forest. There are also wet meadows and some wetlands near the existing roads, especially in the Willow Flats area near Jackson Lake. Road widening in these areas would adversely affect some wetlands and associated plant species and require mitigation to ensure no net loss of park wetlands.

Construction of multi-use pathways along roadways throughout the Park would result in the permanent removal of approximately 44.9 acres (18.1 ha) of vegetation and cause temporary disturbance to at least 44.9 additional acres. Although specific alignments have not yet been determined, the pathways would generally be located within 50 ft (15 m) of roadways. Vegetation impacts in the southern half of the Park would include mostly sagebrush shrubland, with some cottonwood riparian cover along the Gros Ventre and Snake Rivers, and taller riparian shrubs and cottonwoods along Cottonwood Creek.

**TABLE 17
NUMBER OF TREES REMOVED BY ALTERNATIVE 3**

Road Segment	Tree Density	Linear Feet Affected	< 6 inches	6-12 inches	> 12 inches	Total
Granite Canyon Entrance Station to the LSR Preserve	High	2,750	1,700-1,900	50-100	25-75	1,775-2,075
	Medium	1,322	300-400	75-175	25-75	400-650
	Low	2,922	375-475	125-175	250-350	750-1,000
	None	4,916	0	0	0	0
	Total	11,910	2,375-2,775	250-450	300-500	2,925-3,725
LSR Preserve to Moose	High	0	0	0	0	0
	Medium	919	200-300	50-100	0-50	250-450
	Low	511	50-100	0-50	25-75	75-225
	None	8,296	0	0	0	0
	Total	9,725	250-400	50-150	25-125	325-675
South Boundary to Antelope Flats	High	0	0	0	0	0
	Medium	0	0	0	0	0
	Low	2,902	400-500	125-175	250-350	775-1,025
	None	45,645	0	0	0	0
	Total	48,547	400-500	125-175	250-350	775-1,025
Moose to North Jenny Lake Junction	High	1,202	750-850	0-50	0-50	750-950
	Medium	856	200-250	50-100	0-50	250-400
	Low	852	100-150	25-75	50-100	175-325
	None	53,944	0	0	0	0
	Total	56,854	1,050-1,250	75-225	50-200	1,175-1,675
Grand Total		127,036	4,075-4,925	500-1,000	625-1,175	5,200-7,100



**TABLE 18
SUMMARY OF DIRECT LOSS OF POTENTIAL WETLANDS¹ (ACRES) FROM
LINEAR ROAD FEATURES AND SEPARATED PATHWAYS BY ALTERNATIVE**

Road Segment	Road Features					Separated Pathways				
	Alternative					Alternative				
	1	2	3	3a	4	1	2	3	3a	4
South Boundary to North Jenny Lake	0.00	0.02	0.00	0.00	0.00	0.00	0.00	1.14	1.24	1.14
South Boundary to Antelope Flats	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.39	0.39
Gros Ventre Junction to West Boundary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
Moose to Signal Mountain	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.75	0.75	0.75
North Jenny Lake Junction to String Lake	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
North Jenny Lake to Colter Bay	0.00	0.00	0.08	0.20	0.02	0.00	0.00	0.00	2.25	2.86
Signal Mountain to Jackson Lake Junction	0.00	0.00	0.06	0.02	0.02	0.00	0.00	0.00	1.96	1.96
Jackson Lake Junction to Colter Bay	0.00	0.00	0.02	0.18	0.00	0.00	0.00	0.00	0.29	0.90
Granite Canyon Entrance Station to Moose	0.00	0.00	0.04	0.16	0.04	0.00	0.00	0.14	0.00	0.20
Granite Canyon Entrance Station to Moose	0.00	0.00	0.04	0.16	0.04	0.00	0.00	0.14	0.00	0.20
TOTAL²	0.00	0.02	0.12	0.36	0.06	0.00	0.00	1.28	3.49	4.20

¹Figures represent net difference from existing condition.

²Total wetland acres lost for Alternative 1 0.00

Alternative 2 0.02

Alternative 3 1.40

Alternative 3a 3.85

Alternative 4 4.26

Note: Values for wetland impacts have been updated to correct miscalculations in the Draft Plan/EIS.

**TABLE 19
ESTIMATES OF DIRECT HABITAT LOSS¹ (ACRES) FROM LINEAR FEATURES
BY HABITAT TYPE AND ALTERNATIVE**

Habitat Type	Road Features ²					Separated Pathways				
	Alternative					Alternative				
	1	2	3	3a	4	1	2	3	3a	4
Barren	0.00	12.29	13.69	12.93	1.91	0.00	0.00	1.64	2.79	3.02
Coniferous Forest	0.00	0.16	0.80	1.82	0.40	0.00	0.00	1.17	1.52	9.53
Coniferous Woodland	0.00	0.15	0.29	0.84	0.04	0.00	0.00	1.16	2.72	4.22
Deciduous Forest	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.18	0.29	1.06
Deciduous Woodland	0.00	0.01	0.00	0.26	0.00	0.00	0.00	0.70	0.50	1.60
Dwarf Shrubland	0.00	0.02	0.12	0.06	0.00	0.00	0.00	5.05	7.55	6.87
Herbaceous Vegetation	0.00	0.06	0.16	1.18	0.08	0.00	0.00	2.11	2.87	3.60
Mixed Forest	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.06
Mixed Woodland	0.00	0.00	0.00	0.49	0.00	0.00	0.00	1.15	0.41	1.92
Shrubland	0.00	0.58	3.86	5.83	3.59	0.00	0.00	31.41	40.60	46.88
Sparse Vegetation	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Streams	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.22	0.17	0.32
TOTAL³	0.00	13.28	18.93	23.46	6.03	0.00	0.00	44.85	59.42	79.08

¹Figures represent net difference from existing condition.

²Road features include a combination of asphalt, gravel, signs, etc. associated with a widened road shoulder.

³Total acres lost for
 Alternative 1 0.00
 Alternative 2 13.28
 Alternative 3 63.78
 Alternative 3a 82.88
 Alternative 4 85.11

Road realignment along portions of the Moose-Wilson Road would result in the permanent removal of approximately 3.9 acres (1.6 ha) of vegetation. An additional approximately 3.9 acres would be temporarily impacted due to construction activities. The vegetation in this area consists primarily of sagebrush shrubland and tall shrub communities interspersed with pockets of aspen forest, lodgepole pine and mixed conifer forest, and mixed aspen-conifer stands.

Relocation of a portion of the Moose-Wilson Road, between a point approximately one-third mile (0.5 km) north of Death Canyon Trailhead Road and Sawmill Ponds Overlook, would result in construction activity in wet meadows and willow habitats. The short-term disturbance associated with construction would result in a minor benefit to native plant communities. Although

the existing national wetland inventory data does not indicate wetlands in this area, finer-scale mapping of wetlands conducted during the planning and design phases of construction could result in identification of a small amount of wetlands that could be lost and require mitigation as a result of road relocation and construction. Attempts would be made to regenerate aspen in the area vacated by the existing road; this could restore approximately 3.1 acres (1.2 ha) of aspen habitat. However, as the Park has not made similar efforts yet, the successful regeneration and restoration of this plant community is not assured.

Disturbance from construction activities and off-trail visitor use would provide increased opportunities for the spread of exotic plant species, some of which (St. Johnswort, Dalmatian toadflax, yellow toadflax,



houndstongue, musk thistle, and Canada thistle) already have become established in the Moose-Wilson Road corridor and along the Teton Park Road, especially from Moose to Jenny Lake. All multi-use pathways would be monitored for noxious weed invasion and controlled annually, resulting in long-term, localized, minor to moderate, beneficial impacts. Noxious weeds could spread into areas that are disturbed during construction of multi-use pathways and improved road shoulders. This adverse impact is expected to be minor but short term in localized sites, with prompt revegetation of disturbed areas and implementation of measures to control noxious weeds (i.e., annual monitoring and appropriate manual, chemical, or biological control).

Plant Species of Special Concern

No direct or indirect effects to federally listed plants are expected to result from implementation of Alternative 3 due to their absence in Grand Teton National Park. No direct or indirect effects to plant species of special concern are expected to result from implementation of Alternative 3 since a rare plant survey within the project area would be conducted before implementing any management strategies along the Moose-Wilson Road or in the vicinity of streams with appropriate habitat in the Gros Ventre area.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would adversely impact vegetation under this alternative would be the same as for Alternative 1. The ecosystem is experiencing a long-term drought (with drier winters and wetter summers), which contributes to the establishment and survival of non-native plant species, especially in areas of high foot, horse, and vehicular traffic, as well as on lands disturbed for construction or other reasons. This park, YNP, and other jurisdictions have documented a continued increase in the number and distribution of exotic or invasive plant species during the past two decades. Part of this increase is a likely result of increased data collection and problem identification; however, there is a long-term need for exotic plant monitoring and control efforts on behalf of the Park and neighboring landowners and managers.

No cumulative effects to federally listed plant species are expected from implementation of Alternative 3 because none are present. No cumulative effects to plant species of special concern are expected from implementation of Alternative 3 because surveys would be conducted

as needed to ensure that species would not be adversely affected.

The impacts of past, present, and future actions, in conjunction with the beneficial and adverse impacts of Alternative 3, would result in long-term, minor, adverse cumulative impacts to vegetation within the Park. Alternative 3 would contribute a small amount to adverse cumulative impacts and would contribute negligibly to the long-term benefits to vegetation.

Conclusion

Alternative 3 would result in the permanent removal of approximately 63.8 acres (25.8 ha) of vegetation, including 5,200 to 7,100 trees, of which 625 to 1,175 would be over 12 inches in diameter (Table 17). Actions under Alternative 3 would result in long-term, localized, moderate, adverse impacts on vegetation and long-term, localized, negligible, beneficial impacts to vegetation, chiefly because of the construction and eventual use of the pathways system and the improvements and markings of social trails. Widening road shoulders would result in minor to moderate alteration of plant communities, especially in wetland areas and in heavily forested areas. New pathways would be located in relatively undisturbed areas off the main roadways that currently exist in Grand Teton National Park.

In the short term, localized, moderate, adverse impacts would occur where construction disturbs vegetation. With proper and successful regeneration, the long-term, adverse impacts in construction areas would be negligible to minor, although long-term monitoring and control of exotic plants, if found to persist, would need to continue.

No direct or indirect effects to plant species of special concern are expected to result from implementation of Alternative 3.

Cumulative impacts to vegetation within the Park from Alternative 3 would be long-term, minor, and adverse.

Because there would be no major, adverse impacts to plant species, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's vegetation resources and no unacceptable impacts.

Effects of Alternative 3a — Preferred Alternative

Alternative 3a would result in the permanent removal of approximately 82.9 acres (33.5 ha) of vegetation, including 17,900 to 23,075 trees, of which 1,125 to 2,375 would be over 12 inches in diameter (Table 20). The majority of tree removal (approximately 70 percent) would occur between North Jenny Lake Junction and Colter Bay, as coniferous forest becomes more predominant in the northern parts of the project area. Additionally, 3.85 acres (1.56 ha) of wetlands would be impacted under this alternative (see Table 18). Alternative 3a would result in removal of 8.9 acres (3.6 ha) of forests, 54.0 acres (21.9 ha) of shrublands, and 19.8 acres (8.0 ha) of grasslands or barren areas (see Table 19).

Construction of multi-use pathways along U.S. Highway 26/89/191, the Teton Park Road, and North Park Road would result in the permanent removal of approximately 59.4 acres (24.0 ha) of vegetation and cause temporary disturbance to approximately 59.4 additional acres. Although specific alignments have not yet been determined, the pathways would generally be located within 50 ft (15 m) of existing roadbeds. Vegetation removed would include mostly sagebrush shrubland in the southern half of the project area as well as conifer forests, some cottonwood riparian cover (mostly along the Gros Ventre and Snake Rivers and along Cottonwood Creek), and several acres each of aspen, willow, and meadows.

The creation of multi-use pathways along the Moose-Wilson Road would permanently remove approximately 12.1 acres (4.9 ha) of vegetation and temporarily impact a minimum of 12.1 additional acres due to construction activities. This vegetation consists of aspen forest, lodgepole pine and mixed conifer forest, wetland meadows near Sawmill Ponds, and mixed aspen-conifer stands, as well as some sagebrush shrubland and tall shrub communities. While every effort would be made to design and construct the Moose-Wilson pathway so as to minimize the number of trees removed, the removal of a large number of trees would result in an obvious change in the character of the corridor, which would be clearly evident to most visitors. This change would be more extensive and evident than in Alternative 3 because more of the corridor would be affected by the construction of the pathway. This area contains the only lands along the foot of the Teton Range that have not experienced fire activity in the past 35 years; where forested, the canopy cover is thus green and fairly closed and shady compared to areas north, such as in the Taggart and Jenny Lake areas.

Because of the closed canopy, the topography, and the road's proximity to the mountains, views of the high peaks are limited along this corridor. In contrast, the vegetation is more of an apparent foreground feature than in areas where the Teton Mountains pose a spectacular backdrop. These mixed aspen-conifer forests, with their well-developed understory, also have a high diversity compared to other forested plant communities (McCloskey 2006). Opening the overstory would result in changes to understory vegetation composition.

In areas where many trees are removed, additional trees could succumb to root damage caused by soil movement during construction or because opening up the tree canopy would make remaining trees more susceptible to wind throw. Construction areas would be monitored during and after construction activity for hazard trees. In subsequent years, a minor increase could occur in the number of trees needing to be removed for human safety adjacent to roads and pathways. Overall, the construction of the pathways described above and resultant removal of vegetation and trees would result in long-term, localized, moderate adverse impacts to vegetation.

Relocation of a portion of the Moose-Wilson Road, between a point approximately one-third mile (0.5 km) north of Death Canyon Trailhead Road and Sawmill Ponds Overlook, would result in construction activity in wet meadows and willow habitats and would cause the permanent removal of approximately 3.9 acres (1.6 ha) of vegetation and cause temporary disturbance to approximately 3.9 additional acres. The short-term disturbance associated with construction would result in a minor benefit to native plant communities. Although the existing national wetland inventory data do not indicate wetlands in this area, finer-scale mapping of wetlands conducted during the planning and design phases of construction could result in identification of a small amount of wetlands that could be lost and require mitigation as a result of road relocation and construction. Attempts would be made to regenerate aspen in the area vacated by the existing road. This could restore approximately 3.1 acres (1.2 ha) of aspen habitat. However, as the Park has not made similar efforts yet, the successful regeneration and restoration of this plant community are not assured.



**TABLE 20
NUMBER OF TREES REMOVED BY ALTERNATIVE 3A**

Road Segment	Tree Density	Linear Feet Affected	< 6 inches	6-12 inches	> 12 inches	Total
Granite Canyon Entrance Station to the LSR Preserve	High	2,750	1,300-1,500	25-75	25-75	1,350-1,650
	Medium	1,322	225-325	50-100	25-75	300-500
	Low	2,922	275-375	75-125	150-250	500-750
	None	4,916	0	0	0	0
	Total	11,910	1,800-2,200	150-300	200-400	2,150-2,900
the LSR Preserve to Moose	High	0	0	0	0	0
	Medium	919	200-300	50-100	0-50	250-450
	Low	511	50-100	0-50	25-75	75-225
	None	8,296	0	0	0	0
	Total	9,725	250-400	50-150	25-125	325-675
South Boundary to Antelope Flats	High	0	0	0	0	0
	Medium	0	0	0	0	0
	Low	2,902	400-500	125-175	250-350	775-1,025
	None	45,645	0	0	0	0
	Total	48,547	400-500	125-175	250-350	775-1,025
Gros Ventre Junction to West Boundary	High	0	0	0	0	0
	Medium	0	0	0	0	0
	Low	0	0	0	0	0
	None	5,108	0	0	0	0
	Total	5,108	0	0	0	0
Moose to North Jenny Lake Junction	High	1,202	750-850	0-50	0-50	750-950
	Medium	856	175-275	50-100	0-50	225-425
	Low	852	75-175	25-75	50-100	150-350
	None	53,944	0	0	0	0
	Total	56,854	1,000-1,300	75-225	50-200	1,125-1,725
North Jenny Lake Junction to String Lake	High	0	0	0	0	0
	Medium	1,768	425-525	125-175	50-100	600-800
	Low	630	75-125	0-50	25-75	100-250
	None	5,529	0	0	0	0
	Total	7,926	500-650	125-225	75-175	700-1,050
North Jenny Lake Junction to Signal Mountain	High	9,178	2,500-3,500	100-150	75-125	2,675-3,775
	Medium	3,497	425-525	125-175	50-100	600-800
	Low	3,464	200-300	50-100	150-200	400-600
	None	21,053	0	0	0	0
	Total	37,193	3,125-4,325	275-425	275-425	3,675-5,175

**TABLE 20
NUMBER OF TREES REMOVED BY ALTERNATIVE 3A**

Road Segment	Tree Density	Linear Feet Affected	< 6 inches	6-12 inches	> 12 inches	Total
Signal Mountain to Jackson Lake Dam	High	8,335	2,700-2,800	100-150	75-125	2,875-3,075
	Medium	0	0	0	0	0
	Low	374	0-50	0-25	0-50	0-125
	None	1,256	0	0	0	0
	Total	9,965	2,700-2,850	100-175	75-175	2,875-3,200
Jackson Lake Dam to Jackson Lake Junction	High	2,098	650-750	0-50	0-50	650-850
	Medium	0	0	0	0	0
	Low	2,990	200-250	50-100	125-175	375-525
	None	972	0	0	0	0
	Total	6,060	850-1,000	50-150	125-225	1,025-1,375
Jackson Lake Junction to Colter Bay	High	14,552	4,700-4,900	175-275	125-175	5,000-5,350
	Medium	1,329	150-250	25-75	0-50	175-375
	Low	949	50-100	0-50	25-75	75-225
	None	12,065	0	0	0	0
	Total	28,894	4,900-5,250	200-400	150-300	5,250-5,950
Grand Total		222,182	15,525-18,475	1,150-2,225	1,225-2,375	17,900-23,075

Disturbance from construction activities and off-trail visitor use would provide increased opportunities for the spread of exotic plant species, some of which (St. Johnswort, Dalmatian toadflax, yellow toadflax, houndstongue, musk thistle, and Canada thistle) already have become established in the Moose-Wilson Road corridor and along the Teton Park Road, especially from Moose to Jenny Lake. All multi-use pathways would be monitored for noxious weed invasion and controlled annually, resulting in localized, minor to moderate, long-term adverse impacts. Noxious weeds could spread into areas that are disturbed during construction of multi-use pathways and improved road shoulders. This adverse impact is expected to be minor but short term in localized sites, with prompt revegetation of disturbed areas and implementation of measures to control noxious weeds (i.e., annual monitoring and appropriate manual, chemical, or biological control).

Plant Species of Special Concern

No direct or indirect effects to federally listed plants are expected to result from implementation of Alternative 3a due to their absence in Grand Teton National Park. No direct or indirect effects to plant species of special concern are expected to result from implementation of Alternative 3a since a rare plant survey within the project area would be conducted before implementing any management strategies along the Moose-Wilson Road or in the vicinity of streams with appropriate habitat in the Gros Ventre area.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would adversely impact vegetation under this alternative would be the same as for Alternative 1. The ecosystem is experiencing a long-term drought (with drier winters and wetter summers), which contributes to the establishment and survival of non-native plant species, especially in areas of high foot,



horse, and vehicular traffic, as well as on lands disturbed for construction or other reasons. This park, YNP, and other jurisdictions have documented a continued increase in the number and distribution of exotic or invasive plant species during the past two decades. Part of this increase is a likely result of increased data collection and problem identification; however, actions in this alternative contribute, in at least a minor way, to the long-term need for exotic plant monitoring and control efforts on behalf of the Park and neighboring landowners and managers.

No cumulative effects to federally listed plant species are expected from implementation of Alternative 3a because none are present. No cumulative effects to plant species of special concern are expected from implementation of Alternative 3a because surveys would be conducted as needed to ensure that species would not be adversely affected.

The impacts of past, present, and future actions, in conjunction with the beneficial and adverse impacts of Alternative 3a, would result in long-term, minor to moderate, adverse cumulative impacts to vegetation within the Park. Alternative 3a would contribute a moderate amount to adverse cumulative impacts and would contribute negligibly to the long-term benefits to vegetation.

Conclusion

The construction of the pathways and other actions proposed in Alternative 3a would result in long-term, localized, moderate, adverse impacts on vegetation and long-term, localized, negligible, beneficial impacts to vegetation, chiefly as a result of the construction and eventual use of the pathways system and the improvements and markings of social trails. Under Alternative 3a, construction of the pathways would occur along approximately 41.3 miles (67 km) of existing park roadways. This activity would permanently remove approximately 82.9 acres (33.5 ha) of vegetation and cause temporary disturbance to approximately the same number of additional acres. Vegetation removed would include an estimated 3.9 acres (1.6 ha) of wetlands that would be impacted under this alternative (see Table 18). Alternative 3a would result in removal of 8.9 acres (3.6 ha) of forests, 54.0 acres (21.9 ha) of shrublands, and 19.8 acres (8.0 ha) of grasslands or barren areas. The total number of trees likely to be removed under this alternative would be 17,900 to 23,075, of which 1,125 to 2,375 would be over 12 inches in diameter. Efforts would be made to

restore aspen to the former location of the Moose-Wilson Road, which is to be relocated east of Sawmill Ponds; however, the success of these efforts is not assured.

Additional short-term, localized, moderate, adverse impacts would occur where construction disturbs vegetation. With proper and successful regeneration, the long-term, adverse impacts in construction areas would be negligible, although long-term monitoring and control of exotic plants, if found to persist, would need to continue. The number of social trails could be reduced, or their locations altered, which would result in long-term, localized, negligible, beneficial impacts to vegetation that is currently receiving heavy foot traffic. Cumulative impacts would be long term, minor to moderate, and adverse.

No direct or indirect effects to plant species of special concern are expected to result from implementation of Alternative 3a.

Because there would be no major, adverse impacts to plant species, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's vegetation resources and no unacceptable impacts.

Effects of Alternative 4 — Multi-Use Pathways

Alternative 4 would result in the permanent removal of approximately 85.1 acres (34.5 ha) of vegetation, including 29,950 to 33,775 trees, of which 2,075 to 3,150 would be over 12 inches in diameter (Table 21). The majority of tree removal (approximately 71 percent) would occur between North Jenny Lake Junction and Colter Bay, and between the Granite Canyon Entrance Station and Moose (approximately 21 percent), as coniferous forest becomes more predominant in the northern parts of the project area and along the Moose-Wilson Road. Additionally, 4.3 acres (1.7 ha) of wetlands would be impacted under this alternative (see Table 18). Alternative 4 would result in removal of 18.8 acres (7.6 ha) of forests, 57.3 acres (23.2 ha) of shrublands, and 8.6 acres (3.5 ha) of grasslands or barren areas (see Table 19).

**TABLE 21
NUMBER OF TREES REMOVED BY ALTERNATIVE 4**

Road Segment	Tree Density	Linear Feet Affected	< 6 inches	6-12 inches	> 12 inches	Total
Granite Canyon Entrance Station to the LSR Preserve	High	2,750	1,750-1,850	50-100	25-75	1,825-2,025
	Medium	1,322	300-400	100-150	25-75	425-625
	Low	2,922	375-475	125-175	250-350	750-1,000
	None	4,916	0	0	0	0
	Total	11,910	2,425-2,725	275-425	300-500	3,000-3,650
The LSR Preserve to Moose	High	3,372	2,150-2,250	75-125	50-100	2,275-2,475
	Medium	1,801	450-550	150-200	50-100	650-850
	Low	1,732	225-275	75-125	150-200	450-600
	None	11,722	0	0	0	0
	Total	18,628	2,825-3,075	300-450	250-400	3,375-3,925
South Boundary to Antelope Flats	High	0	0	0	0	0
	Medium	0	0	0	0	0
	Low	2,902	400-500	125-175	250-350	775-1,025
	None	45,645	0	0	0	0
	Total	48,547	400-500	125-175	250-350	775-1,025
Moose to North Jenny Lake Junction	High	1,202	750-850	0-50	0-50	750-950
	Medium	856	200-250	50-100	0-50	250-400
	Low	852	100-150	25-75	50-100	175-325
	None	53,944	0	0	0	0
	Total	56,854	1,050-1,250	75-225	50-200	1,175-1,625
North Jenny Lake Junction to Signal Mountain	High	9,178	5,950-6,150	250-300	175-225	6,375-6,675
	Medium	3,497	900-1,000	300-350	125-150	1,325-1,500
	Low	3,464	500-550	125-225	300-400	925-1,175
	None	21,053	0	0	0	0
	Total	37,193	7,350-7,700	675-875	600-775	8,625-9,350
Signal Mountain to Jackson Lake Dam	High	8,333	0	0	0	0
	Medium	0	0	0	0	0
	Low	374	0	0	0	0
	None	1,255	0	0	0	0
	Total	9,962	0	0	0	0



**TABLE 21
NUMBER OF TREES REMOVED BY ALTERNATIVE 4**

Road Segment	Tree Density	Linear Feet Affected	< 6 inches	6-12 inches	> 12 inches	Total
Jackson Lake Dam to Jackson Lake Junction	High	2,098	1,350-1,450	50-100	25-75	1,425-1,625
	Medium	0	0	0	0	0
	Low	2,990	400-500	125-175	250-350	775-1,025
	None	972	0	0	0	0
	Total	6,060	1,750-1,950	175-275	275-425	2,200-2,650
Jackson Lake Junction to Colter Bay	High	14,552	9,500-9,700	400-500	250-350	10,150-10,550
	Medium	1,329	300-400	100-150	25-75	425-625
	Low	949	125-175	25-75	75-125	225-375
	None	12,065	0	0	0	0
	Total	28,894	9,925-10,275	525-725	350-500	10,800-11,550
Grand Total		218,047	25,725-27,475	2,150-3,150	2,075-3,150	29,950-33,775

Construction of multi-use pathways along U.S. Highway 26/89/191, the Teton Park Road, and North Park Road would result in the permanent removal of approximately 79.1 acres (32.0 ha) of vegetation and cause temporary disturbance to approximately 79.1 additional acres. Although specific alignments have not yet been determined, the pathways would generally be located outside of existing roadbeds, except for a section between Signal Mountain Lodge and Jackson Lake Dam where an improved road would be constructed. Vegetation removed would include mostly sagebrush shrubland as well as some coniferous forests and woodlands and herbaceous plant cover (Table 19).

The creation of multi-use pathways along the Moose-Wilson Road would permanently remove approximately 13.9 acres (5.6 ha) of vegetation and temporarily impact a minimum of 13.9 additional acres (5.6 ha) due to construction activities. This vegetation consists of aspen forest, lodgepole pine and mixed conifer forest, wetland meadows near Sawmill Ponds, and mixed aspen-conifer stands, as well as sagebrush shrubland and tall shrub communities. While every effort would be made to design and construct the Moose-Wilson pathway so as to minimize the number of trees removed, a large number of trees (6,375 to 7,575) are expected to be removed.

In areas where many trees are removed, additional trees could succumb to root damage caused by soil movement during construction or because opening up the tree canopy would make remaining trees more susceptible to wind throw. Construction areas would be monitored during and after construction activity for hazard trees. In subsequent years, a minor increase could occur in the number of trees needing to be removed for human safety adjacent to roads and pathways. Overall, the construction of the pathways described above and resultant removal of vegetation and trees would result in localized, long-term, moderate, adverse impacts to vegetation.

As with Alternatives 3 and 3a, relocation of a portion of the Moose-Wilson Road, between a point approximately one-third mile (0.5 km) north of Death Canyon Trailhead Road and Sawmill Ponds Overlook, would result in construction activity in wet meadows and willow habitats and would cause the permanent removal of approximately 3.9 acres (1.6 ha) of vegetation and cause temporary disturbance to approximately 3.9 additional acres. The short-term disturbance associated with construction would result in a minor benefit to native plant communities. Although the existing national wetland inventory data do not indicate wetlands in this area, finer-scale mapping of wetlands conducted during the planning and design phases of construction could result in identification of a small amount of wetlands that could be lost and require mitigation as a result of road relocation and construction. Attempts would be made to regenerate aspen in the area vacated by the existing road. This could restore approximately 3.1 acres (1.2 ha) of aspen habitat. However, as the Park has not made similar efforts yet, the successful regeneration and restoration of this plant community is not assured.

Disturbance from construction activities and off-trail visitor use would provide increased opportunities for the spread of exotic plant species, some of which (St. Johnswort, Dalmatian toadflax, yellow toadflax, houndstongue, and musk and Canada thistles) already have become established in the Moose-Wilson Road corridor and along the Teton Park Road, especially from Moose to Jenny Lake. All multi-use pathways would be monitored for noxious weed invasion and controlled annually, resulting in minor to moderate long-term impacts. Noxious weeds could spread into areas that are disturbed during construction of multi-use pathways and improved road shoulders. This impact is expected to be minor but short term in localized sites, with prompt revegetation of disturbed areas and implementation of measures to control noxious weeds (i.e., annual monitoring and appropriate manual, chemical, or biological control).

Plant Species of Special Concern

No direct or indirect effects to federally listed plants are expected to result from implementation of Alternative 4 due to their absence in Grand Teton National Park. No direct or indirect effects to plant species of special concern are expected to result from implementation of Alternative 4 since a rare plant survey within the project area would be conducted before implementing any

management strategies along the Moose-Wilson Road or in the vicinity of streams with appropriate habitat in the Gros Ventre area.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would adversely impact vegetation under this alternative would be the same as for Alternative 1. The ecosystem is experiencing a long-term drought (with drier winters and wetter summers), which contributes to the establishment and survival of non-native plant species, especially in areas of high foot, horse, and vehicular traffic, as well as on lands disturbed for construction or other reasons. This park, YNP, and other jurisdictions have documented a continued increase in the number and distribution of exotic or invasive plant species during the past two decades. Part of this increase is a likely result of increased data collection and problem identification; however, actions in this alternative contribute, in at least a minor way, to the long-term need for exotic plant monitoring and control efforts on behalf of the Park and neighboring landowners and managers.

No cumulative effects to federally listed plant species are expected from implementation of Alternative 4 because none are present. No cumulative effects to plant species of special concern are expected from implementation of Alternative 4 because surveys would be conducted as needed to ensure that species would not be adversely affected.

The impacts of past, present, and future actions, in conjunction with the beneficial and adverse impacts of Alternative 4, would result in long-term, localized, minor to moderate, adverse cumulative impacts to vegetation within the Park. Alternative 4 would contribute a moderate amount to adverse cumulative impacts and would contribute negligibly to the long-term benefits to vegetation.

Conclusion

The construction of the pathways and other actions proposed in Alternative 4 would result in long-term, localized, moderate, adverse impacts on vegetation and long-term, localized, negligible, beneficial impacts to vegetation, chiefly as a result of the construction and eventual use of the pathways system and the improvements and markings of social trails.



Under Alternative 4, construction of the pathways and road features would occur along approximately 42.6 miles (69.4 km) of existing park roadways. This activity would permanently remove approximately 85.1 acres (34.5 ha) of vegetation, and cause temporary disturbance to approximately the same number of additional acres. Vegetation removed would include an estimated 18.8 acres (7.6 ha) of forests, 57.3 acres (23.2 ha) of shrublands, and 8.6 acres (3.5 ha) of grasslands or barren areas. The total number of trees likely to be removed would be 29,950 to 33,775, of which 2,075 to 3,150 would be over 12 inches in diameter (Table 21). Efforts would be made to restore aspen to the former location of the Moose-Wilson Road, which is to be relocated east of Sawmill Ponds; however, the success of these efforts is not assured.

Additional short-term, localized, moderate, adverse impacts would occur where construction disturbs vegetation. With proper and successful regeneration, the long-term, adverse impacts in construction areas would be negligible, although long-term monitoring and control of exotic plants, if found to persist, would need to continue. The number of social trails could be reduced, or their locations altered, which would result in long-term, localized, negligible, beneficial impacts to vegetation that is currently receiving heavy foot traffic. Cumulative impacts would be long term, minor to moderate, and adverse.

No direct or indirect effects to plant species of special concern are expected to result from implementation of Alternative 4.

Because there would be no major, adverse impacts to plant species, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's vegetation resources and no unacceptable impacts.

Hydrology and Water Quality

Methods and Assumptions

Impacts to hydrology and water quality were assessed by examining any expected changes to channel morphology or capacity and the creation of the impervious surface that would create or increase runoff to nearby water bodies or groundwater. Alterations to channel capacity would be introduced by the construction of new bridges to support improved roadway shoulders or separated multi-use pathways. Changes in the quantity of impervious surfaces would be introduced by constructing new hardened shoulders or pathways into the built environment. Increasing the impervious surface creates more potential for storm runoff and non-point source pollutants to enter park surface water and groundwater systems.

Locations of proposed shoulder widening and pathway construction were examined in relation to the location of surface water features and drainage ways. Areas where pathways or shoulder improvements would cross existing drainage ways were identified. For the purposes of this analysis, it was assumed that most crossings could be accommodated via a cantilevered pathway or shoulder attached to the existing bridge structure, and that no modifications to existing abutments would be required that might affect channel capacity, except perhaps in Alternatives 3, 3a, and 4. During preliminary design, however, these assumptions would need to be confirmed by completing a more detailed hydraulic analysis and an application of requirements for permitting. Impacts of creating impervious surfaces were addressed qualitatively since the final design of the pathways and shoulders is not yet complete.

Impact Threshold Definitions	
Negligible	Neither water quality nor hydrology would be affected, or changes would be either nondetectable or, if detected, would have effects that would be considered slight and local. The action would not result in degradation of water quality or impact channel morphology.
Minor	Changes in water quality or hydrology would be measurable, although the changes would be small and the effects would be localized. Impacts to water quality would be perceptible but highly localized in one or two sites. No alterations to existing channel capacity or morphology would occur. No mitigation measures associated with water quality or hydrology would be necessary.
Moderate	Changes in water quality or hydrology would be measurable but relatively local. Impacts to water quality would be perceptible and/or observable in several locations within the project area. No alterations to existing channel capacity or morphology would occur. Mitigation measures associated with water quality or hydrology would be necessary and the measures would likely succeed.
Major	Changes in water quality or hydrology would be readily measurable, would have substantial consequences, and would be noticed on a regional scale. Impacts to water quality would be perceptible throughout the project area. Alterations to existing channel capacity or morphology would occur. Mitigation measures would be necessary and their success would not be guaranteed.
Duration	Short term — Following treatment, recovery would take less than 1 year.
	Long term — Following treatment, recovery would take longer than 1 year.
Area of Analysis	The Snake River and its tributaries that are adjacent to, crossed by, or downstream from proposed actions and the Snake River Valley Aquifer.

Effects of Alternative 1 — No Action

Under Alternative 1, there would be no direct modifications to channel capacity or levels of nonpoint source pollution. Existing bridges would remain in place along the Snake River and its tributaries. Construction of a separate entrance lane could result in non-point pollution and an increased impervious area; however, this would be localized and BMPs would be put in place to minimize any impacts. Improved signage for pedestrian and wildlife safety and two variable messaging signs would be installed in previously disturbed areas, resulting in negligible short-term impacts to water quality. Non-point source pollution would continue to result from minor oil spills in parking areas, ongoing road maintenance activities, or runoff from unpaved and eroded social trails. However, any maintenance activities would include the implementation of erosion and sedimentation controls and Spill Prevention, Control, and Countermeasure (SPCC) plans, which would limit adverse effects. Impacts of these actions on water quality would be expected to be long term, localized, negligible, and adverse.

Cumulative Impacts

Recent, current, and planned construction projects within Grand Teton National Park that would adversely impact water quality include work on the Murie Ranch, construction of the new Moose Visitor Center and replacement of the Moose Entrance Station, construction of an interpretive center for the LSR Preserve, upgrades to the Jenny Lake Lodge visitor accommodations and employee housing facilities, reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone, replacement of the Snake River Bridge near Flagg Ranch, and the chip-and-seal project from Moran to Jackson Lake Lodge. Widening of North Park Road would affect water quality by increasing the amount of impervious surface along an existing road corridor within the Park. In addition, WYDOT is planning reconstruction of several road segments in the area. One project planned for this area would improve water quality through stabilizing approximately 150 ft (46 m) of the Snake River bank near the float launch area at Moose. This project would produce negligible to minor beneficial impacts within a localized area, given its small size.



None of these facilities would be located in areas where increased recreational use of park waterways would be directly or indirectly affected by their construction. None of these facilities would involve modification of channel capacity or alignment for any of the Park's waterways. Instead, the principal mechanism by which these developments might affect water quality would be by slightly increasing the amount of impervious surface and the potential for runoff and entrance into surface or subsurface waters. Additionally, roadway improvements and construction of a new parking area at Moose would increase opportunities for oil and gasoline spills to be carried into the groundwater, both during the construction process and after implementation. However, spill control and containment measures would be implemented to reduce the chances of any spills reaching surface water or groundwater.

The impacts of these actions, in conjunction with the impacts of Alternative 1, would result in long-term, negligible, adverse cumulative impacts to water quality and hydrology within the Park.

Conclusion

Alternative 1 would result in long-term, localized, negligible, adverse impacts on water quality and hydrology, resulting from continued road maintenance activities, social trail use, and occasional fuel or oil spills at parking areas. Cumulative impacts would be long term, negligible, and adverse.

Because there would be no major, adverse impacts to water resources, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's water resources and no unacceptable impacts.

Effects of Alternative 2 — Improved Road Shoulders

The impacts of Alternative 2 on water quality would be similar to those described for Alternative 1 (i.e., long term, localized, negligible, and adverse). In addition to the actions described for Alternative 1, Alternative 2 includes installation of information kiosks, improved way-finding, and four additional variable messaging signs. The actions would result in localized disturbance in previously disturbed areas and would have short-term, negligible, adverse effects to water quality. Alternative 2 would also provide for shoulder widening along one portion of the Teton Park Road, which includes the crossing of the Snake

River at Moose Junction and the crossing of Cottonwood Creek, Taggart Creek, and several small tributaries along the west side of the Teton Park Road. The small amount of disturbance resulting from the construction of the shoulder would be limited to the areas immediately adjacent to the existing roadway, however, and it is assumed that existing abutments could accommodate the expanded shoulder with no consequences for channel capacity. During final design, a detailed hydraulic study would be undertaken (as needed) to assess the impacts on the stream channel.

This alternative would result in an increase of approximately 12.8 acres (5.2 ha) of impervious surface; however, this would be a small incremental addition located immediately adjacent to the existing roadbed. Long-term, localized, adverse impacts from increased runoff after construction would be negligible. Short-term construction impacts might produce some runoff and non-point source pollution. Grading and surfacing associated with shoulder widening would increase opportunities for sedimentation, as well as leakage of oil and fuels from construction vehicles. Mitigation measures, including placement of erosion-control silt fences and implementation of SPCC measures, would be undertaken to minimize short-term impacts. Given the small amount of shoulder widening involved and the ability to use existing bridgework and abutments for the widening, construction impacts would be short term, localized, negligible to minor, and adverse.

Cumulative Impacts

Impacts of past, current, and reasonably foreseeable future actions would be the same as those for Alternative 1. These projects are estimated to result in minimal changes to hydrology or water quality. The impacts of these actions, in conjunction with the impacts of Alternative 2, would result in negligible, long-term, adverse cumulative impacts to water quality and hydrology within the Park.

Conclusion

Alternative 2 would result in long-term, localized, negligible, adverse impacts on water quality, principally due to a slight increase in impervious surface associated with roadway shoulder facilities and the potential for storm runoff from this area to carry pollutants (e.g., fuels, oil) into the Park's water resources. Short-term impacts associated with construction activities would be localized, negligible to minor, and adverse and with appropriate mitigation, limited to the immediate area of construction. Cumulative impacts would be long term, negligible, and adverse.

Because there would be no major, adverse impacts to water resources, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's water resources and no unacceptable impacts.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

The pathways proposed under Alternative 3 would be generally parallel to the existing road and would consist of a 10-ft (3-m) wide surface and 2-ft (0.6-m) soft shoulders on either side. At least 1 ft (0.3 m) of tree clear zone would extend on either side, in addition to the shoulders, making for a total 16-ft (4.9-m) wide clear corridor. Construction of multi-use pathways outside the road corridor along approximately 23.3 miles (37.3 km) of roads would permanently remove approximately 42.9 acres [17.3 ha] of soils and vegetation and cause temporary disturbance to approximately 42.9 additional acres (17.3 ha). Improving road shoulders along the Teton Park Road and North Park Road between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]) would also permanently remove approximately 18.9 acres (7.6 ha) of soils and vegetation and cause temporary disturbance of another 18.9 acres (7.6 ha) where construction equipment would be used adjacent to the main work area. In total, actions associated with Alternative 3 would cross 16 perennial streams or rivers and 10 intermittent streams; several of which are unnamed.

From the south boundary to North Jenny Lake Junction, the effects to water resources from pathway construction outside the road corridor would be short term, localized, minor, and adverse. The majority of this area is relatively flat and is comprised of mainly sagebrush cover type and therefore erosion from the site and consequently the potential for effects to water quality is expected to be low. The multi-use pathways would cross Ditch Creek and the Gros Ventre River along U.S. Highway 26/89/191 and the Snake River and Cottonwood Creek along the Teton Park Road.

Construction of a multi-use pathway along a portion of the Moose-Wilson Road could require the removal of between 2,925 to 3,725 trees, depending on the specific design, and could result in increased soil erosion in some areas resulting in short-term, localized, minor to moderate, adverse effects to water resources. Pathways along the Moose-Wilson Road would cross Open Canyon and Lake Creek.

Effects to water resources along the Teton Park Road and North Park Road between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]) where shoulder improvements would occur would be short term, localized, negligible to minor, and adverse, and less than pathway construction in this area because construction disturbance would occur in a previously disturbed area immediately adjacent to the existing road. Shoulder widening would occur at the Jackson Lake Dam crossing along Willow Flats and over the East Fork of Pilgrim Creek along North Park Road. Additional named stream crossings would include Beaver Creek, Taggart Creek, Arizona Creek, Lizard Creek, Christian Creek, Spring Creek, and Pilgrim Creek.

If possible, crossings would be accommodated via a cantilevered pathway or shoulder attached to the existing bridge structure, with no consequences for channel capacity and no need to create additional separate bridges for pathways. If cantilevered structures are not feasible, separate bridges would be necessary. During final design, a detailed hydraulic study would be undertaken to assess the impacts of proposed improvements on channel capacity and identify the need for permitting.

Construction of these improved shoulders and pathways is expected to result in approximately 61.8 acres (25.0 ha) of new impervious surface, with the largest share (42.9 acres [17.3 ha]) accounted for by pathway facilities. Long-term indirect impacts from increased runoff to nearby surface drainage and into groundwater would be localized, minor, and adverse.

Short-term construction-related activities might also produce nonpoint source pollution. Grading and surfacing associated with pathway construction in areas adjacent to creeks would increase opportunities for sedimentation, as well as leakage of oil and fuels from construction vehicles. Mitigation measures, including placement of erosion control measures (i.e., silt fence and use of SPCC plans), would be undertaken to minimize short-term impacts. The construction of multi-use pathways cantilevered from existing bridges over larger streams and the Jackson Lake Dam would necessitate placement of formwork and staging of construction activities at the edge of the channel. While construction equipment would be prohibited from the channel, additional mitigation measures, such as placing silt fence barriers and temporarily rerouting channel flows, would be employed to minimize impacts. In each location, short-term impacts would be localized, minor, and adverse.

The Moose-Wilson Road would be realigned in two areas and the existing alignments would be abandoned and



restored to natural conditions. Pavement would be removed and the roadbed would be regraded and revegetated with the intention of restoring aspen and wetland habitat in this area. This would result in the restoration of approximately 5.0 acres (2.0 ha) of soils along the abandoned road alignment, where pavement would be removed and the area graded and reseeded. Approximately 3.9 acres (1.6 ha) of soils would be redisturbed along the new alignment, which follows an old roadbed. The result would be a slight increase in impervious area due to construction of the new segment that would include standard shoulder widths. Effects would be short term, localized, moderate, and adverse during construction.

In addition, under Alternative 3, selected social trails in certain developed areas would be paved or graveled. This would reduce erosion from these trails in the vicinity of Jenny Lake and keep visitors from disturbing new areas that could result in increased runoff and erosion into the lake, a long-term, localized, minor, beneficial impact. Construction of separate entrance lanes and installation of improved signage for pedestrian and wildlife safety and variable messaging signs would have the same effects as those described for Alternative 2.

Cumulative Impacts

Impacts of past, current, and reasonably foreseeable future actions would be the same as those for Alternative 1. These projects are estimated to result in a minimal change to water quality or hydrology. The impacts of these related actions, in conjunction with the adverse and beneficial impacts of Alternative 3, would result in long-term, negligible, adverse cumulative impacts to water quality and hydrology within the Park.

Conclusion

Alternative 3 would result in long-term, localized, minor, adverse impacts on water quality, principally due to the increase in impervious surface associated with pathway and roadway shoulder facilities and the potential for storm runoff from these facilities to carry pollutants (e.g., fuels, oil) into the groundwater. Long-term, localized, minor, beneficial impacts would result from the paving and stabilization of social trails in the vicinity of Jenny Lake. Short-term impacts associated with construction activities would be minor and adverse and with appropriate mitigation, limited to the immediate area of construction. Cumulative impacts would be long-term, negligible, and adverse.

Because there would be no major, adverse impacts to water resources, for which conservation is (1) necessary

to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's water resources and no unacceptable impacts.

Effects of Alternative 3a — Preferred Alternative

Stream crossings under Alternative 3a would include Beaver Creek, Taggart Creek, Arizona Creek, Lizard Creek, Christian Creek, Ditch Creek, the Gros Ventre River, the Snake River, Cottonwood Creek, Pilgrim Creek, and Spring Creek. The main differences between Alternative 3 and Alternative 3a are as follows: Alternative 3a includes the addition of pathway spurs in two areas (North Jenny Lake Junction to String Lake and along Sagebrush Road and Spring Gulch Drive), construction of a pathway within the road corridor rather than a widened shoulder from North Jenny Lake Junction to Colter Bay, and construction of a pathway within the road corridor along a portion of the Moose-Wilson Road rather than outside the road corridor. While impacts to water resources in these areas would be greater than under Alternative 3, the increase is expected to be negligible. In total, actions associated with Alternative 3a would cross 16 perennial streams or rivers and 10 intermittent streams; several of these streams are unnamed.

Construction of multi-use pathways outside the road corridor (along approximately 22.5 miles [36.0 km]) and pathways inside the road corridor (along approximately 18.8 miles [30.3 km]) would be a new feature and would permanently remove approximately 75.9 acres (30.7 ha) of soils and vegetation and cause temporary disturbance to approximately 75.9 additional acres (30.7 ha).

From the south boundary to North Jenny Lake Junction, the effects from construction of multi-use pathways outside the road corridor would be the same as described for Alternative 3 (i.e., localized and minor), except for the pathway spurs. The spurs are proposed in two areas along this segment: North Jenny Lake Junction to String Lake and along Sagebrush Drive and Spring Gulch Road. While impacts to water resources in these areas would be greater than under Alternative 3, the overall effects would still be short term, localized, minor, and adverse. The multi-use pathways would cross Ditch Creek and the Gros Ventre River along U.S. Highway 26/89/191 and the Snake River and Cottonwood Creek along the Teton Park Road.

Construction of multi-use pathways within the road corridor between North Jenny Lake Junction and Colter

Bay (15.5 miles [25.0 km]) would have potentially short-term, localized, moderate, and adverse effects on water quality because of construction within the road corridor. Due to the terrain, pathway construction in this area would require cut and fill actions. In addition, approximately 11.0 acres (4.5 ha) of vegetation removal within the road corridor would likely be required in this area, and another 11.0 acres (4.5 ha) would be temporarily disturbed where construction equipment would be used adjacent to the main work area. Shoulder widening would occur between Signal Mountain Lodge and Jackson Lake Dam, at Jackson Lake Dam crossing along Willow Flats, and over the East Fork of Pilgrim Creek along North Park Road. Separate bridge crossings would be constructed at Christian Creek and Pilgrim Creek.

Construction of a multi-use pathway within the road corridor along a portion of the Moose-Wilson Road could require the removal of 2,150 to 2,900 trees, depending on the specific design, and could affect water quality. Less vegetation removal would be required than under Alternative 3 because the pathway would be constructed within rather than outside the road corridor. Although the pathway would be designed and sited to minimize effects, soil disturbance would occur and could result in impacts to water quality in some areas. Effects are expected to be short-term, localized, minor, and adverse. Pathways along the Moose-Wilson Road would cross Open Canyon and Lake Creek.

Construction of multi-use pathways and road shoulders is expected to result in approximately 76.0 acres (31.0 ha) of new impervious surface. Short-term, construction-related activities might also produce nonpoint source pollution. Grading and surfacing associated with pathway construction in areas adjacent to creeks would increase opportunities for sedimentation, as well as leakage of oil and fuels from construction vehicles. Mitigation measures, including placement of erosion control measures such as silt fences and use of SPCC plans, would be undertaken to minimize short-term impacts. The construction of multi-use pathways cantilevered from existing bridges over larger streams and the Jackson Lake Dam would necessitate placement of formwork and staging of construction activities at the edge of the channel. Separate bridge crossings at Christian Creek, and particularly at Pilgrim Creek, have the potential to impact existing channel capacity or morphology. While construction equipment would be prohibited from the channel, additional mitigation measures (i.e., placing silt fence barriers and temporarily rerouting channel flows) would be employed

to minimize impacts. In each location, short-term impacts would be localized, minor, and adverse.

The Moose-Wilson Road would be realigned in two areas, and the existing alignments would be abandoned and restored to natural conditions. Pavement would be removed and the roadbed would be regraded and revegetated with the intention of restoring aspen and wetland habitat in this area. This would result in the restoration of approximately 5.0 acres (2.0 ha) of soils along the abandoned road alignment where pavement would be removed and the area graded and reseeded. Approximately 3.9 acres (1.6 ha) of soils would be redisturbed along the new alignment, which follows an old roadbed. The result would be a slight increase in impervious area due to construction of the new segment that would include standard shoulder widths. Effects would be short term, localized, moderate, and adverse during construction.

In addition, under Alternative 3a, selected social trails in certain developed areas would be paved or graveled. This would reduce erosion from these trails in the vicinity of Jenny Lake and keep visitors from disturbing new areas that could result in increased runoff and erosion into the lake, a long-term, localized, minor, beneficial impact. Construction of separate entrance lanes and installation of improved signage for pedestrian and wildlife safety and variable messaging signs would have the same effects as those described for Alternative 2.

Cumulative Impacts

Impacts of past, current, and reasonably foreseeable future actions would be the same as those for Alternative 1. These projects are estimated to result in a minimal change to water quality or hydrology. The impacts of these related actions, in conjunction with the adverse and beneficial impacts of Alternative 3a, would result in long-term, minor, adverse cumulative impacts to water quality and hydrology within the Park.

Conclusion

Alternative 3a would result in long-term, localized, minor, adverse impacts on water quality, principally due to the construction of separate bridges over Christian and Pilgrim Creeks; the increase in impervious surface associated with pathway and roadway shoulder facilities; and the potential for storm runoff from these facilities to carry pollutants (fuels, oil) into the groundwater. Long-term, localized, minor, beneficial impacts would result from the paving and stabilization of social trails. Short-term impacts associated with construction activities would be minor and adverse



and with appropriate mitigation, limited to the immediate area of construction. Cumulative impacts would be long term, negligible, and adverse.

Because there would be no major, adverse impacts to water resources, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's water resources and no unacceptable impacts.

Effects of Alternative 4 — Multi-Use Pathways

Stream crossings under Alternative 4 would include Beaver Creek, Taggart Creek, Arizona Creek, Open Canyon, Lake Creek, Lizard Creek, Christian Creek, Ditch Creek, the Gros Ventre River, the Snake River, Cottonwood Creek, Pilgrim Creek, and Spring Creek. The main differences between Alternative 3a and Alternative 4 are as follows: Alternative 4 includes the construction of multi-use pathways outside the road corridor rather than within the road corridor from North Jenny Lake Junction to Colter Bay, and construction of multi-use pathways outside the road corridor along the entire the Moose-Wilson Road rather than just to the LSR Preserve. In addition, the pathway spurs to String Lake and along Sagebrush Road and Spring Gulch Drive would not be constructed under Alternative 4. In total, actions associated with Alternative 4 would cross 16 perennial streams or rivers and 10 intermittent streams; several of which are unnamed.

Under Alternative 4, construction of multi-use pathways outside the road corridor along approximately 42.6 miles (68.4 km) of roads would be a new feature and would permanently remove approximately 81.0 acres (33.0 ha) of soils and vegetation and cause temporary disturbance to approximately 81.0 additional acres (33.0 ha).

From the south boundary to North Jenny Lake Junction, the effects from construction of multi-use pathways outside the road corridor would be the same as for Alternative 3 (i.e., localized and minor). The multi-use pathways would cross Ditch Creek and the Gros Ventre River along U.S. Highway 26/89/191 and the Snake River and Cottonwood Creek along the Teton Park Road.

Construction of multi-use pathways outside the road corridor between North Jenny Lake Junction and Colter Bay has the potential for removal of large amounts of vegetation (26.0 acres [10.5 ha]) in this area, which

could lead to soil erosion and localized effects on water resources. Shoulder widening would occur at the Jackson Lake Dam crossing along Willow Flats, and over the East Fork of Pilgrim Creek, along North Park Road. Separate bridge crossings would be constructed at Christian Creek and Pilgrim Creek. Short-term, localized, minor to moderate, adverse effects to water resources could occur.

Construction of a multi-use pathway outside the road corridor along the entire the Moose-Wilson Road could require the removal of 6,375 to 7,575 trees, depending on the specific design, and could result in increased soil erosion in some areas, resulting in minor to moderate effects to water resources. Approximately 9.9 acres (4.0 ha) of vegetation would also be removed along this road section and an additional 9.9 acres (4.0 ha) would be temporarily disturbed by construction equipment. Pathways along the entire the Moose-Wilson Road would cross several creeks, including Open Canyon and Lake Creek.

Construction of multi-use pathways is expected to result in approximately 81.0 acres (33.0 ha) of new impervious surface. Short-term, construction-related activities might also produce nonpoint source pollution. Grading and surfacing associated with pathway construction in areas adjacent to creeks would increase opportunities for sedimentation, as well as leakage of oil and fuels from construction vehicles. Mitigation measures, including placement of erosion control measures (i.e., silt fences and use of SPCC plans), would be undertaken to minimize short-term impacts. The construction of multi-use pathways cantilevered from existing bridges over larger streams and the Jackson Lake Dam would necessitate placement of formwork and staging of construction activities at the edge of the channel. Separate bridge crossings at Christian Creek, and particularly at Pilgrim Creek, have the potential to impact existing channel capacity or morphology. While construction equipment would be prohibited from the channel, additional mitigation measures (i.e., placing silt fence barriers and temporarily rerouting channel flows) would be employed to minimize impacts. In each location, short-term impacts would be localized, minor, and adverse.

The Moose-Wilson Road would be realigned in two areas, and the existing alignments would be abandoned and restored to natural conditions. Pavement would be removed and the roadbed would be regraded and revegetated with the intention of restoring aspen and wetland habitat in this area. This would result in the

restoration of approximately 5.0 acres (2.0 ha) of soils along the abandoned road alignment (where pavement would be removed and the area graded and reseeded).

Approximately 3.9 acres

(1.6 ha) of soils would be redisturbed along the new alignment, which follows an old roadbed. The result would be a slight increase in impervious area due to construction of the new segment that would include standard shoulder widths. Effects would be short term, localized, moderate, and adverse during construction.

In addition, under Alternative 4, selected social trails in certain developed areas would be paved or graveled. This would reduce erosion from these trails in the vicinity of Jenny Lake and keep visitors from disturbing new areas that could result in increased runoff and erosion into the lake, a long-term, localized, minor, beneficial impact. Construction of separate entrance lanes and installation of improved signage for pedestrian and wildlife safety and variable messaging signs would have the same effects as those described for Alternative 2.

Cumulative Impacts

Impacts of past, current, and reasonably foreseeable future actions would be the same as those for Alternative 1. These projects are estimated to result in a minimal change to water quality or hydrology. The impacts of these related actions, in conjunction with the adverse and beneficial impacts of Alternative 4, would result in long-term, minor, adverse cumulative impacts to water quality and hydrology within the Park.

Conclusion

Alternative 4 would result in long-term, localized, minor to moderate, adverse impacts on water quality, principally due to the construction of separate bridges over Christian and Pilgrim Creeks; the increase in impervious surface associated with pathway facilities; and the potential for storm runoff from these facilities to carry pollutants (fuels, oil) into the groundwater. Long-term, localized, minor, beneficial impacts would result from the paving and stabilization of social trails. Short-term impacts associated with construction activities would be minor and adverse and with appropriate mitigation, limited to the immediate area of construction. Cumulative impacts would be long term, negligible, and adverse.

Because there would be no major, adverse impacts to water resources, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to the

natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's water resources and no unacceptable impacts.

Wetlands

Methods and Assumptions

Wetland presence within the project area was estimated using aerial photography, 1990 NWI mapping, 1982 soil survey mapping, 2002 land cover type classification, and several historic wetland delineations, as described in Chapter 3. Temporary and permanent wetland impacts were calculated by correlating wetland locations with locations of proposed actions. However, because precise wetland locations, pathway locations, and engineering specifications have not been determined at this time, wetland impacts described should be considered professional estimates.

Table 18 provides a summary of direct impacts (acres) to potential wetland areas by alternative and road segment. The table was derived using a Geographic Information System (GIS) analysis, which overlaid alternatives onto habitat classifications of cottonwood, pond, stream, wet meadow, and willow (all of which have the potential to be wetlands). The GIS analysis was designed to calculate the number of potential wetland acres directly affected by each road/pathway segment within each alternative. It was discovered in preparation of the Final Plan/EIS that an error had been made during the calculation of acreages of wetlands that would be impacted associated with each alternative in the Draft Plan/EIS. Table 18 presents the correct acreages potentially impacted by each alternative.



Impact Threshold Definitions	
Negligible	Wetlands area or function would not be affected, or changes would be either nondetectable, or if detected, would have effects that would be considered slight, local, and would likely be short term.
Minor	Wetlands function would not be affected; however, effects to a few individual plant or wildlife species would be measurable. Changes would be small, localized, and short term. No mitigation measures would be necessary.
Moderate	Wetlands function would be affected. Changes would be measurable and long-term, but localized, with all wetland species remaining indefinitely viable within the Park. Mitigation measures would be necessary and likely successful.
Major	Wetlands function would be affected permanently. Changes would be readily measurable, long-term, and have consequences on a regional scale. Wetland species dynamics would be upset and species would be at risk of expiration from the Park. Mitigation measures would be necessary and their success would not be guaranteed.
Duration	Short term — Recovers in less than 3 years.
	Long term — Takes more than 3 years to recover.
Area of Analysis	Within park boundary.

Effects of Alternative 1 — No Action

Under Alternative 1, there would be no actions that would result in impacts to wetlands other than routine road maintenance conducted in the vicinity of wetlands crossed by roads. With the application of appropriate mitigation, including avoidance, erosion and sedimentation control, noxious weed control, and use of construction (as needed), no new loss of wetlands would result from the implementation of Alternative 1, and long-term, adverse impacts (direct or indirect) would be negligible and localized.

Cumulative Impacts

Historic and current park management philosophies emphasize wetland protection, and no existing and future development activities occurring within Grand Teton National Park are expected to adversely impact wetlands to any large degree. Some wetlands have been altered or lost because of past activities; however, the extent of these impacts is unknown. For example, it appears that several springs and associated wetlands located along the toe of the Beaver Creek Bench on the Moose-Wilson Road have been filled and modified in the past because of road construction. Similarly, the flood control levee located along the Snake River east of the Moose-Wilson Road appears to have filled wetlands and altered the hydrology of the area sufficiently to adversely affect adjacent wetlands, as well as those in the vicinity. GIS analysis indicates that approximately 9.2 acres (3.7 ha) of potential wetlands may have been impacted by the present road configuration.

Ongoing and recently completed projects in Grand Teton National Park that would impact wetlands include:

1. Widening and reconstruction of 10.5 miles (16.9 km) of North Park Road (0.9 acre [0.4 ha] of wetland impacts, 3.2 acres [1.3 ha] of wetland mitigation).
2. Widening and rehabilitation of 7.7 miles (12.4 km) of U.S. Highway 26/89/191 (0.3 acre [0.1 ha] of wetland impacts, no mitigation).
3. Spread Creek Material Source and Staging Area Project (0.01 acre [0.004 ha] of wetland impacts).

Environmental assessments and findings of no significant impact associated with these projects addressed impacts to wetlands. In addition to those mentioned specifically above, WYDOT is always planning road reconstruction projects that have the potential to impact wetlands; however, the extent is presently unknown.

The wetland impacts of these other actions, when combined with the negligible wetland impacts resulting from Alternative 1, would result in long-term, negligible to minor adverse impacts to wetlands mainly associated with maintaining small but permanent wetland fills along existing roads that contribute negligibly overall to cumulative impacts to wetlands.

Conclusion

Alternative 1 would result in long-term, localized, negligible, adverse impacts to wetlands, with no new or measurable net wetland losses. Cumulative impacts would be long-term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to wetlands, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's wetlands and no unacceptable impacts.

Effects of Alternative 2 — Improved Road Shoulders

Alternative 2 would have similar impacts to wetlands (as described for Alternative 1 relating to continued road maintenance), with a slight addition to adverse effects from the shoulder widening along the Teton Park Road in the vicinity of Cottonwood Creek, Taggart Creek, and the Snake River, where palustrine-scrub/shrub and emergent wetlands are present. There is the potential for wetland impacts to occur northeast of Jackson Lake Dam, where the Teton Park Road bisects Willow Flats, a large expanse of palustrine-scrub/shrub wetlands. Wetland impacts would primarily be associated with wetland fills that would be required to construct improved shoulders along this portion of the road. Approximately 0.02 acres (0.008 ha) of wetlands would potentially be affected (see Table 18). However, because shoulder construction would occur without any expansion of the current bridges, potential impacts would be minimized or avoided completely. Actions under Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts to wetlands.

Cumulative Impacts

Cumulative impacts to wetlands associated with Alternative 2 would be generally the same as those identified in Alternative 1 because wetlands would be avoided during shoulder construction along existing roadways. If any wetlands were disturbed, wetland mitigation requirements would ultimately result in total replacement and a possible net increase in park wetlands that are similar in type and function to impacted wetlands. Human uses of linear facilities resulting from implementing Alternative 2, including vehicles, are not expected to contribute to cumulative impacts in any measurable way.

The wetland impacts of other actions (described in Alternative 1), when combined with wetland impacts resulting from Alternative 2, would result in long-term, negligible to minor, adverse impacts to wetlands mainly associated with the small but permanent wetland fills that contribute negligibly overall to cumulative impacts to wetlands.

Conclusion

Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts on Grand Teton National Park wetlands. Permanent losses of wetlands would be avoided, minimized, and if necessary, compensated for at a minimum ratio of 1:1. Construction activities would employ BMPs to reduce or largely eliminate any adverse effects to adjacent and nearby wetlands. Cumulative impacts to wetlands would be long term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to wetlands, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's wetlands and no unacceptable impacts.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Alternative 3 would affect a small portion of palustrine-scrub/shrub, emergent, and aquatic bed wetlands within the project area if wetlands cannot be totally avoided during construction in certain areas, such as Willow Flats. Wetland impacts would primarily be associated with improved shoulders planned for north of Jenny Lake to Colter Bay, which would involve crossing Willow Flats and the Pilgrim Creek area. Construction of the multi-use pathways through or adjacent to wetlands could affect wetlands by altering or obstructing groundwater and surface water regimes, altering wetland connectivity, and changing chemical and biological characteristics. Potential impacts would be minimized or eliminated by using cantilevered additions to existing bridges, if feasible, and by placing multiple culverts through a separated pathway, if needed. Any long-term adverse impacts following mitigation would be minor and localized.

The majority of wetland impacts that could occur under Alternative 3 would affect palustrine-scrub/shrub wetlands and palustrine emergent wetlands associated with the stream crossings at Ditch Creek, Taggart Creek, Cottonwood Creek, Snake River, Gros Ventre River, Arizona Creek, Lizard Creek, Christian Creek, Spring Creek, and Pilgrim Creek. Approximately 0.12 acres (0.05 ha) of wetlands could potentially be impacted by roadway features and 1.28 acres (0.52 ha) could potentially be impacted by pathways (see Table 18). Wetland impacts not associated with stream crossings would be greatest in the area from Jackson Lake



Dam to Jackson Lake Junction. Additional wetland impacts would be located in small, localized areas adjacent to Jackson Lake and Cottonwood Creek and along the Moose-Wilson Road realignment. Wetland impacts would occur mainly along existing transportation corridors; however, the exact alignment of the multi-use pathways has not yet been determined. In all areas where construction would potentially affect wetlands, mitigation measures would be implemented to preserve wetland functions and values, as well as to control erosion, noxious weeds, and spills of any construction-related fuels. Impacts would be long-term, localized, minor, and adverse.

The Moose-Wilson Road would be realigned in two areas, and the existing alignments would be abandoned and restored to natural conditions. Specifically, a section of the existing Moose-Wilson Road between Sawmill Ponds Overlook and a point approximately one-third mile (0.5 km) north of Death Canyon Road junction would be abandoned and restored to natural conditions. Realignment would occur for the purpose of restoring aspen habitat to this area and avoiding important wetland and riparian areas. The aspen, cottonwood, and mixed deciduous-coniferous forests and wetlands located along this section of the Moose-Wilson Road provide unique habitat for wildlife and distinct vegetative communities. This action would result in long term, localized, minor to moderate, beneficial impacts.

Improvements to several social trails in the vicinity of Jenny Lake would have no direct impacts on wetlands since these trails are not located in wetlands. There would be indirect, long-term, localized, negligible, beneficial impacts to wetlands by eliminating runoff from eroded trails into nearby wetlands that border Jenny Lake.

Cumulative Impacts

Cumulative impacts to wetlands associated with Alternative 3 would be generally the same as those identified in Alternative 1, with only a small incremental effect expected from construction of multi-use pathways in certain areas. Wetland mitigation requirements would ultimately result in total replacement and a possible net increase in park wetlands that are similar in type and function to impacted wetlands. Human uses of linear facilities resulting from implementing Alternative 3, including vehicles, are not expected to contribute to cumulative impacts in any measurable way.

The wetland impacts of other actions (described in Alternative 1), when combined with wetland impacts resulting from Alternative 3, would result in long-term, localized, negligible to minor, adverse impacts to wetlands

associated mostly with the small but permanent wetland fills that contribute negligibly overall to cumulative impacts to wetlands.

Conclusion

Alternative 3 would result in long-term, localized, minor, adverse impacts on Grand Teton National Park wetlands, mainly in the vicinity of Cottonwood Creek and Willow Flats, with long-term, localized, negligible, beneficial impacts due to improving social trails and long term, localized, minor to moderate, beneficial impacts from realignment of the Moose-Wilson Road. Permanent losses of wetlands would be avoided, minimized, and if necessary, compensated for at a minimum ratio of 1:1. Construction activities would employ BMPs to reduce or largely eliminate any adverse effects to adjacent and nearby wetlands. Cumulative impacts would be long-term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to wetlands, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's wetlands and no unacceptable impacts.

Effects of Alternative 3a — Preferred Alternative

Alternative 3a would affect a small portion of palustrine-scrub/shrub, emergent, and aquatic bed wetlands within the project area if wetlands cannot be totally avoided during construction in certain areas, such as Willow Flats. Wetland impacts would primarily be associated with the creation of separated pathways from the Granite Canyon Entrance Station to the LSR Preserve on the Moose-Wilson Road; the south boundary to Antelope Flats Road; along the Teton Park Road from Moose Junction to North Jenny Lake Junction; and on to String Lake along the Jenny Lake Road. Construction of the multi-use pathways through or adjacent to wetlands could affect wetlands by altering or obstructing groundwater and surface water regimes, altering wetland connectivity, and changing chemical and biological characteristics. Potential impacts would be minimized or eliminated by using cantilevered additions to existing bridges, if feasible, and by placing multiple culverts through a separated pathway, if needed. Any long-term adverse impacts following mitigation would be minor and localized.

Approximately 3.85 acres (1.56 ha) of potential wetlands would be affected under this alternative (see Table 18). The majority of wetland impacts that could occur under Alternative 3a would affect palustrine-scrub/shrub wetlands and palustrine emergent wetlands associated with the stream crossings at Ditch Creek, Taggart Creek, Cottonwood Creek, Snake River, Gros Ventre River, Arizona Creek, Lizard Creek, Christian Creek, Spring Creek, Pilgrim Creek, Open Canyon Creek, and Lake Creek. Wetland impacts would be greatest in the section from Jackson Lake Dam to Jackson Lake Junction. Additional wetland impacts would be located in small, localized areas adjacent to Jackson Lake and along the segments of the Moose-Wilson Road realignment. Wetland impacts would occur mostly along existing transportation corridors; however, the exact alignment of the multi-use pathways has not yet been determined. In all areas where wetlands would potentially be affected to complete construction, mitigation measures would be implemented to preserve wetland functions and values, as well as to control erosion, noxious weeds, and spills of any construction-related fuels. Impacts would be long-term, localized, minor to moderate, and adverse.

The Moose-Wilson Road would be realigned in two areas, and the existing alignments would be abandoned and restored to natural conditions. Specifically, a section of the existing Moose-Wilson Road between Sawmill Ponds Overlook and a point approximately one-third mile (0.5 km) north of Death Canyon Road junction would be abandoned and restored to natural conditions. Realignment would occur for the purpose of restoring aspen habitat to this area and avoiding important wetland and riparian areas. The aspen, cottonwood, and mixed deciduous-coniferous forests and wetlands located along this section of the Moose-Wilson Road provide unique habitat for wildlife and distinct vegetative communities. This action would result in long term, localized, minor to moderate, beneficial impacts.

Improvements to several social trails in the vicinity of Jenny Lake would have no direct impacts on wetlands since these trails are not located in wetlands. There would be indirect long-term, localized, negligible, beneficial impacts to wetlands by eliminating runoff from eroded trails into nearby wetlands that border Jenny Lake.

Cumulative Impacts

Cumulative impacts to wetlands associated with Alternative 3a would be generally the same as those identified in Alternative 3, with an increased effect expected from construction of multi-use pathways from the Granite Canyon Entrance Station to the LSR Preserve on the Moose-Wilson Road; and multi-use pathways rather than improved shoulders from North Jenny Lake to Colter Bay. Wetland mitigation requirements would ultimately result in total replacement and a possible net increase in park wetlands that are similar in type and function to impacted wetlands. Human uses of linear facilities resulting from implementing Alternative 3a, including vehicles, are not expected to contribute to cumulative impacts in any measurable way.

The wetland impacts of other actions (described in Alternative 1), when combined with wetland impacts resulting from Alternative 3a, would result in long-term, negligible to minor, adverse impacts to wetlands associated mostly with the small but permanent wetland fills that contribute negligibly overall to cumulative impacts to wetlands.

Conclusion

Alternative 3a would result in long-term, localized, minor to moderate, adverse impacts to Grand Teton National Park wetlands, mainly in the vicinity of Cottonwood Creek and the area from Jackson Lake Dam to Jackson Lake Junction, with long-term, localized, negligible, beneficial impacts due to improving social trails and long-term, localized, minor to moderate, beneficial impacts from realignment of the Moose-Wilson Road. Permanent losses of wetlands would be avoided, minimized, and if necessary, compensated for at a minimum ratio of 1:1. Construction activities would employ BMPs to reduce or largely eliminate any adverse effects to adjacent and nearby wetlands. Cumulative impacts would be long-term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to wetlands, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's wetlands and no unacceptable impacts.



Effects of Alternative 4 — Multi-Use Pathways

Alternative 4 would affect a small portion of palustrine-scrub/shrub, emergent, and aquatic bed wetlands within the project area if wetlands cannot be totally avoided during construction in certain areas, such as Willow Flats. Wetland impacts would primarily be associated with the creation of multi-use pathways from North Jenny Lake to Colter Bay; the south boundary to Antelope Flats Road; and from the Granite Canyon Entrance Station to Moose. Construction of the multi-use pathways through or adjacent to wetlands could affect wetlands by altering or obstructing groundwater and surface water regimes, altering wetland connectivity, and changing chemical and biological characteristics. Potential impacts would be minimized or eliminated by using cantilevered additions to existing bridges, if feasible, and by placing multiple culverts through a separated pathway, if needed. Any long-term adverse impacts following mitigation would be minor and localized.

Approximately 4.26 acres (1.72 ha) of potential wetlands would be affected by this alternative (see Table 18). The majority of wetland impacts that could occur under Alternative 4 would affect palustrine-scrub/shrub wetlands and palustrine emergent wetlands associated with the stream crossings at Ditch Creek, Taggart Creek, Cottonwood Creek, Snake River, Gros Ventre River, Arizona Creek, Lizard Creek, Christian Creek, Spring Creek, Pilgrim Creek, Open Canyon Creek, and Lake Creek. Wetland impacts would be greatest in the section from Jackson Lake Dam to Jackson Lake Junction. Additional wetland impacts would be located in small, localized areas adjacent to Jackson Lake and along the segments of the Moose-Wilson Road realignment. Wetland impacts would occur mostly along existing transportation corridors; however, the exact alignment of the multi-use pathways has not yet been determined. The exact locations where pathways would be constructed are unknown; therefore, calculations for disturbance values address the greatest potential disturbance. Actual disturbance would be less than the estimated 4.26 acres (1.72 ha). In all areas where wetlands would potentially be affected to complete construction, mitigation measures would be implemented to preserve wetland functions and values, as well as to control erosion, noxious weeds, and spills of any construction-related fuels. Impacts would be long term, localized, minor to moderate, and adverse.

As in Alternatives 3 and 3a, the Moose-Wilson Road would be realigned in two areas, and the existing alignments

would be abandoned and restored to natural conditions. Specifically, a section of the existing Moose-Wilson Road between Sawmill Ponds Overlook and a point approximately one-third mile (0.5 km) north of Death Canyon Road junction would be abandoned and restored to natural conditions. Realignment would occur for the purpose of restoring aspen habitat to this area and avoiding important wetland and riparian areas. The aspen, cottonwood, and mixed deciduous-coniferous forests and wetlands located along this section of the Moose-Wilson Road provide unique habitat for wildlife and distinct vegetative communities. This action would result in long term, localized, minor to moderate, beneficial impacts.

Improvements to several social trails in the vicinity of Jenny Lake would have no direct impacts on wetlands since these trails are not located in wetlands. There would be indirect long-term, localized, negligible, beneficial impacts to wetlands by eliminating runoff from eroded trails into nearby wetlands that border Jenny Lake.

Cumulative Impacts

Cumulative impacts to wetlands associated with Alternative 4 would be the same as those identified in Alternatives 3 and 3a for the south boundary to North Jenny Lake Road segment; and slightly greater than Alternatives 3 and 3a for the North Jenny Lake to Colter Bay road segment and the Granite Canyon Entrance Station to Moose road segment. This increased effect is expected from construction of multi-use pathways from the Granite Canyon Entrance Station to Moose rather than from the Granite Canyon Entrance Station to the LSR Preserve, as in Alternatives 3 and 3a, and from construction of multi-use pathways outside the road corridor rather than improved shoulders or pathways within the road corridor from North Jenny Lake to Colter Bay. Wetland mitigation requirements would ultimately result in total replacement and a possible net increase in park wetlands that are similar in type and function to impacted wetlands. Human uses of linear facilities resulting from implementing Alternative 4, including vehicles, are not expected to contribute to cumulative impacts in any measurable way.

The wetland impacts of other actions (described in Alternative 1), when combined with wetland impacts resulting from Alternative 4, would result in long-term, negligible to minor, adverse impacts to wetlands associated mostly with the small but permanent wetland fills that contribute negligibly overall to cumulative impacts to wetlands.

Conclusion

Alternative 4 would result in long-term, localized, minor to moderate, adverse impacts to Grand Teton National Park wetlands, mainly in the vicinity of Cottonwood Creek and the area from Jackson Lake Dam to Jackson Lake Junction, with long-term, localized, negligible, beneficial impacts due to improving social trails and long-term, localized, minor to moderate, beneficial impacts from realignment of the Moose-Wilson Road. Permanent losses of wetlands would be avoided, minimized, and if necessary, compensated for at a minimum ratio of 1:1. Construction activities would employ BMPs to reduce or largely eliminate any adverse effects to adjacent and nearby wetlands. Cumulative impacts would be long-term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to wetlands, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park's GMP or other relevant NPS planning documents, there would be no impairment of the Park's wetlands and no unacceptable impacts.

Threatened and Endangered Species, Species of Special Concern, Neotropical Migratory Birds, and General Wildlife

Methods and Assumptions

This section addresses impacts to endangered and threatened animal species, bird species of special concern, neotropical migratory birds, and general wildlife (i.e., mammals, reptiles, and amphibians).

Effects of transportation routes, features, and improvements on terrestrial wildlife (including threatened and endangered species) have been documented (Trombulak and Frissell 2000; Forman et al. 2003) and include such impacts as mortality from collisions, modification of animal behavior, disruption of the physical environment, spread of exotic species, and changes in human use of the lands and water. Specific examples include habitat loss and fragmentation, reduced animal use of habitats because of noise and/or the presence of humans, loss of forage, interference with wildlife life-history functions (e.g., courtship, nesting, and migration), spread of non-native species carried by vehicles, and increased levels of recreation.

The level of impact relates, in part, to the density of transportation features, the physical footprint and effect zone of the transportation network, availability of secure habitat areas, and traffic volume. Grand Teton National Park is approximately 484 square miles (1,254 square km) in size, and there are roughly 350 miles (563 km) of transportation routes within the Park. This represents an average transportation-route density of 0.7 mile per square mile (0.45 km per square kilometer) for the entire park. Road density is scale-dependent and would be higher or lower than the average figure reported here in some portions of the Park. The approximate physical footprint of the road system is 0.8 square miles (2.1 square km), which is less than 1 percent of the total park area.

The following sources of information were used to assess project impacts to wildlife, including threatened, endangered, and sensitive species:

- Scientific literature on species life histories, distributions, habitat selection, and responses to human activities.
- Site-specific information on wildlife distribution and use patterns within Grand Teton National Park and its vicinity, including complete and ongoing studies (when available) and the professional judgment of park, other federal, state, or non-agency biologists familiar with the status and management concerns related to individual species.

The impact analyses considered a variety of factors, including known or likely presence of the species in the areas that would be affected by actions under each alternative, and presence of the species' preferred habitat. Factors considered included habitat loss or disturbance, direct mortality, human-caused disturbance (e.g., noise, traffic volumes, and human use patterns), and habitat fragmentation.

For purposes of Section 7 consultation with the USFWS, the impact assessments for federally listed species also include a concluding statement for each federally listed species as to whether the alternative would have "No Effect," "May Affect but is Not Likely to Adversely Affect," or "May Affect and is Likely to Adversely Affect." Review of this document and the impact analysis is intended to serve as the Biological Assessment in support of the Section 7 formal consultation process.



Impact Threshold Definitions	
Threatened and Endangered Species (Federally Listed Species)	
No Effect	A federally listed species would not be affected.
Minor	Analogous to a “May-Affect-but-Not-Likely-to-Adversely Affect” determination used by the USFWS. Implementing the alternative could possibly affect, but is not likely to adversely affect, a listed species or its critical habitat. Mitigation measures would be needed in order to attain the “Not-Likely-to-Adversely-Affect” determination.
Moderate	Analogous to a “May Affect but Not Likely to Adversely Affect” determination used by the USFWS or to a “May Affect and Likely to Adversely Affect” determination when an action could affect one or more individual members of a listed species and/or its critical habitat, but when the action would not threaten the survival of the species. Mitigation measures would likely be required to reduce impacts.
Major	Analogous to a “May Affect and Likely to Adversely Affect” determination used by the USFWS when an action could affect one or more individual members of a listed species and/or its critical habitat; and when the action could threaten the survival of the species and/or its critical habitat. Mitigation measures would likely be required to reduce impacts, or the action could result in a “Jeopardy Opinion” given by the USFWS.
Duration	Short term — recovers in less than 1 year.
	Long term — requires more than 1 year to recover.
Area of Analysis	Within the Park and surrounding GYA.
Species of Special Concern, Neotropical Migratory Birds, and General Wildlife	
Negligible	A small number of individual animals and/or a small amount of their respective habitat would be adversely affected via direct or indirect impacts associated with a given alternative. Populations would not be affected or the effects would be below a measurable level of detection. Mitigation measures would not be warranted.
Minor	Effects to individual animals and/or their respective habitats would be more numerous and detectable. Populations would not be affected or the effects would be below a measurable level of detection. Mitigation measures would be needed and would be successful in reducing adverse effects.
Moderate	Effects to individual animals and their habitat would be readily detectable, with consequences occurring at a local population level. Mitigation measures would likely be needed to reduce adverse effects and would likely be successful.
Major	Effects to individual animals and their habitat would be obvious and would have substantive consequences on a regional population level. Extensive mitigation measures would be needed to reduce any adverse effects and their success would not be guaranteed.
Duration	Short term — Impact has a duration less than or equal to 3 years following implementation.
	Long term — Impact has a duration greater than 3 years following implementation.
Area of Analysis	Within park boundary and surrounding GYA.

Linear developments (e.g., roads, trails, and pathways) have been shown to affect wildlife through direct habitat loss, disturbance and creation of barriers to movement, habitat avoidance, social disruption, and direct or indirect mortality (Jalkotzy et al. 1997, Forman and Alexander 1998, Trombulak and Frissell 2000, Gucinski et al. 2001, Forman et al. 2003, Gaines et al. 2003, Jacobson 2005). The level of impact depends on the nature of the corridor (e.g., length, width, type of use, use levels, etc.), the habitats it traverses,

species present, and whether the linear development occurs in previously disturbed or relatively pristine areas.

Construction of new linear features or expansion of existing features directly impacts the habitat it displaces, as vegetation removed in the process of construction is no longer available for use by wildlife. Once built, the mere presence of linear features can also influence the local environment and site conditions, and thus habitat conditions. Noise and human activity associated

with the construction phase would cause individual animals to avoid the areas of activity in the short term. Activities (e.g., motorized vehicle traffic, biking, walking or hiking, etc.) associated with the linear corridors can disturb wildlife, causing them to leave the area, alter use patterns, or experience a stress response. These responses carry costs in terms of energy expenditures and possibly lost opportunities (Jalkotzy et al. 1997). Some responses are unique to certain wildlife species and differ depending upon an animal's sensitivity, age, or sex and would change according to season, group size, and habitat security. Behavioral responses would be short in duration (temporary displacement) or long-term, such as abandonment of preferred foraging areas. Animal density would be increased in the remaining habitat, which can impact the ability of individual animals to survive. In general, impacts to wildlife from human disturbance are influenced by characteristics of the disturbance itself and would vary depending upon type of activity, distance away, direction of movement, speed, predictability, frequency, and magnitude.

The ecological impacts of linear developments generally expand beyond the actual physical linear footprint. The width of this zone of influence (ZOI) varies and is influenced by individual species' sensitivity, landscape, topographic features, and the patterns of human use (e.g., type, timing, and frequency). For example, a ZOI for a nesting passerine bird is smaller than the zone for a grizzly bear. Estimated grizzly bear ZOIs from roads have ranged from 328 ft to over 2,952 ft (100 m to over 900 m) (Puchlerz and Servheen 1994), whereas those for songbirds have been reported as 33 ft to 327 ft (10 m to 100 m) (Miller et al. 1998).

For this analysis, to account for differences among species two ZOIs along linear features were identified and used to compare and analyze potential impacts among the alternatives considered. These zones were created by buffering the linear features (both existing and proposed) by either 246 ft (75 m) or 1,312 ft (400 m) (Figure 23). The resulting buffers depict areas where wildlife would be affected by disturbance from use of the road or biking and walking along the pathway. Pathway effects on more sensitive species (e.g., bears, most ungulates, some birds) are represented generally by the larger buffer, while those on less sensitive species (e.g., most birds, small mammals) are represented by the smaller buffer. Multi-use pathways were buffered from an alignment 50 ft (15.1 m) from the roadside, assuming their location would generally be

within this distance. Where pathways diverge more than this, impacts would be greater. Where pathways would need to be immediately adjacent to the road because of topographic constraints or resource concerns they were buffered 10.5 ft (3.2 m) from the road.

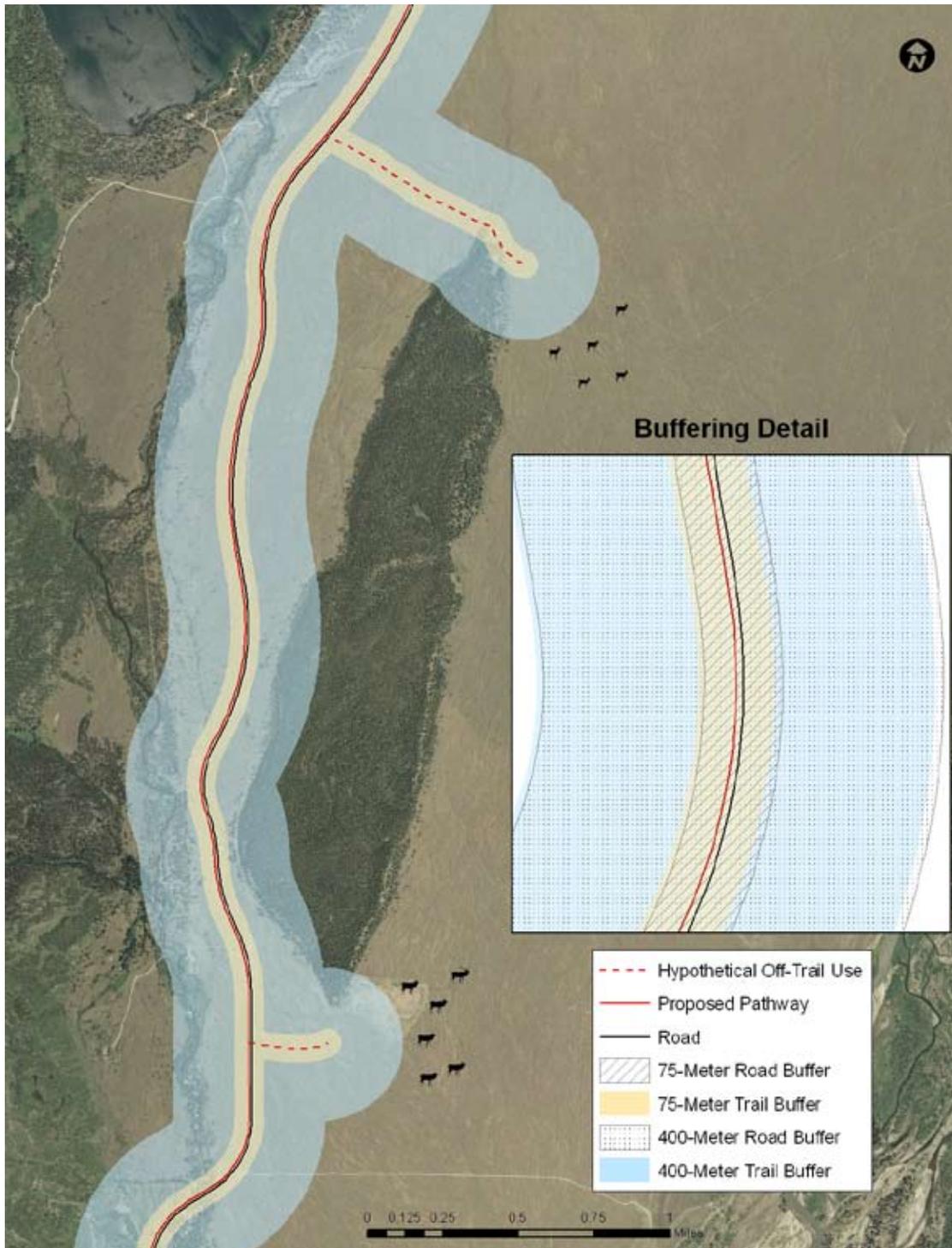
Acreages presented in Appendix B tables were derived from applying these buffers to the landscape and overlaying them on a vegetation and habitat type map.

Predictable and localized activities, such as motorized activities that are confined to specific routes where vehicles seldom stop, would have less impact to wildlife species than activities that are unpredictable and/or widespread. The response of wildlife to a road or pathway would be short term. Increasing levels of use and changes in the type of use, however, would disturb wildlife enough to cause them to move away permanently. Predictability can be a factor in how much disturbance a trail user causes.

For example, some wildlife would become habituated to high-use roads where vehicles seldom stop or stop mostly in predictable locations (e.g., pullouts). In these situations, wildlife would utilize habitat closer to the road than they would otherwise. Generally, the level of predictability along a linear corridor declines as human activities change from (1) vehicles passing through a linear corridor; to (2) vehicles stopping only at established pullouts along the corridor; to (3) vehicles stopping randomly along the corridor; to (4) people exiting vehicles at random points along the corridor; to (5) people approaching wildlife from random points along a corridor. Because pathways would allow users to easily stop and approach wildlife at any point along the corridor (Figure 21), the ability of wildlife to predict human responses would be low. This potential off trail use is likely to increase the average ZOI for the corridor (Figure 23).



FIGURE 23
AN EXAMPLE OF THE APPLICATION OF 75- AND 400-METER BUFFERS APPLIED TO REPRESENT A PATHWAY'S ZONE OF INFLUENCE ON ADJACENT HABITATS, AND HOW UNPREDICTABLE OFF-TRAIL USE CAN EXTEND THIS INFLUENCE



General Measures of Habitat Loss for All Alternatives

Direct habitat loss from construction of improved shoulders, multi-use pathways, and road realignments among eight vegetation classes ranges from 0 acres for Alternative 1 to 85.1 acres (34.4 ha) for Alternative 4 (Tables 19 and 22). Indirect habitat loss from the 75- and 400-m ZOI associated with roads in the project area is presented in Table 23. These tables present the net habitat loss associated with linear feature ZOIs and range from 0 acres for Alternative 1 to 215.9 acres (87.4 ha) for Alternative 4 (Table 23). Appendix B includes a more detailed depiction of direct habitat loss for each alternative. These tables will be referred to as needed in the context of subsequent topical impact sections.

Grand Teton National Park is a large, natural area that supports robust populations of several large, potentially dangerous species of mammals. Existing forms of park transportation (i.e., vehicles, bicyclists, and pedestrians on several classes of roads, pedestrians on and off trails, equestrians, and both motorized and non-motorized watercraft) each have certain wildlife hazards that are reasonably well understood. Generally, vehicles are subject to potentially dangerous collisions with wildlife, while non-motorized users are concerned with undesirably close encounters with potentially dangerous wildlife.

Providing multi-use pathways in this context presents new human safety challenges for park managers and the public. Wildlife hazards associated with pathways would be similar to those associated with trails, with one important exception: bicycles and other wheeled vehicles, which are not permitted on trails but would be permitted on pathways, would be able to move quickly and quietly through the landscape. This would greatly increase the probability of sudden, surprise encounters with and aggressive responses from wildlife. These encounters take place due to the absence of two important mitigating factors: the slow speed of pedestrians and loud noise of motorized vehicles. Areas near noisy streams or where sight distances are minimized by terrain, daylight, or vegetation would have increased hazards, as would using any portion of a pathway after dark.

Encounters with bears (especially grizzly bears), moose, and bison are of particular concern because of their propensity to respond with aggression that can result in serious human injuries or death. Higher frequencies of encounters can be expected in higher quality habitats for each of the species concerned. Pathway alignments that stay as close to the road as possible, maximize sight distances, and avoid high quality habitat can help mitigate, but not eliminate, these hazards (Herrero et al. 1986). Signage and other forms of education would also mitigate risk. Not surprisingly, few data exist from which to base predictions of encounter rates because precedents for combining pathways with large protected areas and high densities of large, dangerous mammals are rare.

Bears

Some information on bicyclist encounters with grizzly bears is available from Herrero and Herrero (2000), from which the following information was taken. In North America, 33 records were found for bicyclist encounters with grizzly bears in which the bear responded aggressively. Five of these occurred on roads used by cars and the remaining occurred on trails or nearby. In most cases, grizzly bears charged or chased bicyclists. In 12 percent (4 of 33) of encounters, bicyclists were injured by grizzly bears; in 75 percent of these cases (3 of 4), injuries were serious (requiring more than 24 hours in a hospital). The majority (22 of 33) of encounters occurred in Banff and Jasper National parks, where mountain biking is allowed on some trails. Ninety-five percent of encounters in which distance was estimated, the bicyclist first became aware of the bear at less than 163.8 ft (50 m), which Herrero (1985) defined as a “sudden encounter.” Importantly, while not conclusive, the data suggest that rates of sudden encounters with bears are much higher among bicyclists than pedestrians. Indeed, in Canada’s Kluane National Park (Kluane National Park 1997), park managers state that “Mountain bikers travel quickly and quietly on the trails. As a result, they are much more likely to have surprise encounters with bears and other wildlife than with hikers and horses.” Most of the encounters documented by Herrero and Herrero (2000) and discussed above occurred on dirt trails where bicycles would be expected to travel more slowly and make more noise than they would on a paved pathway.



**TABLE 22
SUMMARY OF DIRECT HABITAT LOSS¹ (ACRES) FROM LINEAR ROAD
FEATURES AND MULTI-USE PATHWAYS BY ALTERNATIVE**

Road Segment	Road Features ²					Separated Pathways				
	Alternative					Alternative				
	1	2	3	3a	4	1	2	3	3a	4
Granite Canyon Entrance Station to Moose	0.00	0.00	3.96	12.07	3.96	0.00	0.00	6.14	0.00	13.92
South entrance to Antelope Flats	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.81	17.81	17.81
Gros Ventre Junction to West Boundary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.84	0.00
Moose to Signal Mountain	0.00	13.28	7.69	3.85	0.00	0.00	0.00	20.90	28.12	34.55
North Jenny Lake Junction to String Lake	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.86	0.00
Signal Mountain to Jackson Lake Junction	0.00	0.00	3.30	2.17	2.07	0.00	0.00	0.00	2.20	2.20
Jackson Lake Junction to Colter Bay	0.00	0.00	3.98	5.37	0.00	0.00	0.00	0.00	6.59	10.60
TOTAL FOR ALL ROAD SEGMENTS³	0.00	13.28	18.93	23.46	6.03	0.00	0.00	44.85	59.42	79.08

¹Figures represent net difference from existing condition.

²Road features include a combination of asphalt, gravel, signs, etc associated with a widened road shoulder.

³Total acres lost for

Alternative 1	0.00
Alternative 2	13.28
Alternative 3	63.78
Alternative 3a	82.88
Alternative 4	85.11

Bison

Many records are available for human-bison encounters in which aggressive reactions by bison occurred. In Grand Teton, bison have charged several people; however, only one human injury has been documented to date. In this case, a man was seriously gored in the thigh after approaching a bison bull too closely.

In YNP, however, bison have charged and made contact with humans at least 81 times from 1978-1999 (Yellowstone. net 2000). Many victims received serious injuries, and two visitors died from their injuries. In each case, bison appeared to be reacting defensively to people who approached them too closely. By comparison, grizzly bears injured 30 people and killed two humans during the same period, making bison the most dangerous animal in YNP.

Moose

Moose have a long-standing but perhaps downplayed reputation of aggressive encounters with humans. Stories of anglers being treed by moose are common, as are chases by moose cows protecting calves. In rare cases, moose have killed humans (C. Schwartz 2005, pers. comm.). Moose cows protecting calves are perhaps the most dangerous, and approaching too closely or having sudden, surprise encounters seems to be a common denominator in aggressive responses. In Grand Teton, several such encounters have been reported to date. One, in 2006, involved a boy that was kicked in the head by an adult female moose after he approached the cow and her two calves too closely. The boy received a serious head injury.

**TABLE 23
AREA (ACRES) WITHIN 75-METER AND 400-METER ZONE OF INFLUENCE BUFFERS
BY ALTERNATIVE AND SECTION¹**

Road Segment	75-m ZOI					400-m ZOI				
	Alternative					Alternative				
	1	2	3	3a	4	1	2	3	3a	4
Granite Canyon Entrance Station to Moose	0.00	0.00	19.70	6.88	44.24	0.00	0.00	20.33	6.38	34.24
South entrance to Antelope Flats	0.00	0.00	47.12	47.12	47.12	0.00	0.00	48.56	48.56	48.56
Gros Ventre Junction to West Boundary	0.00	0.00	0.00	4.65	0.00	0.00	0.00	0.00	2.67	0.00
Moose to Signal Mountain	0.00	13.38	64.87	81.80	96.68	0.00	72.52	63.44	76.63	94.71
North Jenny Lake Junction to String Lake	0.00	0.00	0.00	7.47	0.00	0.00	0.00	0.00	3.69	0.00
Signal Mountain to Jackson Lake Junction	0.00	0.00	3.32	8.55	8.54	0.00	0.00	3.28	8.26	8.27
Jackson Lake Junction to Colter Bay	0.00	0.00	4.06	24.41	29.92	0.00	0.00	4.36	25.30	30.14
TOTAL FOR ALL ROAD SEGMENTS	0.00	13.38	139.07	180.88	226.50	0.00	72.52	139.97	171.49	215.92

¹Values represent the net difference between the existing condition and impacts associated with each alternative.

Cougars

From 1991-2003, seventy-one cougar attacks resulting in 10 human deaths were recorded in North America (Beier 2005); however, none were reported from Wyoming. Details of these accounts indicate that children are more vulnerable than adults, and at least four attacks involved bicyclists, including one mountain biker fatality in California. Cougar attacks are too rare to make valid comparisons among user groups, but most victims shared the common trait of recreating in cougar habitat when attacks occurred. While risk of cougar attacks would increase if pathways attract more visitors into cougar habitat, no evidence could be found to suggest that user attributes associated with pathways would increase risk above that experienced by other outdoor recreationists.

Effects of Alternative 1 — No Action

Endangered and Threatened Species
(Federally Listed Species)

Bald Eagle

Under Alternative 1, the presence and ongoing maintenance of existing park roads would not directly affect bald eagles or their habitat. Road maintenance activities would not occur within one-half mile (0.8 km) of bald eagle nests, and no eagle habitat would be removed during routine road maintenance.

Indirect effects from road use and maintenance or from the new road management strategies on the Moose-Wilson Road would include a reduction in habitat effectiveness within a ZOI from the road. Based on nesting habitat management guidelines (Greater Yellowstone Bald Eagle Working Group 1996), it was assumed that bald eagles would avoid suitable habitat within a 1,312-ft (400-m) buffer from the road. The amount of habitat within this ZOI that would be impacted by Alternative 1 would be the same as



the amount impacted under existing conditions (Table 23). Disturbance from human presence, noise, and recreation within the ZOI could displace eagles or occasionally flush birds from perches in areas that contain suitable eagle habitat, such as near Moose Bridge, Cottonwood Creek, and at Jackson Lake Dam. Other indirect effects from human disturbance would include modifications of behavior, habitat avoidance, and possibly changes in reproductive success. Activities associated with road maintenance or vehicle use of the road would be short term and would not be expected to cause measurable changes in bald eagle use of the area. Overall, impacts to local and regional bald eagle populations under Alternative 1 are expected to be long-term, localized, none to minor, and adverse.

Cumulative Impacts

Activities occurring within bald eagle habitat that would adversely affect bald eagles are limited and, for public land management actions, are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect bald eagle populations include private land development, vegetation management, human recreation, contaminants, and illegal killing of individuals.

Residential development on private lands adjacent to the Snake River outside of Grand Teton National Park has increased dramatically, and this trend is expected to continue into the foreseeable future. However, the number of bald eagles nesting and producing young within the Snake Population Unit, including Grand Teton National Park, has increased. The development thresholds at which eagle productivity within the Snake Population Unit would decline are unknown; but they are not expected to occur as a result of Alternative 1 or other projects proposed at this time. Planned development and improvements within the Park include construction of a new visitor center at Moose, replacement of the Moose Entrance Station, construction of a new visitor facility at the LSR Preserve, upgrades to the Jenny Lake Lodge visitor accommodations and employee housing facilities, replacement of the Snake River Bridge near Flagg Ranch, the chip-and-seal project from Moran to Jackson Lake Lodge, and reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone. The latter project will widen the roadway from its current approximately 25-ft (7.6-m) width to 32 ft (9.8 m). All of these projects are likely to cause bald eagles to avoid the project areas during construction due to an increase in noise and human activity; however, avoidance of the area is anticipated to

be temporary, and none of the projects is known to occur within one-half-mile (0.8 km) of an active bald eagle nest.

Recreational activities, such as floating, fishing, hiking, horseback riding, snowshoeing, and skiing, within bald eagle nesting and foraging areas could adversely impact nest occupancy and productivity if these activities occur in proximity to active nests. However, the Park has been successful at minimizing human intrusion into the one-half mile (0.8-km) spatial buffer around active bald eagle nests during the nesting season, thus minimizing disturbance to nesting eagles. There is no evidence that suggests that current levels of recreational use within Grand Teton National Park or elsewhere in Jackson Hole have adversely affected bald eagle nesting. It is likely, however, that human recreational use of the Snake River would at times conflict with bald eagle foraging and cause displacement of individual birds from certain foraging areas when humans are present. In places of heavy recreational use, such as in the Snake River Canyon south of the Park, bald eagles appear to adapt to human presence and human-related disturbances by spatially and/or temporally adjusting their foraging activities and apparently do so without adversely affecting reproductive success. Bald eagles that are not habituated to human-related disturbances would abandon nests and/or alter their behavior resulting in nest failure and low productivity (MBAMP 1994).

An “Incidental Take” permit for 18 bald eagles was given to the Canyon Club golf course development project within the Snake River Canyon in southern Jackson Hole in 2002, but this potential “Take” was determined by the USFWS not to jeopardize the continued existence of the species. After 2 years of golf course construction, no “Incidental Take” of eagles has occurred because of construction-related activities on the Canyon Club project.

These activities cumulatively contribute to increased mortality risks to bald eagles and reduce the availability of secure eagle habitat. However, the total cumulative impact of the above listed activities, as well as other unidentified actions occurring within bald eagle habitat, does not appear to have adversely affected population recovery, as evidenced by current population numbers in the GYA. In the long term, actions under Alternative 1 are not expected to increase human presence within or improve access to bald eagle habitat that would cumulatively reduce habitat security.

Overall, long-term, localized, adverse cumulative impacts to the bald eagle would be minor. Adverse impacts resulting from Alternative 1 would be expected to contribute slightly to cumulative impacts affecting bald eagles.

Effects Determination and Summary of Rationale

Under Alternative 1, individual bald eagles would be displaced by human presence, noise, and activities associated with road maintenance and vehicular use of roads. Given that the project area is outside of bald eagle nest territories, however, these effects are expected to be negligible. No actions included in this alternative would affect important bald eagle wintering or foraging habitats. Overall, impacts to local and regional bald eagle populations under Alternative 1 are expected to be long-term, localized, none to minor, and adverse. Therefore, this alternative “may affect, but is not likely to adversely affect” bald eagles.

Canada Lynx

Under Alternative 1, the existing transportation infrastructure would remain in use and routine maintenance of existing roadways would continue to occur. New road management strategies would be tested on the Moose-Wilson Road. The presence and ongoing maintenance of existing park roads that are within or adjacent to lynx habitat could have minor adverse effects on lynx. Direct effects to lynx could include permanent loss of a small amount of habitat (likely less than 5.0 acres [2.0 ha]) caused by paving of roads and pullouts in forested habitats or secondary habitats important for connectivity. Potential lynx habitat occurs adjacent to the Moose-Wilson Road, along the Teton Park Road between Signal Mountain and Jackson Lake Dam, and along North Park Road between Jackson Lake Junction and Colter Bay. In the Wyoming range of northwestern Wyoming, lynx were documented using non-forested habitats where they were intermingled with or immediately adjacent to primary habitat (Squires and Laurion 2000, Ruediger et al. 2000). Thus, the sagebrush habitats adjacent to the Teton Park Road would provide lynx travel habitat that links habitats and populations both within the Park and between more southern and northern areas of the GYA. These habitats are part of an identified linkage area connecting the Granite LAU with the Berry and Two Ocean LAUs.

Direct mortality could also result from collisions with vehicles. There are few records of lynx fatalities resulting from collisions with vehicles, but they have been documented (Ruediger et al. 2000). No lynx have been reported killed by vehicles in the Park. The risk of mortality relates to the type of roadway, traffic volume, and lynx density. The risk of roadway mortality and the degree of habitat fragmentation increases as highways are upgraded and/or speeds are increased (Ruediger et al. 2000). No

roadway upgrades or changes to speed limits are proposed; therefore, the risk of roadway mortality and effects on lynx are anticipated to be long-term, localized, none to minor, and adverse.

Indirect effects from road use and maintenance, or from the new road management strategies on the Moose-Wilson Road, would include a reduction in habitat effectiveness within a ZOI beyond the boundaries of the habitat actually lost to the road. Other indirect effects to lynx would include human-caused displacement of animals from areas adjacent to roads or other behavior modifications. There is little information on the disturbance effects of linear corridors on medium-sized mammals, such as lynx. They would be less tolerant of human activities in the southern part of their range where suitable habitats are naturally more fragmented (Jalkotzy et al. 1997). However, some anecdotal information suggests that lynx may be relatively tolerant of humans (Ruediger et al. 2000), with the exception of human activity near den sites (Ruggiero et al. 2000). It is not known if lynx avoid habitats adjacent to linear features or if human activities along these corridors displace them; thresholds at which this may occur are also unknown (Ruediger et al. 2000). For the purposes of this analysis, it was assumed that lynx would avoid coniferous habitats within 1,312 ft (400 m) of linear features (400-m ZOI). Approximately 2,825 acres (1,143 ha) of coniferous forest habitat occurs within the 1,312-ft (400-m) ZOI of the existing transportation system. No lynx den sites are known in the Park, but given that they generally are located in mature subalpine forests with abundant coarse woody debris (Squires and Laurion 2000), it is unlikely that any den sites are close to the main transportation system. Therefore, effects on lynx are anticipated to be long-term, localized, none to minor, and adverse. The threshold where human activity precludes use of an area by lynx is unknown (Ruediger et al. 2000).

Cumulative Impacts

Other activities occurring in the GYA that would affect lynx or their habitat include timber management, wildland fire management (including prescribed burns both inside and outside the Park), grazing (outside and within the Park), winter recreation (including grooming for Over-Snow Vehicles [OSVs]) and trapping of other furbearers. With the exception of trapping, all of these activities have the potential to affect forest successional stages, and consequently, snowshoe hare and lynx. Continued use and maintenance of the existing park roadways within the project area are expected to add minor cumulative impacts to lynx.



Impact Determination and Summary of Rationale

Under Alternative 1, individual lynx would be displaced by human presence and noise associated with routine maintenance and continued use of the transportation system, but given that most of the project area is outside of mapped lynx habitat, these effects are expected to be long term, localized, and minor, and adverse. No actions are proposed in this alternative that would affect important lynx linkage areas. The likelihood of a lynx being struck and killed by a vehicle is anticipated to be low. Lynx likely occur in the Park at low densities, if at all, and no vehicle mortalities have been reported to date. Based on the above assumptions and conclusions, Alternative 1 “may affect, but is not likely to adversely affect” Canada lynx.

Grizzly Bear

Under Alternative 1, the presence, use, and ongoing maintenance of existing park roads within or adjacent to bear habitat (Table 24) would adversely affect grizzly bears, both directly and indirectly. Direct effects include permanent loss of habitat caused by paving of roads and pullouts and the potential for vehicle-caused mortality. Indirect effects from use and maintenance of existing primary roads would include a reduction in habitat effectiveness within the 1,312-ft (400-m) ZOI of existing roads, which is estimated to be 1,819 acres (736 ha) within the designated grizzly recovery zone and 22,220 acres (8,992 ha) (Appendix B, Table B-3) within the remainder of the Park. The section of the Park road between North Jenny Lake Junction and Jackson Lake Junction – which is outside the recovery zone but occupied by grizzly bears – accounts for 3,227 acres (1,306 ha) of the affected area outside the recovery zone. A reduction in habitat effectiveness could potentially result in slightly lower reproductive fitness of some individual bears within home ranges adjacent to the road corridor. However, range and population increases of grizzly bears in Grand

Teton National Park suggest that impacts associated with roads have not yet reached a threshold impact level that jeopardizes the survival of grizzly bears in the Park (Figure 24). Other indirect effects to grizzly bears include human-caused displacement of bears from areas adjacent to roads, habituation to humans, and other potential behavior modifications. Most of these impacts would be considered long-term, localized, minor, and adverse; however, impacts from vehicle mortality could be considered moderate because they could affect one or more bears but would not threaten the survival of the species. Sixteen grizzly bears have been road-killed within the GYA since 1977 (M. Haroldson 2006, pers. comm.), including one with Grand Teton National Park.

Cumulative Impacts

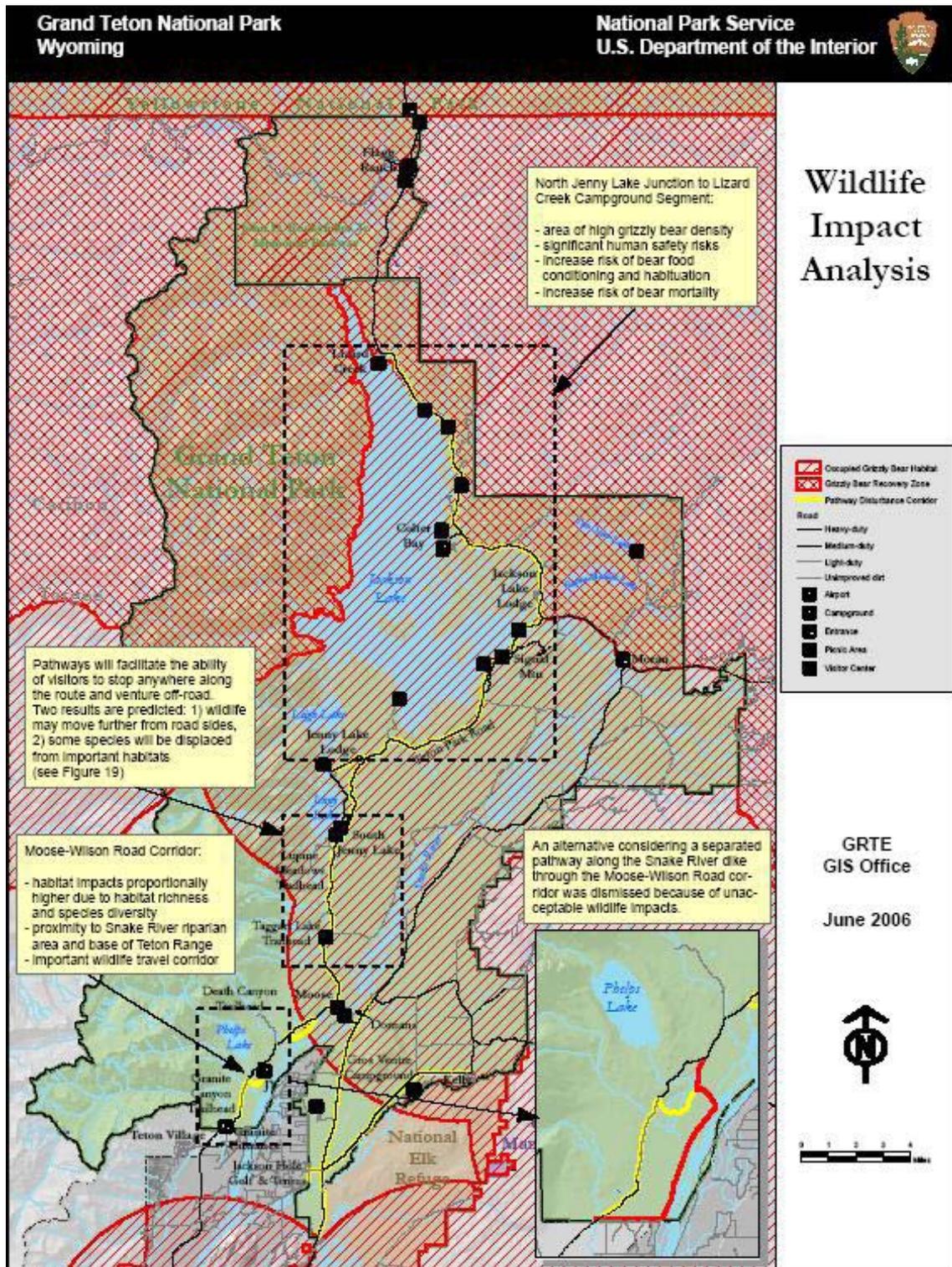
Actions occurring on public lands within the recovery zone that would adversely affect grizzly bears or their habitat, such as oil and gas exploration and development, logging, and mining, are limited by the ESA (USFWS 1982) and are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect grizzly bears in the recovery zone include:

- Livestock grazing (which would impact grizzly bears through management actions).
- Private land development.
- Firewood cutting.
- Road use/management.
- Timber harvest (past).
- Recreation activities that lead to human-bear conflicts (especially big game hunting).
- Vegetation management.
- Wildland and prescribed fire.

TABLE 24
MILES OF ROAD IN GRAND TETON NATIONAL PARK BY ROAD CLASS INSIDE|
AND OUTSIDE OF THE GRIZZLY BEAR RECOVERY ZONE
(PRIMARY CONSERVATION AREA), 2004

Road Class	Inside Recovery Zone	Outside Recovery Zone
Heavy Duty	13.98	26.86
Medium Duty	1.25	52.83
Light Duty	38.4	121.04
Unimproved Dirt	16.08	79.59

FIGURE 24
GRIZZLY BEAR OCCUPIED HABITAT (FROM SCHWARTZ ET AL. 2002) AND RECOVERY ZONES
IN GRAND TETON NATIONAL PARK



- Loss or decline of important food sources (e.g., whitebark pine seeds due to fire suppression).
- Potential reduction in elk and bison populations.

These activities would cumulatively contribute to increased mortality risks, reduce availability of secure habitat, and diminish habitat effectiveness for grizzly bears. The total cumulative impact of the above-listed activities, as well as other unidentified actions occurring within the grizzly bear recovery zone, does not appear to be adversely affecting population recovery, as evidenced by the expanding grizzly bear population in the GYA (Eberhardt and Knight 1996; Schwartz et al. 2002; Pyare et al. 2004).

Cumulative impacts to grizzly bears in the GYA specific to this Final Plan/EIS include road kills, recreation use, management removals, and road or project construction. Eighteen grizzly bears have been road-killed within the GYA since 1977 (M. Haroldson 2006, pers. comm.), including two within Grand Teton National Park. The cumulative impacts of these actual losses and possible future road kills are likely to be minor because road kills are not a significant source of mortality to the GYA population.

Increases in backcountry recreation by humans in and around Grand Teton National Park would negatively affect grizzly bears if human-bear encounters increase. Elk hunting, as part of the Park's annual elk reduction, occurs on approximately 66,600 acres (26,952 ha) of the Park's backcountry, 29,100 acres (11,776.4 ha) of which is in the recovery zone. Hunting of elk and other big game also occurs outside of and adjacent to the Park's boundaries. Conflicts between grizzly bears and hunters appear to be increasing (Gunther et al. 2004) and these encounters are a potential source of bear mortality. In 2004, seven of 19 (37 percent) human-caused grizzly bear mortalities in the Yellowstone ecosystem were attributed to hunter conflicts (M. Haroldson 2005, pers. comm.), and for the first time in many years, female grizzly recovery mortality limits were exceeded. In 2005 mortalities attributed to hunters dropped to 4 of 14 (29%). However, unless hunter-related conflicts increase substantially, the cumulative adverse effects of these conflicts at current grizzly bear population levels are likely to be minor. Land and wildlife management agencies, including Grand Teton National Park, have active programs designed to educate backcountry users about grizzly bears and the requirements designed to reduce human-bear conflicts.

Several privately owned and State of Wyoming-owned in-holdings are present in Grand Teton National Park;

depending upon future human activities occurring on these properties, grizzly bears would be negatively affected. For many years, Grand Teton National Park has attempted to secure these in-holdings with lifetime leases and out-right purchases and has been quite successful in doing so. No large-scale developments or land-based projects have been proposed for these in-holdings. The LSR Preserve (approximately 1,100 acres [445 ha] in southern Grand Teton National Park) will be conveyed to the federal government in 2006 to be administered as part of the Park. Although most of the development that has been present on the ranch will be removed, the current owners will develop an interpretive facility and trail system prior to the conveyance. Recently, the federal government has made efforts to secure several parcels of state-owned land within Grand Teton National Park. The cumulative adverse effects of possible future development occurring on these in-holdings are likely to be minor.

The recent Teton County, Wyoming approval of the Snake River Associates development plan for Teton Village on private land adjacent to the Park's south boundary could have additional cumulative, long term impacts on grizzly bears. This development will likely result in higher numbers of visitors to the Park and greater associated dispersed use. This may be particularly true in the southwest corner of the Park, where excellent bear habitat exists. Grizzly bears will likely colonize this area, even though it is several miles outside of the primary conservation area (PCA).

In the past 20 years, two grizzly bears have been removed from Grand Teton National Park for management reasons: one for cattle depredation and one because of human habituation and food conditioning. The latter bear came to Grand Teton National Park as a nuisance bear after being relocated from the northern to the southern part of the ecosystem. An additional bear that had broken into a cabin at the AMK Ranch in Grand Teton National Park was killed after being relocated from Grand Teton National Park to Montana and continuing its nuisance behavior there. Management removals within the PCA and a 10-mile (16.1-km) buffer around it are counted against recovery parameters (USFWS 2003), mortality limits in the Conservation Strategy (USFWS 2003), and likely those associated with the delisting proposal (Interagency Grizzly Bear Study Team 2005). The existing transportation system increases the potential for management removals because of the access to grizzly bear habitat it provides, adding cumulatively to removals throughout the ecosystem.

Overall, the contribution of this alternative to long-term cumulative impacts to grizzly bears in the GYA would be minor.

Mitigation Measures

- “Bearwise” education would be conducted with all personnel involved in road and reconstruction and maintenance projects.
- All food and other attractants would be properly stored at all times, and all food materials, garbage, and other attractants would be packed out on a daily basis if they cannot be stored in bear-resistant containers.
- Project crews (other than law enforcement personnel) would not carry firearms.
- Project crews would carry bear pepper spray when conducting project activities and would be trained in bear safety.
- All project crews working in grizzly bear habitat would meet standards for sanitation, attractant storage, and access.
- All grizzly bear/human confrontations would be reported to Science and Resource Management personnel.

Effects Determination and Summary of Rationale

Alternative 1 is not expected to have substantial adverse population level impacts on grizzly bears nor would it jeopardize the recovery of grizzly bears within the GYA. However, it is reasonable to expect that one or more grizzly bears could be struck and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone grizzly bear populations under Alternative 1 would be long-term, localized, and moderate because one or more individual bears are “likely to be adversely affected” by this alternative.

Gray Wolf

Under Alternative 1, the presence, use, and ongoing maintenance of existing park roads within or adjacent to wolf habitat would continue to adversely affect wolves, both directly and indirectly. Direct effects include permanent loss of habitat caused by paving of roads and pullouts and the potential for vehicle-caused mortality. Radio-telemetry data have shown that the Teton and Sage packs regularly cross U.S. Highway 89/191 between Moran and Moose and between Moran and the Park’s east boundary. Other wolves from unknown pack affiliations have also been observed crossing park roads on many

occasions (S. Cain 2006, pers. comm.). Indirect effects from road use and maintenance would include a reduction in habitat effectiveness within a ZOI beyond the boundaries of the habitat actually paved by the road. The loss of habitat associated with existing primary roads in the Park is estimated to be 14,577 acres (5,899 ha) (Appendix B, Table-B-3), using a buffer of 1,312 ft (400 m) on each side of the road as an average ZOI. Other indirect effects to wolves include human-caused displacement of wolves from areas adjacent to roads and possibly other behavior modifications. Under this alternative, no activities would occur within 1 mile (1.6 km) of known wolf dens or rendezvous sites.

Most of these impacts would be considered long term, localized, minor, and adverse; however, impacts from vehicle mortality could be considered moderate because they could affect one or more wolves but would not threaten the survival of the species. Between 1995 and 2001, thirteen wolves were killed by vehicles in the GYA, and 3 wolves were killed within the Park during the last two years. Existing road conditions and future road reconstruction could result in the death of additional wolves.

Cumulative Impacts

Activities occurring within wolf habitat that would adversely affect wolves in the GYA are limited and, for public land management agencies are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect wolves occurring within the recovery zone include livestock grazing, private land development, vegetation management, potential reduction in elk and bison populations, and control actions.

These activities would cumulatively contribute to increased mortality risks and reduce the availability of secure habitat. However, the total cumulative impact of the above-listed activities, as well as other unidentified actions occurring within wolf habitat, does not appear to have adversely affected population recovery, as evidenced by the quick expansion of the wolf population following reintroduction and the continued expansion into areas outside of YNP. In the long term, this alternative is not expected to increase human presence within or improve access to wolf habitat that would cumulatively reduce habitat security.

Cumulative impacts to the gray wolf specific to this Final Plan/EIS also include road kills, recreational use, and road reconstruction in the area. Between 1995 and 2001, 13 wolves were killed by vehicles in the GYA. Existing road



conditions and future road reconstruction would result in the death of additional wolves. However, the cumulative impacts of these actual losses and possible future road kills on the Greater Yellowstone population are likely to be minor.

Several privately owned and State of Wyoming-owned in-holdings are present in Grand Teton National Park. Depending upon future human activities occurring on these properties, wolves would be negatively affected. For many years, Grand Teton National Park has attempted to secure these in-holdings with lifetime leases and out-right purchases and has been quite successful in doing so. No large-scale developments or land-based projects have been proposed for these in-holdings. The LSR Preserve (approximately 1,100 acres [445 ha] in southern Grand Teton National Park) will be conveyed to the federal government in 2006 to be administered as part of the Park. Although most of the development that has been present on the ranch will be removed, the current owners will develop an interpretive facility and trail system prior to the conveyance. Recently, the federal government has made efforts to secure several parcels of state-owned land within Grand Teton National Park. The cumulative impacts of existing residential activities and possible future development occurring on these in-holdings are likely to be minor.

Overall, long-term adverse cumulative impacts to the gray wolf would be minor. Adverse impacts to gray wolves resulting from Alternative 1 would be expected to contribute only slightly to cumulative impacts to wolves.

Effects Determination and Summary of Rationale

Alternative 1 is not expected to have substantial adverse population level impacts on wolves nor would it jeopardize the recovery of wolves within the GYA. However, it is reasonable to expect that one or more wolves could be struck and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone wolf population under Alternative 1 would be long-term, localized, and moderate because one or more individual wolves are “likely to be adversely affected” by this alternative.

Yellow-billed Cuckoo

Under Alternative 1, the presence, use, and ongoing maintenance of existing park roads would not directly affect the yellow-billed cuckoo or its habitat. No known cuckoo nests are within or adjacent to the project area, and no potential nesting habitat would be removed during road maintenance.

Indirect effects from road use and maintenance or from the new road management strategies on the Moose-Wilson Road would include a reduction in habitat effectiveness within a ZOI from the road. Based on findings reported in Miller et al. (1998) for other passerine species, it was assumed that cuckoos would avoid suitable habitat within a 246-ft (75-m) buffer from the road. The amount of habitat within this ZOI that would be impacted by Alternative 1 would be the same as the amount impacted under existing conditions (Table 23). Studies have shown that passerine bird species respond to human disturbance in several ways and that these responses vary depending upon the species, sex, and age of an individual, as well as on the time of year and quality and foraging potential of adjacent habitat (Knight and Temple 1995, Gutzwiller et al. 1998). How cuckoos would respond to and be impacted by noise and human presence from road maintenance are relatively unknown; however, responses would include habitat avoidance, nest abandonment, behavior modifications, or reproductive failure, as observed by other passerine bird species (Boyle and Samson 1985, Knight and Temple 1995, Miller et al. 1998, Gutzwiller et al. 1998, Buhler and Anderson 1999).

Because no cuckoos have been reported in the project area and activities associated with road maintenance would be short term and localized, impacts from Alternative 1 would not be expected to change yellow-billed cuckoo use of the area measurably, and adverse impacts would be none to minor.

Cumulative Impacts

Activities occurring within yellow-billed cuckoo habitat that would adversely affect this species are limited and, for public land management actions are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect yellow-billed cuckoo populations include private land development, loss of riparian habitat, human recreation, and nest predation.

These activities would cumulatively contribute to increased mortality risks to cuckoos and reduce the availability of secure cuckoo habitat. Overall, long-term adverse cumulative impacts to cuckoos would be minor. Adverse impacts resulting from Alternative 1 would be expected to contribute slightly too cumulative impacts affecting yellow-billed cuckoo.

Effects Determination and Summary of Rationale

Under Alternative 1, human presence, noise, and activities associated with road maintenance would displace

individual cuckoos; however, given that no cuckoos are known to nest in the Park, these effects are expected to be none minor. No actions are proposed in this alternative that would affect potential cuckoo breeding or nesting habitats. Overall, impacts to yellow-billed cuckoo populations under Alternative 1 are expected to be short term, localized, and none to minor. Therefore, this alternative “may affect, but is not likely to adversely affect” yellow-billed cuckoos.

Bird Species of Special Concern
(Not Federally Listed) and Neotropical Migratory Birds

Neotropical Migratory Birds / Bird Species of Special Concern

Activities occurring under Alternative 1 would have the lowest impact of the alternatives considered in this document on bird species of special concern and other neotropical migratory bird species that may breed or use areas within the project area. No vegetation or bird habitat would be removed.

Indirect effects from road use and maintenance would include a reduction in habitat effectiveness within a ZOI from the road. Based on findings reported in Miller et al. (1998) for a variety of songbirds, it was assumed that many bird species of special concern and neotropical migratory birds in the project area would avoid suitable habitat within a 246-ft (75-m) buffer from the road, although for some raptor species this ZOI may be greater (Dubois and Hazelwood 1987). The amount of habitat within this ZOI that would be impacted by Alternative 1 would be the same as the amount impacted under existing conditions (Table 23).

The effects that disturbance would have on birds within the ZOI would be variable and difficult to quantify. Factors such as species, sex, and age of individuals, as well as the time of year, magnitude, and type and duration of human activities, affect response (Knight and Temple 1995, Gutzwiller et al. 1998, Postovit and Postovit 1987). Studies have found that birds may respond to human disturbance by avoiding habitat, abandoning nests, and modifying behavior (Boyle and Samson 1985, Gutzwiller et al. 1994, Knight and Temple 1995, Miller et al. 1998). Disturbance to diurnal raptors has also been shown to disrupt behavior when it deters foraging or flushes birds from foraging perches and roosts (Holmes et al. 1993). In addition, nest predation and parasitism has been shown to increase in areas with greater human disturbance due to greater predator attraction and less nest vigilance (Anglestam

1986, Martin 1988). This in turn, may be responsible for a decline in bird species richness and abundance in human-dominated landscapes (Martin 1988).

Maintenance activities associated with Alternative 1 would be limited in time and space; therefore, disturbance to birds would be short term, localized, negligible, and adverse. No long-term adverse effects are anticipated for bird species of special concern and/or other neotropical migratory birds from Alternative 1.

Cumulative Impacts

Neotropical migratory birds are of particular interest to wildlife managers because they have been experiencing severe population declines throughout their North American range. Habitat fragmentation and loss of winter range are at least two factors believed responsible for these declines. Bird species of special concern would be vulnerable to extirpation at the global or state level due to inherent rarity, loss of habitat, or sensitivity to human-caused mortality or habitat disturbances (Fertig and Beauvais 1999). These factors cumulatively contribute to reduced reproductive success, increased mortality risks, and reduced availability of secure habitat to bird species of special concern.

Residential development in Jackson Hole has been responsible for both habitat loss (or at least habitat alterations and conversion) and increased mortality because of predation by domestic pets (especially cats) and collisions with windows. Future residential development in the valley can be expected to continue this negative trend. Within the Park, projects that could affect bird species of special concern and migratory birds and their habitat include construction of a new visitor center at Moose, replacement of the Moose Entrance Station, construction of the LSR Preserve, upgrades to the Jenny Lake Lodge visitor accommodations and employee housing facilities, reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone, replacement of the Snake River Bridge near Flagg Ranch, and the chip-and-seal project from Moran to Jackson Lake Lodge.

In the long term, Alternative 1 is not expected to increase loss of habitat to birds or human presence within important breeding bird habitat that would cumulatively reduce habitat security. Therefore, Alternative 1 would have short term, localized, negligible, adverse impacts to bird species of special concern.



Greater Sage-Grouse

Under Alternative 1, the routine maintenance of existing park roads would not directly affect sage-grouse and their habitat. No leks are located within the project area. Although known nesting, brood-rearing, and wintering habitat are adjacent to roadways in the southern portion of the project area, no vegetation in these habitats would be removed under Alternative 1. Direct mortality of grouse could result from collisions with vehicles. Grouse have been killed by vehicles along the Outer Highway and the Teton Park Road (S. Wolff 2004, pers. comm.). Road use and maintenance under Alternative 1 would not be expected to increase mortality to grouse along roadways or measurably change sage-grouse use of the area.

Indirect effects from road use and maintenance would include a reduction in habitat effectiveness within a ZOI from the road. For the purposes of this analysis, it was assumed that sage-grouse would be affected by a ZOI 246 ft (75 m) from the roadway. The amount of habitat within this ZOI that would be impacted by Alternative 1 would be the same as the amount impacted under existing conditions (Table 23). Potential indirect effects to sage-grouse due to human presence and noise associated with project activities include displacement of individuals, habitat avoidance, and modifications in behavior. Human activity along roadways and dispersed use beyond the roadway could cause occasional flushing of birds from nests or brood-rearing areas. Under this alternative, these impacts would occur infrequently and only during the duration of road maintenance; therefore, Alternative 1 would have short-term, localized, negligible, adverse effects on the greater sage-grouse.

Cumulative Impacts

Actions occurring on public and private lands within greater sage-grouse suitable habitat that would adversely affect grouse or their habitat include, but are not limited to:

- Oil and gas exploration and development.
- Livestock grazing and sagebrush removal.
- Private land development.
- Road use/management.
- Vegetation management.
- Wildland and prescribed fire.
- Recreation near leks, such as bird-watching.
- Increase in predator populations and in turn, increased predation rates.

In the Jackson Hole area, the condition and extent of wintering habitat may be limiting sage-grouse population growth (Holloran and Anderson 2004). Wintering habitat is characterized by dense, tall sagebrush stands on relatively flat south to west facing slopes and includes areas south of Blacktail Butte (prior to the 2003 wildfire), Wolff Ridge, and the northern portions of the National Elk Refuge. The extent of historical wintering habitats in the Jackson Hole region is difficult to quantify; however, it appears that areas have been eliminated through development, large ungulate grazing of these habitats, and/or prescribed and natural fires (Holloran and Anderson 2004).

The activities listed above cumulatively contribute to increased mortality risks and reduced availability of secure habitat for sage-grouse and would potentially limit sage-grouse population growth in the Jackson Hole region. In the long term, Alternative 1 is not expected to increase loss of habitat to sage-grouse or human presence within sage-grouse habitat that would cumulatively reduce habitat security. Therefore, Alternative 1 would have short-term, localized, negligible, adverse impacts to the greater sage-grouse.

General Wildlife

Mammals

The continued use and maintenance of existing park roads would have both direct and indirect, short- and long-term, localized, minor adverse effects on mammals whose habitats the roads intersect. Under Alternative 1, adverse impacts to mammals would be primarily associated with the risk of vehicle collisions, reduced habitat effectiveness, and fragmentation of habitats.

Direct effects to mammals include vehicle caused mortality and permanent loss of habitat due to paving of roads and/or pullouts. Ungulates residing in and migrating through Grand Teton National Park frequently cross roads and these crossings sometimes result in wildlife-vehicle collisions (WVCs). Park records have documented an average of 31 deer, 25 elk, 9 moose, 5 bison, and 2 pronghorn antelope killed each year based on data from 1992-2005. The number of WVCs occurring in Grand Teton National Park has increased over the 14-year period from 1992 and 2005. This may reflect a true increase in park WVCs or a more consistent reporting effort. Beginning in 2000, a more complete and standardized system for recording and collecting data on the location and nature of WVCs was implemented in the Park (Sarah Dewey 2006, pers comm., GRTE Dispatch). Changes in the

occurrence of WVCs within the Park could also be related to other factors including those related to animal numbers and ecology, traffic volume and speed, and landscape features (Gunther et al. 1998, Bertwistle 1999, Waller et al. 2005), but the link between these variables and the Park trend has not been evaluated. Regardless of the trend the current figures represent minimum road-kill estimates as some WVCs are probably unreported or undetected. WVCs in Teton County showed a comparable increasing trend over a similar period and correlate strongly with increases in traffic levels (Biota 2003). Annual recreational visitation in Grand Teton National Park has been relatively flat over the last decade and is expected to increase only slightly over the next 5 to 10 years. If WVCs in the Park follow a pattern similar to Teton County as a whole, then ungulate road-related wildlife mortalities may also increase over the life of this Final Plan/EIS.

Other mammals are also killed by vehicles on park roads but to a far lesser extent than ungulates. Black bears and coyotes appear to be the most susceptible non-ungulate species to vehicle collisions. Park records documented an average of two black bears and three coyotes killed per year for the period 1992-2005. Overall, the number of ungulates and black bears hit by vehicles on park roads is low and current numbers represent a minor mortality source to park mammals on an annual basis.

Existing roads, trails, and human uses of these linear facilities can displace wildlife and reduce roadside habitat use. The extent to which mammals would be displaced by the existing road system is unknown. Studies of ungulates suggest that animals may habituate to situations when they associate predictable and consistent stimuli with harmless outcomes (Knight and Temple 1995). Elk in protected areas like national parks sometimes adapt to vehicle traffic along roads when their experiences with these disturbances are benign. Winter is the most critical time for wildlife. With the exception of moose, ungulate wintering areas are generally outside of the Park or away from project area roads. For other mammals present in the Park during the winter, this period coincides with the lowest levels of park use by humans.

Roads and the human developments along roads may in some cases be an attractant for some species (e.g., coyotes, bears, etc.), especially if use of these areas has been reinforced by food reward. Carnivores searching for both natural and unnatural food sources in and adjacent to road corridors may be more susceptible to road mortality.

Linear features would also cause some degree of wildlife habitat fragmentation; however, this is one of the least understood impacts in road ecology. Traffic volume and speed, road width, and the presence or absence of fencing influences the extent to which a roadway and system impede connectivity. The current road system has a relatively low posted speed (45 mph on the Teton Park Road and North Park Road, and 55 mph on U.S. Highway 26/89/191), regular patrols to enforce speed limits, a two-lane road surface, and limited use of fencing; these are all characteristics that reduce the likelihood that existing road corridors limit wildlife movements. Overall, Alternative 1 would have long-term, localized, minor, adverse impacts to mammals.

Amphibians and Reptiles

Activities occurring under Alternative 1 would have the lowest impact of those considered in this document on amphibians and reptiles. Under Alternative 1, maintenance of existing roads would occur and be confined to roadways. No vegetation or suitable breeding habitat would be removed. Direct mortality of adult amphibians or reptiles that occupy areas within the project area could result due to human activities and operation of equipment; however, these effects would be negligible and short term. Overall, activities associated with Alternative 1 would have long-term, localized, negligible, adverse impacts to amphibians and reptiles in the Park.

Cumulative Impacts (General Wildlife)

Cumulative impacts to wildlife could result from other developments and use of the Park, such as construction of new facilities and recreational intrusion into habitats. Historic and current park management practices emphasize natural ecosystem processes so that development has been minimized and much of the historical development in the Park has been removed and reclaimed. Existing and future development within Grand Teton National Park is not expected to adversely impact wildlife populations. Traffic and recreational use, and the associated noise and human presence within Grand Teton National Park, could adversely impact individual animals but are not likely to adversely affect populations.

Cumulative impacts of other past, present, and future projects in and around the Park have the potential of adversely affecting wildlife. These impacts primarily involve the loss or degradation of habitat. Within the Park, these projects include construction of a new visitor center at Moose, replacement of the Moose Entrance Station, construction of the LSR Preserve, upgrades to Jenny Lake



Lodge visitor accommodations and employee housing facilities, reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone, replacement of the Snake River Bridge near Flagg Ranch, and the chip-and-seal project from Moran to Jackson Lake Lodge.

Residential development on private land has increased dramatically in recent years, and this trend is expected to continue into the near future. Despite these residential and recreational increases, mammal populations within Jackson Hole, including Grand Teton National Park, appear to have remained relatively stable or increased. Development of riparian areas and wetlands has resulted in impacts to reptiles and amphibians. However, wetland protection administered by the ACOE and by county government is believed to be sufficient to protect the integrity of amphibians and reptiles on private land in Jackson Hole.

Declining amphibian populations have been documented worldwide and are thought to be particularly acute in western North America. These declines have been attributed to habitat disturbance, including pollution, fish introduction, and habitat degradation. There is also growing interest in infectious diseases and their role in global amphibian declines (Daszak et al. 1999). In particular, chytrid fungus, a contagious disease found in various frogs, toads, and salamanders, has been thought to be the cause of heightened mortality leading to mass amphibian die-offs in six continents, including North America. Montane and pristine areas in the western United States have not been immune to the fungus. In fact, two toad species once common in the Rocky Mountains, including boreal toads in Rocky Mountain National park, have likely been decimated by the disease (Muths et al. 2003). Cases of chytrid-infected amphibians in Wyoming and Montana, as well as in Colorado, have indicated the distribution of the disease is throughout the Rocky Mountains and has the potential to be detrimental to amphibian populations in these areas. A pilot project conducted in Grand Teton National Park during the summer of 2004 identified chytrid fungus on the skin of boreal toads and spotted frogs; however, it did not appear to affect the health or survival of infected animals (Wolff 2004).

Overall, the impacts from past, present, and future actions, in conjunction with the effects of Alternative 1, would result in long-term, localized, minor to moderate, adverse impacts to general wildlife.

Conclusion (Threatened and Endangered (Federally Listed) Species, Bird Species of Special Concern, and General Wildlife)

Threatened and Endangered (Federally Listed) Species

Alternative 1 “may affect, but is not likely to adversely affect” the bald eagle, Canada lynx, or yellow-billed cuckoo. Alternative 1 is “likely to adversely affect” the grizzly bear and gray wolf because vehicle collisions may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species.

Bird Species of Special Concern

Alternative 1 would have long-term, localized, negligible, adverse impacts on bird species of special concern, neotropical migratory birds, and greater sage-grouse. Cumulative impacts would be negligible and adverse.

General Wildlife

Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts to mammals, reptiles, and amphibians from continued use of park roads and trails due to displacement from and/or avoidance of habitats adjacent to existing roads. Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Cumulative impacts would be long term, minor to moderate, and adverse, with Alternative 1 adding a negligible amount to overall cumulative impacts.

Because there would be no major, adverse impacts to wildlife resources or values, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s wildlife resources, including any listed species or species of special concern.

Effects of Alternative 2 — Improved Road Shoulders

Endangered and Threatened Species (Federally Listed Species)

Bald Eagle

Similar to Alternative 1, no direct adverse impacts to bald eagles would result from implementing Alternative 2. The proposed shoulder widening along the Teton Park Road between Moose and Signal Mountain would not directly

affect bald eagle nesting, foraging, or wintering habitat. Construction of improved shoulders would not occur within 0.5 mile (0.8 km) of known bald eagle nests. Road widening in the vicinity of the Snake River near Moose Bridge and near Cottonwood Creek would be confined to the existing roadway.

Indirect effects from construction activities and increases in road use by pedestrians and bicyclists would cause a reduction in habitat effectiveness within a 1,312-ft (400-m) ZOI (see Alternative 1 analysis for discussion on bald eagle ZOIs). The amount of habitat within this ZOI that would be impacted by Alternative 2 would be the same as the amount impacted from existing conditions (Table 23). Disturbance from human presence, noise, and recreation along the roadway and from dispersed use off of the roadway could displace eagles or occasionally flush birds from perches in areas that contain suitable eagle habitat, such as near Moose Bridge and Cottonwood Creek. Other indirect effects from human disturbance would include modifications of behavior, habitat avoidance, and possibly changes in reproductive success. Activities associated with shoulder construction would be short term; however, pedestrian and bicyclist use along roadways would be long-term. Impacts from Alternative 2 would be similar to those of Alternative 1.

Cumulative Impacts

Cumulative impacts to bald eagles associated with Alternative 2 would be generally the same as those identified in Alternative 1. Any disturbances to bald eagles from road shoulder construction would have minor cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of proposed improved shoulders, would contribute only negligibly to cumulative impacts. Overall, long-term cumulative impacts to bald eagle populations would be none to minor.

Impact Determination and Summary of Rationale

Under Alternative 2, human presence, noise, vehicular road use, and activities associated with road shoulder widening would displace individual bald eagles; however, given that the project area is outside of bald eagle nest territories, these effects are expected to be none to minor. No actions are proposed in this alternative that would affect important bald eagle wintering or foraging habitats. Overall, impacts to local and regional bald eagle populations under Alternative 2 are expected to be long-term, localized, and minor. Therefore, this alternative “may affect, but is not likely to adversely affect” bald eagles.

Canada Lynx

Direct and indirect effects to lynx resulting from Alternative 2 would be similar to those described for Alternative 1 (i.e., none to minor and adverse). In addition to the effects from existing conditions, Alternative 2 includes widening of roadway shoulders along approximately 17.8 miles (28.6 km) of the Teton Park Road between Moose and Signal Mountain, which would involve removal of a small amount of vegetation. A 1-mile section of road from Signal Mountain turnoff to Signal Mountain Lodge is within the Two Ocean LAU, and mapped lynx habitat occurs adjacent to the roadway in this area. A small amount (less than 1 acre) of lynx habitat would be lost; however, this loss would occur adjacent to the existing road and large patches of forested cover would remain intact nearby. Therefore, the direct loss of habitat would be minor. Indirect impacts associated with construction of improved shoulders and use of the roadside by more pedestrians and bicyclists would include human-caused displacement and possibly other behavior modifications. Approximately 3.8 acres (1.5 ha) of coniferous forest habitat would be affected by the 1,312-ft (400-m) ZOI associated with Alternative 2. How lynx respond to increased recreation use is likely to depend upon the activities in which people participate. Activities that are predictable would allow animals to habituate to them. Those that are noisier (i.e., that allow the animal to detect recreationists), short in duration, and where recreationists do not directly approach the animal have the least impact. Because of the increased recreation use anticipated and a slightly larger transportation footprint expected under this alternative, the loss in habitat effectiveness in the road corridors ZOI is expected to be greater than under Alternative 1, but less than those associated with the other action alternatives. Anticipated vehicle traffic levels on roads in the Park would be similar to Alternative 1, and these levels represent a minor potential source of mortality for Canada lynx.

Cumulative Impacts

Other activities occurring in the GYA that would affect lynx or their habitat include timber management, wildland fire management (including prescribed burns both inside and outside the Park), grazing (outside and within the Park), winter recreation, and trapping of other furbearers. With the exception of trapping, all of these activities have the potential to affect forest successional stages, and consequently, snowshoe hare and lynx.

Cumulative impacts to Canada lynx associated with Alternative 2 would be generally the same as those identified in Alternative 1. Road density within the Park would not increase because of the proposal, although the physical



footprint and the effect zone would increase slightly. Any disturbances to lynx from road shoulder construction would represent a none to minor contribution to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of proposed improved shoulders, would contribute only minor cumulative impacts.

Impact Determination and Summary of Rationale

Under Alternative 2, human presence and noise associated with routine maintenance and continued use of the transportation system would displace individual lynx; however, because most of the project area is outside of mapped lynx habitat, effects are expected to be long term, localized, and minor. No actions are proposed in this alternative that would affect important lynx linkage areas. The likelihood of a lynx being struck and killed by a vehicle is anticipated to be low because lynx likely occur in the Park at low densities, if at all, and to date no vehicle mortalities have been reported. Impacts to lynx or lynx habitat are expected to be greater than those described under Alternative 1 but are still expected to be minor. Therefore, Alternative 2 “may affect, but is not likely to adversely affect” Canada lynx.

Grizzly Bear

Direct and indirect effects to grizzly bear resulting from Alternative 2 would be similar to those resulting from Alternative 1, with the following exceptions: direct impacts associated with the proposed approximately 17.8 miles (28.6 km) of improved road shoulder along the Teton Park Road would involve removal of a small amount of vegetation, and thus direct habitat loss (Tables 19 and 22) adjacent to the existing road. While several studies suggest bears tend to avoid road corridors (Mace et al. 1996, McLellan et al. 1988), in Yellowstone and Grand Teton National Parks, where grizzly bear use of roadside habitats is tolerated, mounting evidence suggests these areas may be important to one or more individual bears annually (M. Haroldson 2006, pers. comm., S. Cain 2006, pers. comm.). Indirect impacts associated with construction of improved shoulders and use of the roadside by more pedestrians and bicyclists would include human-caused displacement of bears from areas adjacent to improved roads, habituation to humans, and possibly other behavior modifications. However, use of the roadsides by more people would make it more difficult for bears to habituate to this less predictable activity; thus, the loss in habitat effectiveness in the roads’ ZOI could be expected to be greater than under Alternative 1. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times.

The creation of non-motorized corridors (i.e., expanded road shoulders) in this alternative is expected to result in an increase in non-motorized use of these areas. Bear-human encounters in these areas would probably increase both because of increased human use and because of the added surprise factor that quiet, non-motorized use represents. This is particularly true where roads and pathways traverse habitats where terrain and/or vegetation limit sight distances, or where noise from streams can cover noise of approaching humans. The risk of serious human injuries from such encounters would increase; however, their frequency of occurrence cannot be predicted.

Increasing access in grizzly bear habitat for large numbers of the public (potentially carrying food) also creates additional opportunities for bears to become conditioned to human food (Herrero 1985). Experience in the Park has shown that food-storage regulation compliance is poorest and hardest to enforce among dispersed recreationists. Therefore, while education efforts would help mitigate this potential, some bears would become conditioned to human food. Bears that become conditioned to human food usually become a threat to human safety and ultimately need to be destroyed. Because this alternative would provide more non-motorized access (through expanded road shoulders) in grizzly bear habitat than Alternative 1, it would result in higher potential for bear mortality associated with human food conditioning. Improving social trails in and near campgrounds would keep visitors from straying to less developed areas that bears could inhabit, but otherwise would have no effect.

Most of these adverse impacts would be considered moderate, long-term, and localized; however, impacts from vehicle mortality and potential mortality from human conditioning could be considered moderate because this could affect one or more bears but would not threaten the survival of the species.

Cumulative Impacts

Cumulative impacts to grizzly bears associated with Alternative 2 would be generally the same as those identified in Alternative 1. Any disturbances to grizzly bears from road shoulder construction would contribute only negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of proposed improved shoulders, would contribute only negligibly to cumulative impacts. Overall, long-term cumulative impacts to grizzly bears in the GYA population would be minor.

Mitigation Measures

- “Bearwise” education would be conducted with all personnel involved in road and pathway construction and maintenance projects.
- All food and other attractants would be properly stored at all times, and all food materials, garbage, and other attractants would be packed out on a daily basis if they cannot be stored in bear-resistant containers.
- Project crews (other than law enforcement personnel) would not carry firearms.
- Project crews would carry bear pepper spray when conducting project activities and would be trained in bear safety.
- All project crews working in grizzly bear habitat would meet standards for sanitation, attractant storage, and access.
- All grizzly bear/human confrontations would be reported to Science and Resource Management personnel.

Effects Determination and Summary of Rationale

Alternative 2 is not expected to have substantial adverse population level impacts on grizzly bears nor would it jeopardize the recovery of grizzly bears within the GYA. However, the inclusion of expanded road shoulders in grizzly bear habitat (Figure 24), some of which have limited sight distances, would reduce habitat effectiveness, increase potential for habituation and/or food conditioning by some bears, and increase the potential for bear mortalities associated with management removals. It is also reasonable to expect that one or more grizzly bears could be hit and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone grizzly bear population under Alternative 2 would be long-term, localized, and moderate since one or more individual bears are “likely to be adversely affected” by this alternative.

Gray Wolf

Direct and indirect effects to wolves resulting from Alternative 2 would be similar to those resulting from Alternative 1, with the following exceptions: direct impacts associated with the proposed approximately 17.8 miles (28.6 km) of improved road shoulder along the Teton Park Road would involve removal of a small amount of vegetation, and thus direct habitat loss for some potential wolf prey species (Table 19 and 22). However, this loss would occur adjacent to the existing road and because

both ungulates and wolves largely avoid the road corridor, the loss in habitat effectiveness would be minor.

Indirect impacts associated with use of the roadside by more pedestrians and bicyclists would include human-caused displacement of wolves from areas adjacent to improved roads, habituation to humans, and possibly other behavior modifications. However, use of the roadsides by more people would make it more difficult for wolves to habituate to this less predictable activity; thus, the loss in habitat effectiveness in the roads’ ZOI could be expected to be greater than under Alternative 1. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. Improving social trails in and near campgrounds would have no effect on wolves.

Most of these adverse impacts would be considered minor, long-term, and localized; however, impacts from vehicle mortality could be considered moderate because this could affect one or more wolves but would not threaten the survival of the species.

Cumulative Impacts

Cumulative impacts to gray wolves associated with Alternative 2 are expected to be similar to those identified in Alternative 1. Vehicle use of existing Grand Teton National Park roads and bicyclist and pedestrian use of new improved shoulders along the Teton Park Road are not expected to contribute to cumulative impacts on wolves. The cumulative impacts of existing residential activities, and possible future development occurring on park in-holdings and properties near Grand Teton National Park, are likely to be minor. Overall, long-term impacts to gray wolves would be minor, and the contribution of impacts resulting from Alternative 2 to gray wolf cumulative impacts would remain minor.

Effects Determination and Summary of Rationale

Alternative 2 is not expected to have substantial adverse population level impacts on wolves nor would it jeopardize the recovery of wolves within the GYA. However, habitat security would be reduced, and it is reasonable to expect that one or more wolves could be struck and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone wolf population under Alternative 2 would be long-term, localized, and moderate since one or more individual wolves are “likely to be adversely affected” by this alternative.



Yellow-billed Cuckoo

Similar to Alternative 1, no direct adverse impacts to yellow-billed cuckoo would result from implementing Alternative 2. The proposed shoulder widening along the Teton Park Road would not occur near any known cuckoo nesting or foraging habitats; however, a small amount of potential cuckoo habitat would be permanently removed including cottonwood and riparian forest as well as willow habitat (0.02 acres [0.008 ha]; Appendix B). Road shoulder widening in the vicinity of the Snake River near Moose Bridge and near Cottonwood Creek would be confined to the existing roadway.

Indirect effects from construction activities and increases in road use by pedestrians and bicyclists would cause a reduction in habitat effectiveness within a 246-ft (75-m) ZOI (see Alternative 1 analysis for discussion on cuckoo ZOIs). Approximately 0.2 acre (0.1 ha) of cottonwood and riparian forest and willow habitat (Appendix B) would be potentially impacted within this ZOI; however, the amount of habitat impacted by Alternative 2 would be the same as existing conditions (Table 23). The effects that construction, human presence, noise, and recreation along the roadway and from dispersed use off the road would have on cuckoos within the ZOI are relatively unknown but would include displacement of individuals, changes in behavior, reduction in breeding and reproduction success, and movement to less desirable habitats.

Impacts from Alternative 2 would be expected to be greater than under Alternative 1 and have no long-term effects on yellow-billed cuckoos, although no cuckoos have been reported in the project area.

Cumulative Impacts

Cumulative impacts to yellow-billed cuckoos associated with Alternative 2 would be generally the same as those identified in Alternative 1. The amount of habitat removed would be small and would be along the existing road corridor; therefore, the loss of this habitat would not significantly contribute to habitat fragmentation. Cumulative impacts from disturbances during road shoulder construction would have only minor cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of proposed improved shoulders, would have only minor cumulative impacts. Overall long-term cumulative impacts to yellow-billed cuckoo populations would be none to minor.

Impact Determination and Summary of Rationale
Under Alternative 2, human presence, noise, and activities

associated with road shoulder widening could displace individual yellow-billed cuckoos; however, because no known cuckoo breeding or nesting territories are located within the project area, these effects are expected to be none. No actions are proposed in this alternative that would affect important yellow-billed cuckoo nesting or foraging habitats. Overall, impacts to yellow-billed cuckoo populations under Alternative 2 are expected to be long-term, localized, and minor. Therefore, this alternative “may affect, but is not likely to adversely affect” yellow-billed cuckoo.

Bird Species of Special Concern (Not Federally Listed) and Neotropical Migratory Birds

Neotropical Migratory Birds/Birds Species of Special Concern

Direct and indirect effects to bird species of special concern and/or neotropical migratory birds resulting from Alternative 2 would be similar to those described in Alternative 1. In addition to the effects from existing conditions, a direct loss of approximately 13.3 acres (5.4 ha) of vegetation would occur due to shoulder widening in habitats such as sagebrush, cottonwood, willow, barren land, and conifer forests (Appendix B). The removal of these habitats would impact breeding, nesting, brood-rearing, and year-round foraging habitat of several bird species that depend on these habitat types; however, because the amount of direct habitat loss is small, these impacts would be negligible. The most impacted habitat other than barren land would be sagebrush (0.58 acres [0.2 ha]). Birds that use this habitat type include sagebrush obligate and near obligate species. Nests, eggs, or young could be impacted if construction of road shoulders occurs during the breeding season (mid-May through mid-July); therefore, mitigation measures to reduce these losses would be implemented, as discussed below.

Indirect impacts associated with the construction of road shoulders and their use by pedestrians and bicyclists would include a reduction in habitat effectiveness within a 246-ft (75-m) ZOI from the road (see Alternative 1 discussion on bird species of concern and neotropical migratory bird species ZOIs). Within the 12.1 acres (4.9 ha) in this ZOI, are a variety of habitats (Table 19; Appendix B), and therefore several different bird species, would be affected. The most impacted habitat other than barren land, would be sagebrush, thus those birds using this habitat would be most impacted. The effects that this disturbance would have on birds within the ZOI would be variable and

difficult to quantify. Studies have shown that individual songbirds respond differently to human disturbance and that responses depend on species, sex, and age of the individual and on the time of year and quality of adjacent habitat (Knight and Temple 1995, Gutzwiller et al. 1998). Potential response to human disturbance by passerine birds includes habitat avoidance, nest abandonment, reproductive failure, and modifications in behavior (Boyle and Samson 1985, Knight and Temple 1995, Miller et al. 1998, Paige and Ritter 1999). Recreational disturbance to diurnal raptors has also been shown to disrupt behavior when it deters foraging or flushes birds from foraging perches and roosts (Holmes et al. 1993). Additionally, species richness and abundance may change in areas adjacent to human presence along the proposed widened shoulder. For example, avian predators have been shown to increase in areas of human intrusion resulting in a decline of songbird abundance and diversity (Martin 1988, Angelstam 1986, Buhler and Anderson 1999). Recreational use along the roadway and dispersed use off the road could further reduce habitat effectiveness by an unknown, but perhaps moderate, amount at times (Figure 22). Although individual human disturbances would be brief in time, repeated encounters could have long-term impacts. Overall, impacts to bird species of special concern and/or neotropical migratory birds from Alternative 2 would be long-term, localized, negligible, and adverse.

Cumulative Impacts

Cumulative impacts to birds under Alternative 2 would be generally the same as those described in Alternative 1. Alternative 2 would contribute to the loss of habitat; however, effects would be confined to the areas along the Teton Park Road between Moose and Signal Mountain. Habitat removed from Alternative 2 would primarily be sagebrush, thus bird species that use this habitat would be most impacted. Many of these species have shown range-wide declines due to habitat loss, fragmentation, increases in predation and parasitism, and other unknown factors. Because only a small amount of sagebrush would be removed as a result from Alternative 2, cumulative impacts would be negligible. Overall, any disturbances to birds from road shoulder construction would contribute negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of proposed improved shoulders, would contribute negligibly to cumulative impacts. Long-term cumulative impacts to bird species of special concern and/or other neotropical migratory bird populations would be negligible.

Mitigation Measures

To minimize the potential for “taking” a nest or egg of a migratory bird species, either (1) any activity that would destroy a nest or egg would occur after July 15 (a timeframe outside of the primary nesting season), or (2) a survey for any nests in the project area would be conducted prior to these activities.

Greater Sage-Grouse

Direct and indirect effects to greater sage-grouse resulting from Alternative 2 would be similar to those described for Alternative 1. In addition to the effects from existing conditions, Alternative 2 includes improving road shoulders on the Teton Park Road between Moose Junction and Signal Mountain Lodge (approximately 17.8 miles [28.6 km]) to provide increased access for bicycling. Direct impacts from Alternative 2 would include permanent loss of 0.58 acres (0.2 ha) of sagebrush habitat from Moose to Signal Mountain (Appendix B), although this loss would occur adjacent to the existing road. Sage-grouse have been reported using areas along the road from Moose to North Jenny Lake. No direct effects would occur to known sage-grouse lekking, nesting, brood-rearing, or wintering areas under Alternative 2.

Indirect impacts associated with the construction of road shoulders and their use by pedestrians and bicyclists include a reduction in habitat effectiveness within a ZOI (see Alternative 1 for discussion on sage-grouse ZOIs). An estimated 8.76 acres (3.6 ha) of sagebrush habitat would be impacted within this ZOI along the Teton Park Road from Moose to Signal Mountain, (Appendix B). Sagebrush habitat along the Teton Park Road is considered potential sage-grouse nesting and brood-rearing habitat, and could, therefore, be impacted by activities associated with Alternative 2.

Indirect effects to sage-grouse due to human presence and noise associated with project activities include displacement of individuals, habitat avoidance, and modifications in behavior. Human activity along roadways and dispersed use beyond the roadway could cause occasional flushing of birds from nests or brood-rearing areas. Although impacts during construction would be short-term, repeated human disturbance from recreational use along improved shoulders would be long-term. As a result, impacts from Alternative 2 would have long-term, localized, negligible to minor, adverse impacts to the greater sage-grouse.



Cumulative Impacts

Cumulative impacts to greater sage-grouse associated with Alternative 2 would be generally the same as those identified in Alternative 1. Alternative 2 would contribute to the loss of sagebrush habitat; however, this loss would be confined to the areas along the Teton Park Road. Any disturbances to sage-grouse from road shoulder construction would contribute negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of proposed improved shoulders, would contribute negligibly to cumulative impacts. Overall long-term, cumulative impacts to greater sage-grouse in the Jackson Hole population would be negligible.

General Wildlife

Mammals

In addition to the effects from continued use and maintenance of existing roadways, Alternative 2 includes widening of roadway shoulders along approximately 17.8 miles (28.6 km) of the Teton Park Road between Moose and Signal Mountain. Approximately 13.3 acres (5.4 ha) of native vegetation, mainly barren land and sagebrush, would be removed permanently (Table 19). Sagebrush habitats are important to a wide range of mammals, including all the native ungulates and a number of carnivores and small mammals. The actual amount of habitat lost would be small and would occur immediately adjacent to the existing road corridor, but because the corridor would increase in width, edge effects would increase. This would enhance habitat for generalist species (e.g., coyotes, black bears) but would further degrade habitats for specialist species (e.g., forest dwelling species). In the short term, construction-related activity would likely temporarily displace any mammals present from habitat adjacent to the road; however, they would resume use in some areas once reclamation and revegetation activities are complete.

The primary additional impact to mammals in the long term under Alternative 2 would be disturbance due to the increased level of recreation (mainly bicyclists) on the roadway. Widening of the road shoulder would increase the footprint of the roadway and its ZOI on adjacent habitats. The construction of improved shoulders is expected to result in an increase in non-motorized recreation use, which could result in increased disturbance impacts as well as increased potential for conflicts with wildlife.

Responses of wildlife to human activities vary by individual and species. An individual animal's response may vary

according to the season, age and sex, body size, group size, behavioral response of cohorts, or habitat security (Knight and Temple 1995). Behavioral responses are influenced by the characteristics of the disturbance itself (type, distance away, direction of movement, speed, predictability, and frequency) and location (open habitat areas versus those screened by topography or vegetation), as well as the tolerance of the species or individual to disturbance. Recent experimental measurement of the effects of off-road recreation on mule deer and elk found that elk displayed more pronounced reactions to all-terrain vehicles (ATVs) and mountain bikers than horseback riders or pedestrians (Wisdom et al. 2004). In general, recreational activities had a substantial effect on elk behavior; however, it is unclear what the energetic costs associated with these disturbances may be. Mule deer showed little response in terms of movement rates but may respond to off-road activity by seeking denser cover, which could result in reduced foraging opportunities (Wisdom et al. 2004). Taylor and Knight (2003) observed that mule deer, bison, and pronghorn antelope exhibited a high probability of flushing from on-trail recreationists when encountered at close range (within 327 ft [100 m]). They identified a 654-ft (200-m) area of influence along trails. ZOIs up to 4,263 ft (1,300 m) have been identified for elk along roads (Gaines et al. 2003).

Areas adjacent to the Teton Park Road from Moose to North Jenny Lake Junction are important to elk for feeding and as rutting sites, and to bison, pronghorn, and mule deer for feeding. Under this alternative, both the 246-ft (75-m) and 1,312-ft (400-m) ZOIs would increase by approximately 13.3 acres (5.4 ha) and 72.5 acres (29.3 ha), respectively (Table 23). Because recreationists could stop at any point along the pathway to approach wildlife or enter occupied habitats, however, disturbance levels within the ZOI are expected to be higher than under Alternative 1. An increase in off-trail use associated with increased levels of recreation users in the road corridor would further reduce habitat effectiveness by an unknown, but perhaps moderate, amount at times (Figure 22). Although, some studies suggest that ungulates and other wildlife may habituate to the presence of humans, it is unknown how they would respond to relatively unpredictable activities. In addition, habituation can lead to an increase in wildlife-human conflicts (e.g., elk in the townsite of Banff, Canada) and an escalation of management actions (e.g., removal, hazing, relocation, etc.) to improve human safety. Alternative 2 is not expected to have significant population level impacts on mammals, although it is likely that individuals and groups of individuals in specific areas would be influenced by disturbance impacts.

Motor vehicle traffic levels on roads in Grand Teton National Park are expected to be similar to Alternative 1 and represent a minor potential source of mortality to mammals. Although wildlife-vehicle collisions usually cause the death of an animal, they occur relatively infrequently and do not adversely affect mammals at a population level. Overall, Alternative 2 would have long-term, localized, minor, adverse impacts to mammals.

Reptiles and Amphibians

Direct and indirect effects to amphibians and reptiles resulting from Alternative 2 would be similar to those described in Alternative 1. In addition to the effects from existing conditions, Alternative 2 includes widening of roadway shoulders along approximately 17.8 miles (28.6 km) of the Teton Park Road between Moose and Signal Mountain, and removing an estimated 13.3 acres (5.4 ha) of vegetation (Appendix B). Approximately 0.02 acres of wetland habitat would occur from the proposed shoulder widening. Although no known amphibian or reptile breeding sites occur within the project area, if construction does occur near a wetland that may be a potential amphibian breeding area, measures would be taken to prevent damage caused by construction equipment, erosion, siltation, or other activities. The removal of vegetation for shoulder widening could cause direct impacts to amphibians or reptiles that use these areas to forage or for cover. Direct and indirect mortality of adult amphibians or reptiles due to human activities and operation of equipment could occur. Overall, impacts to reptiles and amphibians from Alternative 2 would be short term, localized, and negligible.

Cumulative Impacts (General Wildlife)

Cumulative impacts to general wildlife under Alternative 2 would be similar to those identified in Alternative 1 (i.e., long term, minor to moderate, and adverse). The contribution of impacts resulting from Alternative 2 to cumulative impacts would be negligible.

Conclusion (Threatened and Endangered (Federally Listed) Species, Bird Species of Special Concern, and General Wildlife)

Threatened and Endangered (Federally Listed) Species

Alternative 2 “may affect, but is not likely to adversely affect” the bald eagle, Canada lynx, and yellow-billed cuckoo. Alternative 2 is “likely to adversely affect” the grizzly bear and gray wolf because vehicle collisions or mortality related to human conditioning (i.e., for bears)

may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species.

Bird Species of Special Concern

Alternative 2 would have long-term, localized, negligible, adverse impacts on bird species of special concern and neotropical migratory birds, and long-term, localized, negligible to minor, adverse effects on the greater sage-grouse. Cumulative impacts would be long-term, negligible, and adverse.

General Wildlife

Alternative 2 would result in long-term, localized, negligible to minor, adverse impacts to mammals, reptiles, and amphibians from continued use of park roads and construction of shoulder widening along a portion of the Teton Park Road. Although the amount of direct habitat loss is less under this alternative than the other action alternatives, the construction of improved shoulders to accommodate bicycle traffic is likely to lead to an increase in recreation use and consequently levels of disturbance. The potential for human-wildlife conflicts and associated management actions would be higher than under Alternative 1, again due to increased recreation use levels. Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Although no adverse population level impacts to mammals, reptiles, or amphibians are anticipated, effects to local species distributions and habitat use patterns are likely, but to a lesser degree than in Alternatives 3, 3a, or 4. Cumulative impacts would be long term, negligible, minor to moderate, and adverse, with Alternative 2 adding little to overall cumulative impacts.

Because there would be no major, adverse impacts to wildlife resources or values, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s wildlife resources, including any listed species or species of special concern.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Endangered and Threatened Species (Federally Listed Species)



Bald Eagle

No direct adverse impacts to bald eagles would result from implementing Alternative 3. The improved road shoulder and multi-use pathway outside the road corridor would not directly affect bald eagle nesting, foraging, or wintering habitat. Construction of improved shoulders and multi-use pathways would not occur within one-half mile (0.8 km) of known bald eagle nests. The development of multi-use pathways in the vicinity of the Snake River near Moose Bridge, along Cottonwood Creek, and Jackson Lake Dam would be confined to the existing roadway. The road realignment on the Moose-Wilson Road would not be constructed within bald eagle habitat.

Indirect effects from construction activities, pedestrians and bicyclist use along pathways, and improved shoulders would cause a reduction in habitat effectiveness within the ZOI (see Alternative 1 analysis for the definition of ZOIs for bald eagles). Disturbance from human presence, noise, and recreation along the roadway and pathways, as well as from dispersed use off the pathways, could displace eagles or occasionally flush birds from perches in areas that contain suitable eagle habitat, such as near Moose Bridge, Cottonwood Creek, and at Jackson Lake Dam. Other indirect effects from human disturbance would include modifications of behavior, habitat avoidance, and possibly changes in reproductive success. Activities associated with shoulder and pathway construction would be short term; however, pedestrian and bicyclist use along roadways and pathways would be long-term. Impacts from Alternative 3 would be greater than those from Alternative 1 and similar to those from Alternative 2. These impacts would have long-term, localized, minor, adverse effects on bald eagles.

Cumulative Impacts

Cumulative impacts to bald eagles associated with Alternative 3 would be generally the same as those identified in Alternatives 1 and 2. Cumulative impacts to bald eagles from pathway and improved shoulder construction would be minor. Vehicle use of Grand Teton National Park roads and pedestrian and bicyclist use of proposed pathways would have minor cumulative impacts. Overall long-term cumulative impacts to bald eagle populations would be minor.

Impact Determination and Summary of Rationale

Under Alternative 3, human presence, noise, and activities associated with pathway and shoulder construction would displace individual bald eagles; however, given that the project area is outside of bald eagle nest territories, these effects are expected to be minor. No actions are proposed

in this alternative that would affect important bald eagle wintering or foraging habitats. Overall, impacts to local and regional bald eagle populations under Alternative 3 are expected to be long-term, localized, minor, and adverse. Therefore, this alternative “may affect, but is not likely to adversely affect” bald eagles.

Canada Lynx

Direct and indirect effects to Canada lynx resulting from Alternative 3 would be similar to those described for Alternatives 1 and 2, including direct mortality and direct and indirect impacts to lynx habitat. Overall impacts would be long-term negligible to minor and adverse.

In addition to effects resulting from continued use and maintenance of the existing transportation system, Alternative 3 involves construction of approximately 15.5 miles (25.0 km) of improved shoulders along the Teton Park Road between North Jenny Lake and Colter Bay. A portion of the Moose-Wilson Road would be realigned and the old road alignment restored. Multi-use pathways would be constructed in three segments totaling approximately 23.3 miles (37.3 km). These segments are proposed along U.S. Highway 26/287/191 from the south boundary to Antelope Flats Road, the Teton Park Road from Moose Junction to North Jenny Lake Junction, and along the Moose-Wilson Road from the Granite Canyon Entrance Station to the LSR Preserve. Shoulder widening would result in a direct loss of 1.09 acre (0.44 ha) (Appendix B, Table B-1) of conifer-forest vegetation types. 0.5 acres (0.2 ha) of this loss would occur between North Jenny Lake turnoff and Colter Bay, a portion of which is in the Two Ocean and Steamboat LAUs. Conifer habitats represent potential habitat for lynx. This amount of habitat loss would be minor given the large amount of coniferous forest remaining that would not be impacted.

Disturbance impacts to lynx could occur from noise and human presence associated with construction of the shoulders and pathways and their subsequent use, especially in contiguous conifer habitats that are primary habitat for lynx such as those along the Moose-Wilson Road and between Signal Mountain and Colter Bay. Pathway and shoulder construction and use would extend the road corridor’s ZOI and could result in an indirect loss of lynx habitat. An estimated 33.5 acres (13.5 ha) of coniferous forest habitat would be affected by the 1,312-ft (400-m) ZOI associated with actions under Alternative 3. Lynx are generally crepuscular animals (active at twilight or before sunrise) and may rest in secure habitat during the day and emerge at night to use areas where human activity

has stopped or decreased. Consequently, because pathway use would occur only during daylight hours, disturbance impacts to lynx habitats adjacent to the road and pathway corridors are expected to be minimal.

Motor vehicle traffic levels under this alternative are expected to be similar to those predicted under the other alternatives and represent a minor potential source of mortality for lynx. The overall risk of direct mortality is not expected to increase from pathway construction and use.

Cumulative Impacts

Other activities occurring in the GYA that would affect lynx or their habitat include timber management, wildland fire management (including prescribed burns both inside and outside the Park), grazing (outside and within the Park), winter recreation, and trapping of other furbearers. With the exception of trapping, all of these activities have the potential to affect forest successional stages, and consequently, snowshoe hare and lynx.

Cumulative impacts to Canada lynx associated with Alternative 3 would be generally the same as those identified in Alternatives 1 and 2. Although road density would not increase under this alternative, the overall density of linear features would increase with an addition of approximately 23.3 miles (37.3 km) of multi-use pathways. The physical footprint of the road would increase slightly, and construction of the pathway would result in additional direct habitat loss and reduced habitat effectiveness. Disturbance to lynx from road shoulder construction would represent a minor contribution to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of proposed improved shoulders, would contribute only minor cumulative impacts.

Effects Determination and Summary of Rationale

Under Alternative 3, a small amount of lynx habitat would be directly lost due to construction. In addition, individual lynx may also be displaced by human presence and noise associated with routine maintenance; shoulder and pathway construction and use; road realignment; and continued use of the transportation system. Effectiveness of lynx habitat may also be reduced where it is adjacent to non-motorized routes. The likelihood of a lynx being struck and killed by a vehicle is anticipated to be low. Lynx likely occur in the Park at low densities, if at all, and no vehicle mortalities have been reported to date. Impacts to lynx or lynx habitat are expected to be greater than those described under Alternatives 1 or 2 but are still expected to be long-term, localized, and minor in scale. Based on

the above assumptions and conclusions, Alternative 3 “may affect, but is not likely to adversely affect” Canada lynx.

Grizzly Bear

Direct and indirect effects to grizzly bears resulting from Alternative 3 would include those resulting from road use and maintenance, as described under Alternative 1. The presence and ongoing maintenance of existing park roads within or adjacent to bear habitat adversely affects grizzly bears, both directly and indirectly. Direct effects include permanent loss of habitat caused by paving of roads and pullouts and the potential for vehicle-caused mortality. Indirect effects from road use and maintenance would include a reduction in habitat effectiveness within the 1,312-ft (400-m) ZOI.

A reduction in habitat effectiveness could potentially result in slightly lower reproductive fitness of some individual bears within home ranges adjacent to the road corridor. However, range and population increases of grizzly bears in Grand Teton National Park suggest that impacts associated with existing roads have not yet reached a threshold impact level that jeopardizes the survival of grizzly bears in the Park. Other indirect effects to grizzly bears include human-caused displacement of bears from areas adjacent to roads, habituation to humans, and possibly other behavior modifications.

In addition to the effects resulting from existing conditions, Alternative 3 includes the construction of approximately 23.3 miles (37.3 km) of multi-use pathways and 15.5 miles (25.0 km) of improved road shoulders along the main park roads, which would have additional impacts. Direct impacts associated with these actions would include the permanent loss of approximately 63.8 (26.0 ha) of native vegetation (4.0 acres [1.6 ha] in the recovery zone) and an equal additional temporary loss during construction and revegetation phases (Tables 19 and 22). Most of this habitat alteration would occur immediately adjacent to existing roads (16.0 miles [26.0 km]) or within 50 ft (15.2 m) of the road (24.3 miles [38.3 km]). Additional indirect habitat loss within the 1,312-ft (400-m) ZOI associated with roads and multi-use pathways under this alternative would equal 4.4 acres (1.8 ha) within the grizzly recovery zone, and 135.6 acres (54.9 ha) (Appendix B, Table B-2) within the remainder of the project area (Figure 24).

By limiting actions to improved shoulder widening within the grizzly recovery zone, much of the habitat loss associated with this alternative would occur within the ZOI of existing roads. While several studies suggest bears tend to avoid road corridors (Mace et al. 1996, McLellan et al. 1988), in



Yellowstone and Grand Teton National Parks, where grizzly bear use of roadside habitats is tolerated, mounting evidence suggests these areas may be important to one or more individual bears annually (M. Haroldson 2006, pers. comm., S. Cain 2006, pers. comm.). In small areas where pathways would diverge as much as 150 ft (46 m) from roadsides (e.g., the Jenny Lake area), impacts would be increased. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown, but potentially moderate, amount at times. Indirect impacts associated with construction and use of the roadsides and multi-use pathways by more pedestrians and bicyclists would include human-caused displacement of bears from adjacent areas, potential habituation to humans (Herrero 1985), and possibly other behavior modifications. Mattson et al. (1992) reported that habituated bears in the GYA were killed from a variety of causes 3.1 times more often than wary bears. Use of the roadsides by more people would make it more difficult for most bears to habituate to this less predictable activity, however, and thus the loss in habitat effectiveness in the road's ZOI could be expected to be greater than under Alternatives 1 or 2.

The creation of non-motorized corridors, both expanded road shoulders and multi-use pathways, is expected to result in an increase in non-motorized use of these areas. Bear-human encounters in these areas would increase both because of increased human use and because of the added surprise factor that quiet, non-motorized use represents. This is particularly true where roads and pathways traverse habitats where terrain and/or vegetation limit sight distances, or where noise from streams can cover noise of approaching humans. Serious human injuries from such encounters may occur; however, their frequency cannot be predicted.

Adding pathways in grizzly bear habitat that are easily utilized by large numbers of the public (potentially carrying food) also creates additional opportunities for bears to become conditioned to human food (Herrero 1985). Experience in the Park has shown that food-storage regulation compliance is poorest and hardest to enforce among dispersed recreationists. Therefore, while education efforts would help mitigate this potential, some bears may become conditioned to human food. Bears that become conditioned to human food usually become a threat to human safety and ultimately need to be destroyed. Because Alternative 3 would have more pathways in grizzly bear habitat than Alternatives 1 or 2, it would result in higher potential for bear mortality associated with human food conditioning.

In this alternative, none of the proposed multi-use pathways occur within the grizzly bear recovery zone (USFWS 1993) or PCA identified in the final conservation strategy for the grizzly bear in the Yellowstone ecosystem (USFWS 2003). However, the approximately 5.5-mile (8.8-km) section of improved road shoulder proposed between Jackson Lake Junction and Colter Bay borders the PCA through willow, sage/grass, and mixed lodgepole, spruce-fir cover types where grizzly bears are common. The grizzly bear recovery zone was delineated to define an area within which to focus grizzly bear recovery efforts after the species was listed in 1975. At the time the boundary was delineated, grizzly bears were uncommon in Grand Teton National Park. Currently, however, grizzly bears are established in large areas outside of the PCA in Grand Teton National Park (Schwartz et al. 2002) (Figure 24), and the line has little relevance in terms of grizzly bear distribution.

The final conservation strategy for the grizzly bear in the Yellowstone ecosystem (USFWS 2003) was developed to guide grizzly bear management after the species is delisted. It includes a "no-net-loss" of secure habitat standard for all of the PCA. Thus, while the loss of secure habitat from expanded road shoulders and pathways, the ZOI from pathway and shoulder users, and off-trail use adjacent to the PCA would be technically allowable (considering the current distribution of bears), it would be contrary to the goals of the conservation strategy (considering the current distribution of bears), of which Grand Teton National Park is a signatory.

Currently, grizzly bears are uncommon in the area of proposed multi-use pathways on the Teton Park Road south of North Jenny Lake Junction. The probability of human-bear encounters in this area is further reduced because habitat cover types are predominately open with long sight distances. However, it is likely that grizzly bears would become more common in this area in the future. While grizzly bears are also currently uncommon along the Moose-Wilson Road corridor, individuals have been known to travel through the area. Realigning the roadway in this area is not anticipated to increase the probability of human-grizzly bear encounters and associated human injuries above the current level. Paving of social trails in and near campgrounds would perhaps help to keep visitors from straying into bear habitat, but otherwise would have no effect on bears.

Most of these adverse impacts would be considered minor; however, impacts from vehicle mortality could

be considered moderate because they could affect one or more bears but would not threaten the survival of the species.

Cumulative Impacts

Actions occurring on public lands within the recovery zone that would adversely affect grizzly bears or their habitat (i.e., oil and gas exploration and development, logging, and mining) are limited by the ESA (USFWS 1982) and are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect grizzly bears in the recovery zone include:

- Livestock grazing (which would impact grizzly bears through management actions).
- Private land development.
- Firewood cutting.
- Road use/management.
- Timber harvest (past).
- Recreation activities that leads to human-bear conflicts (especially big game hunting).
- Vegetation management.
- Wildland and prescribed fire.
- Loss or decline of important food sources (e.g., whitebark pine seeds due to fire suppression).
- Potential reduction in elk and bison populations.

These activities and issues cumulatively contribute to increased mortality risks, reduce availability of secure habitat, and diminish habitat effectiveness for grizzly bears. The total cumulative impact of the above-listed activities, as well as other unidentified actions occurring within the grizzly bear recovery zone, does not appear to be adversely affecting population recovery, as evidenced by the expanding grizzly bear population in the GYA (Eberhardt and Knight 1996, Schwartz et al. 2002, Pyare et al. 2004).

Cumulative impacts to grizzly bears in the GYA specific to this alternative would be similar to those under Alternatives 1 and 2 and include road kills, recreation use, management removals, and road or project construction. As previously noted two grizzly bears were killed by vehicles in Grand Teton National Park within the last two summer seasons. Since 1977 eighteen grizzly bears have been killed by vehicles in the GYA (M. Haroldson 2006, pers. comm.). Existing road conditions and grizzly bear distribution suggest that future road kills are likely. The cumulative

effects of these actual losses and possible future road kills are likely to be minor, however, because road kills are not a significant source of mortality to the population in the GYA.

Increases in backcountry recreation by humans in and around Grand Teton National Park may negatively affect grizzly bears if human-bear encounters increase. Elk hunting, as part of the Park's annual elk reduction, occurs in approximately 66,600 acres (26,952 ha) of the Park's backcountry, 29,100 acres (11,776 ha) of which are in the recovery zone or PCA. Hunting of elk and other big game also occurs outside of and adjacent to the Park's boundaries. Conflicts between grizzly bears and hunters appear to be increasing (Gunther et al. 2004), and these encounters are a potential source of bear mortality. In 2004 and 2005, seven of 19 (37 percent) and four of 14 (28 percent) human-caused grizzly bear mortalities in the Yellowstone ecosystem, respectively, were attributed to hunter conflicts (Haroldson and Frey 2006; M. Haroldson 2005, pers. comm.). In 2005, total human-caused mortality rates were under the mortality threshold; however, female mortalities exceeded the annual mortality threshold. 2005 was the second consecutive year that the female mortality threshold was exceeded (Haroldson and Frey 2006). Unless hunter-related conflicts increase substantially, the cumulative adverse effects of these conflicts at current grizzly bear population levels are likely to be minor. Land and wildlife management agencies, including Grand Teton National Park, have active programs designed to educate backcountry users about grizzly bears and the requirements designed to reduce human-bear conflicts.

Several privately owned and State of Wyoming-owned in-holdings are present in Grand Teton National Park. Depending upon future human activities occurring on these properties, grizzly bears would be negatively affected. For many years, Grand Teton National Park has attempted to secure these in-holdings with lifetime leases and outright purchases and has been quite successful in doing so. No large-scale developments or land-based projects have been proposed for these in-holdings. The LSR Preserve (approximately 1,100 acres [445 ha] in southern Grand Teton National Park) is being converted into an interpretive center and much of the existing development is being removed and reclaimed. In addition, management of this in-holding will eventually be handed over to Grand Teton National Park. Recently, efforts have been made by the federal government to secure several parcels of state-owned land within Grand Teton National Park. The cumulative adverse effects of possible future development occurring on these in-holdings are likely to be minor.



The recent Teton County, Wyoming approval of the Snake River Associates development plan for Teton Village on private land adjacent to the Park's south boundary could have additional cumulative, long term impacts on grizzly bears. This development will likely result in higher numbers of park visitors and associated dispersed use. This may be particularly true in the southwest corner of the Park, where excellent bear habitat exists. Grizzly bears will probably eventually colonize this area, even though it is several miles outside of the PCA.

In the past 20 years, two grizzly bears have been removed from Grand Teton National Park for management reasons: one for cattle depredation and one because of human habituation and food conditioning. The latter bear came to Grand Teton National Park as a nuisance bear after being relocated from the northern to the southern part of the ecosystem. An additional bear that had broken into a cabin at the AMK Ranch in Grand Teton National Park was killed after being relocated from Grand Teton National Park to Montana and continuing its nuisance behavior there. Management removals within the PCA and a 10-mile (16-km) buffer around it are counted against recovery parameters (USFWS 2003), mortality limits in the Conservation Strategy (USFWS 2003), and likely those associated with the delisting proposal (Schwartz et al. 2005). Implementation of this alternative would increase the potential for management removals, adding cumulatively to removals throughout the ecosystem.

In summary, losses of habitat effectiveness and potential lowering of reproductive fitness of some individual bears resulting from existing roads and approximately 16.0 miles (26.0 km) of expanded road shoulders and 24.3 miles (38.3 km) of new multi-use pathways would contribute only negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, pedestrian and bicyclist use of proposed pathways, and potential management removals associated with this use are also expected to have minor cumulative impacts. Thus, overall, long-term cumulative impacts to grizzly bears in the GYA because of this alternative would be minor.

Mitigation Measures

- “Bearwise” education would be conducted with all personnel involved in road and pathway construction and maintenance projects.
- All food and other attractants would be properly stored at all times, and all food materials, garbage, and other attractants would be packed out on a daily basis if they cannot be stored in bear-resistant containers.

- All road-killed wildlife carcasses found less than 100 yards from the roadside would be removed within 24 hours to a location away from roads and human activities.
- Project crews (other than law enforcement personnel) would not carry firearms.
- Project crews would carry bear pepper spray when conducting project activities and would be trained in bear safety.
- All project crews working in grizzly bear habitat would meet standards for sanitation, attractant storage, and access.
- All grizzly bear/human confrontations would be reported to Science and Resource Management personnel.

Effects Determination and Summary of Rationale

Alternative 3 is not expected to have substantial adverse population level impacts on grizzly bears nor would it jeopardize the recovery of grizzly bears within the GYA. However, the inclusion of multi-use pathways and expanded road shoulders in grizzly bear habitat, some of which has limited sight distances, would reduce habitat effectiveness, increase potential for habituation and/or food conditioning by some bears, and increase potential for bear mortalities associated with management removals. It is also reasonable to expect that one or more grizzly bears could be struck and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone grizzly bear population under Alternative 3 would be long-term, localized, and moderate since one or more individual bears “are likely to be adversely affected” by this alternative.

Gray Wolf

Direct and indirect effects to wolves resulting from Alternative 3 would include those resulting from road use and maintenance, as described under Alternative 1. The presence and ongoing maintenance of existing park roads within or adjacent to wolf habitat adversely affects wolves, both directly and indirectly. Direct effects include permanent loss of habitat caused by paving of roads and pullouts and the potential for vehicle-caused mortality. Radio-telemetry data have shown that the Teton and Sage packs regularly cross U.S. Highway 89/191 between Moran and Moose and between Moran and the Park's east boundary. Other wolves from unknown pack affiliations have also been observed crossing park roads on many occasions (S. Cain 2006, pers. comm.). Indirect effects from road use and maintenance

would include a reduction in habitat effectiveness within a ZOI beyond the boundaries of the habitat actually paved by the road. The loss of habitat associated with existing primary roads is estimated to be 14,577 acres (5,899 ha) (Appendix B, Table B-3). Other indirect effects to wolves include human-caused displacement from areas adjacent to roads, possible habituation to humans, and possibly other behavior modifications.

In addition to the effects resulting from existing conditions, Alternative 3 includes the construction of approximately 23.3 miles (37.3 km) of multi-use pathways and 15.5 miles (25.0 km) of improved shoulders along the main park roads, which would have additional impacts. Direct impacts associated with these actions would include the permanent loss of approximately 63.8 acres (25.8 ha) of habitat for wolves and some of their prey species (Tables 19 and 22) and an equal, additional temporary loss during construction and revegetation phases. Most of this habitat alteration would occur immediately adjacent to existing roads (15.5 miles [25.0 km]) or within 50 ft (15 m) of the road (23.3 miles [37.3 km]). Additional indirect habitat loss from extending the ZOI associated with roads and multi-use pathways under this alternative would equal a net loss of approximately 140.0 acres (56.7 ha) beyond the existing condition (Appendix B, Table B-2).

Because nearly all the habitat loss associated with this alternative would occur adjacent to or within ZOIs of existing roads, and because wolves and most of their primary prey tend to avoid road corridors, the loss in long-term habitat effectiveness would be minor. Indirect impacts associated with construction and use of the roadsides and multi-use pathways by more pedestrians and bicyclists would include human-caused displacement of wolves from adjacent areas, potential habituation to humans, and possibly other behavior modifications. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. However, use of the roadsides and pathways by more people would make it more difficult for wolves and their prey to habituate to this less predictable activity along the corridor, and thus the loss in habitat effectiveness in the road's ZOI could be expected to be greater than under Alternatives 1 or 2. None of the proposed expanded road shoulders, multi-use pathways, or related construction activities would occur within 1 mile (1.6 km) of known wolf dens or rendezvous sites. Paving of social trails in and near campgrounds would have no effect on wolves.

Most of these adverse impacts would be considered minor; however, impacts from vehicle mortality could be considered moderate because they could affect one or more wolves but would not threaten the survival of the species. Between 1995 and 2001, 13 wolves were killed by vehicles in the GYA, and 3 wolves were killed within the Park during the last two years. Existing road conditions and future road reconstruction will likely result in the death of additional wolves, but will not threaten the survival of the species.

Cumulative Impacts

Activities occurring within wolf habitat that would adversely affect wolves in the GYA are limited and, for public land management agencies, are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect wolves occurring within the recovery zone include livestock grazing, private land development, vegetation management, potential reduction in elk and bison populations, and control actions.

These activities and others discussed under Alternative 1 cumulatively contribute to increased mortality risks and reduce the availability of secure habitat. However, the total cumulative impact of the above-listed activities, as well as other unidentified actions occurring within the wolf habitat, does not appear to have adversely affected population recovery, as evidenced by the quick expansion of the wolf population following reintroduction and the continued expansion into areas outside of YNP. Actions proposed under Alternative 3 could be expected to increase human presence within or improve access to wolf habitat that would cumulatively reduce habitat security in the long-term by a minor amount.

Impact Determination and Summary of Rationale

Alternative 3 is not expected to have substantial adverse population level impacts on wolves nor would it jeopardize the recovery of wolves within the GYA. However, habitat security would be reduced and it is reasonable to expect that one or more wolves could be struck and killed by vehicles using park roads during the lifetime of this Plan. Therefore, adverse impacts to the Park and Greater Yellowstone wolf populations under Alternative 3 would be long-term, localized, and moderate since one or more individual wolves are "likely to be adversely affected" by this alternative.



Yellow-billed Cuckoo

Similar to Alternatives 1 and 2, no direct adverse impacts to yellow-billed cuckoo would result from implementing Alternative 3. The proposed pathways, improved shoulders, and realignment of the Moose-Wilson Road would not occur near any known cuckoo nesting or foraging areas; however, approximately 2.4 acres (1.0 ha) of cottonwood riparian wetland and willow habitat that are potential cuckoo habitat would be potentially removed for the construction of multi-use pathways and roadway shoulder improvements (Appendix B). The direct impact from the loss of this habitat would be minor because the amount of habitat removed would be small.

Indirect impacts to cuckoos include displacement of individuals due to human presence and noise associated with project activities in areas that contain cuckoo habitat, such as near the Gros Ventre Bridge, Moose Bridge and Cottonwood Creek; however, no cuckoos have been reported in these areas. Any reduction in effective habitat from pathway and improved shoulder construction and increase in pedestrian and bicyclist use would be confined to the project's immediate area, as well as within the 246-ft (75-m) ZOI (see Alternative 1 for discussion on ZOIs for cuckoos). Under Alternative 3, approximately 8.0 acres (3.24 ha) of cottonwood, willow, and riparian wetland habitats would be potentially impacted within this ZOI beyond those impacted by the existing conditions. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown, but perhaps moderate, amount at times. The effects of human disturbance on cuckoos within the ZOI are unknown but may include displacement of individuals, changes in behavior, reduction in breeding and reproduction success, and movement to less desirable habitats. Although impacts during construction would be short term, repeated human disturbance from recreational use along the pathways and improved shoulders would be long term. Overall, adverse impacts from Alternative 3 would be long-term, localized, and minor, and greater than those from Alternatives 1 and 2.

Cumulative Impacts

Cumulative impacts to yellow-billed cuckoo associated with Alternative 3 would be greater than those identified in Alternatives 1 and 2 because additional habitat that would be used by cuckoos would be removed under this alternative. Loss of mature cottonwood forests and lack of recruitment have decreased suitable and future habitat for this species (MTPIF 2000). Fragmentation of cottonwood forests has resulted in many areas with patch

sizes below the recommended minimum. Any disturbance to yellow-billed cuckoo from pathway construction would contribute only negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of proposed pathways, would contribute to cumulative impacts by a minor amount. Overall long-term cumulative impacts to yellow-billed cuckoo populations would be minor.

Impact Determination and Summary of Rationale

Under Alternative 3, individual yellow-billed cuckoos would be displaced by human presence, noise, and activities associated with pathway construction. Because the project area does not contain any known breeding or nesting cuckoos, these effects are expected to be minor. Actions proposed in this alternative could affect potential yellow-billed cuckoo nesting or foraging habitats. Overall, impacts to yellow-billed cuckoo populations under Alternative 3 are expected to be long-term, localized, and minor. Therefore, this alternative "may affect, but is not likely to adversely affect" the yellow-billed cuckoo.

Bird Species of Special Concern (Not Federally Listed) and Neotropical Migratory Birds

Neotropical Migratory Birds/ Bird Species of Special Concern

Direct and indirect effects to bird species of special concern and neotropical migratory birds resulting from Alternative 3 would be greater than those identified under Alternatives 1 and 2. Shoulder widening, road realignment, and pathway development would result in a direct loss of several different habitat types (Appendix B) and an estimated 5,200 to 7,100 trees would be removed (Table 17). The greatest amount of habitat loss would occur in shrubland/dwarf shrubland 35.3 acres (14.3 ha), conifer forest 2.0 acres (0.8 ha), and herbaceous vegetation 2.3 acres (0.9 ha) (Appendix B). The removal of these habitats would impact breeding, nesting, brood-rearing, and year-round foraging habitat of several bird species, such as sagebrush obligates, sagebrush near-obligates, forest bird dwellers (in particular those that use coniferous forests), and cottonwood or aspen forest-dependent birds. Nests, eggs, or young could be destroyed if construction of multi-use pathways and road shoulders occurs during the breeding season (mid-May through mid-July); therefore, mitigation measures to reduce these losses would be implemented.

Indirect impacts associated with the construction of road shoulders and pathways and their use by pedestrians and

bicyclists could cause a reduction in effective habitat within a 246-ft (75-m) ZOI (see Alternative 1 discussion on bird species of concern and neotropical migratory bird species ZOIs). A net increase of 259.0 acres (104.8 ha) of habitat could be impacted within this ZOI beyond the existing condition, including several different habitat types (Table 23), which would impact several bird species. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. The indirect impacts to birds from human disturbance within the ZOI would be variable and difficult to quantify. Birds may respond to human use along a pathway in a variety of ways, and responses may differ depending upon an individual's species, age, sex, reproductive status, and habitat requirements. Responses from disturbances can range from nothing to displacement of individuals, modifications in behavior, and a reduction of reproductive success (Boyle and Samson 1985, Knight and Temple 1995, Miller et al. 1998). Additionally, species richness and abundance may change in areas with human disturbance. For example, avian predators have been shown to increase in areas of human intrusion resulting in a decline of songbird abundance and diversity (Martin 1988, Angelstam 1986, Buhler and Anderson 1999). Recreational disturbance to diurnal raptors may also disrupt behavior when it deters foraging or flushes birds from foraging perches and roosts (Holmes et al. 1993). Although individual disturbances may be brief in time, repeated encounters with recreationists could result in minor impacts to birds in the long term.

The construction of multi-use pathways along the Teton Park Road through contiguous conifer forests, sagebrush, willow and other habitats would alter bird species composition, distribution, and abundance. Studies have shown that some species of birds dependent upon contiguous habitat types may decline due to the creation of habitat edges and fragmentation from trails, whereas habitat generalists increase (Hickman 1990, Miller et al. 1998). Furthermore, nest predation from avian and mammalian predators (e.g., corvids and coyotes) and nest parasitism from brown-headed cowbirds typically increases in areas where habitat edges are created (Miller et al. 1998, Hickman 1990, Paton 1994). Although it is uncertain what effects habitat edges that are created under Alternative 3 would have on birds, it is expected that these effects would be long term and minor.

Impacts associated with Alternative 3 are expected to be variable; however, overall impacts to bird species of special concern and neotropical migratory birds would be long-

term, localized, minor, and adverse, and would be greater than under Alternatives 1 and 2.

Cumulative Impacts

Cumulative impacts to birds associated with Alternative 3 would be greater than those identified in Alternatives 1 and 2 due to the amount of habitat loss and fragmentation, the loss of habitat effectiveness, and the potential for human disturbance along the proposed pathway. A variety of habitat types used by birds would be removed from the construction of the pathway outside of the road corridor from the Park's south boundary to North Jenny Lake. The majority of this habitat would be sagebrush, thus bird species, such as sagebrush obligates and near-obligates, that use this habitat would be most impacted. Many of these species have shown range-wide declines due to habitat loss, fragmentation, increases in predation and parasitism, and other unknown factors. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness and could increase habitat fragmentation. Any disturbances to birds from pathway construction and from vehicle, pedestrian, and bicyclist use of the proposed pathways would contribute a minor amount to cumulative impacts. Overall long-term cumulative impacts to bird species of special concern and/or other migratory bird populations would be long-term, localized, minor, and adverse.

Mitigation Measures

To minimize the potential for "taking" a nest or egg of a migratory bird species, either (1) any activity that would destroy a nest or egg would occur after July 15 (a timeframe outside of the primary nesting season), or (2) a survey for any nests in the project area would be conducted prior to these activities.

Greater Sage-Grouse

Direct impacts to sage-grouse resulting from Alternative 3 would primarily involve loss of habitat from the construction of multi-use pathways outside the road corridor and the improvement of road shoulders within the road corridor along U.S. Highway 26/89/191 and the Teton Park Road. Approximately 35.3 acres (14.3 ha) of potential sage-grouse habitat would be permanently removed outside the road corridor adjacent to U.S. Highway 26/89/191 between the southern park boundary and North Jenny Lake and within the road corridor from North Jenny to Signal Mountain. Because no known sage-grouse sightings have been reported along the Moose-Wilson Road, the NPS does not anticipate that the realignment actions in this area would impact sage-grouse.



Indirect impacts associated with the construction of road shoulders and pathways, and their use by pedestrians and bicyclists, include a reduction in habitat effectiveness within a ZOI (see Alternative 1 for discussion on sage-grouse ZOIs). An estimated net change of 62.7 acres (25.4 ha) of sagebrush habitat would be impacted within this ZOI, along the Teton Park Road from the south boundary to Signal Mountain (Appendix B) beyond the amount of sagebrush habitat impacted by existing conditions. Potential indirect effects to sage-grouse due to human presence and noise associated with project activities include displacement of individuals, habitat avoidance, and modifications in behavior. Human activity along roadways and dispersed use beyond the roadway could cause occasional flushing of birds from nests or brood-rearing areas. Although impacts during construction would be short term, repeated human disturbance from recreational use along improved shoulders would be long term.

The project area north of the Potholes does not contain critical sage-grouse habitat. Activities associated with paving social trails in and adjacent to campgrounds would not affect sage-grouse or their habitat.

Impacts associated with Alternative 3 would be greater than those in Alternatives 1 and 2. The loss of sagebrush habitat and its effectiveness in the ZOI, as well as the possible displacement of sage-grouse along the proposed pathway could result in be long-term, localized, and minor adverse effects to the greater sage-grouse.

Cumulative Impacts

Cumulative impacts to greater sage-grouse associated with Alternative 3 would be greater than those for Alternatives 1 and 2 because the amount of sagebrush removed under this alternative outside the road corridor along U.S. Highway 26/89/191 and the Teton Park Road would increase. Sage-grouse habitat management guidelines (Connelly et al. 2000) suggest protecting suitable breeding (nesting and early brood-rearing) habitats within 3.1 miles (5.0 km) from all occupied leks for non-migratory populations, such as the population residing in the Park. Research conducted in Grand Teton National Park, along with the tenuous nature of the sage-grouse population in Jackson Hole, led Holloran and Anderson (2004) to suggest that sagebrush should not be manipulated within 4.8 miles (7.7 km) of any known leks in the Park. Under Alternative 3, sagebrush would be removed along U.S. Highway 26/89/191 and the Teton Park Road between Moose and North Jenny Lake Junction from areas within a 4.8-mile (7.7 km) buffer near two active leks (the Airport and Timbered Island leks) and

would, therefore, potentially add to cumulative impacts to local sage-grouse populations.

Any disturbances to sage-grouse from pathway construction would contribute negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of the proposed pathway, would contribute to cumulative impacts by a minor amount. Overall impacts to greater sage-grouse in the Jackson Hole population would be long-term, localized, minor, and adverse.

General Wildlife

Mammals

Direct and indirect adverse effects to mammals resulting from Alternative 3 would be similar to those described for Alternatives 1 and 2 (i.e., long-term, localized, and minor). In addition, Alternative 3 includes the construction of approximately 23.3 miles (37.3 km) of multi-use pathways and 15.5 miles (25.0 km) of improved road shoulders along the main park roads and paving /improvement of social trails near Jenny Lake and Signal Mountain. The road shoulder, road realignment, and multi-use pathway construction proposed under Alternative 3 would permanently remove approximately 63.8 acres (25.8 ha) (Table 19) of vegetation, mostly dry sagebrush shrubland but also some forested habitat. Most of this habitat loss would occur immediately adjacent to existing roads (15.5 miles [25.0 km]) or within 50 ft (15.2 m) of the road (23.3 miles [37.3 km]). Approximately, 3.1 acres (1.3 ha) (Table 19) of aspen habitat would be reclaimed following rerouting of a portion of the Moose-Wilson Road. Additional acres of vegetation would be temporarily disturbed by construction activities associated with improved roads and multi-use pathways. All disturbed areas outside of improved road and multi-use pathways surfaces (e.g., cut/fill slopes) would be reclaimed and revegetated with native vegetation. Finally, there would be some loss or disturbance to riparian vegetation and cottonwood communities where the proposed multi-use pathways cross the Snake River near Moose, the Gros Ventre River, and Cottonwood Creek along the Teton Park Road, and where shoulder widening occurs in the Willow Flats area and over Pilgrim Creek. This would be minimized by using existing bridges where possible. Paving social trails would not remove vegetation but could cause noise and disturbances that affect nearby wildlife.

Indirect habitat loss within the 1,312-ft (400-m) ZOI associated with roads and multi-use pathways under

this alternative would equal 140.0 acres (56.7 ha) (Table 23). Between North Jenny Lake Junction and Colter Bay, much of the habitat loss would occur within the ZOI of existing roads. In the short term, construction-related activity would likely temporarily displace any mammals present from habitat adjacent to the road; however, they would resume use in some areas once reclamation and revegetation activities are complete, depending upon their tolerance to human disturbance.

The construction of non-motorized corridors (both expanded shoulders and multi-use pathways) is expected to result in an increase in non-motorized recreation use in these areas and is likely to result in increased disturbance impacts and potential for wildlife-human conflicts compared to Alternative 2. Impacts to ungulates would be greatest where cover is poor and least where cover is greatest. Local use and movement by ungulates occurs daily throughout the summer and fall across the areas proposed for development of separated pathways, especially along the Moose-Wilson Road and the Teton Park Road near Windy Point, between Timbered Island and Signal Mountain. Daily ungulate movements also occur throughout the corridor between Jackson Lake Dam and Colter Bay. Movements of carnivores including black bears, coyotes, fox, etc. also occur throughout the project area. Where peak wildlife use of or movement through areas traversed by non-motorized routes coincide with high recreational activity, disturbance impacts are expected to be higher.

Existing and anticipated vehicle traffic levels on roads in Grand Teton National Park would be similar to Alternative 1 and would represent a minor potential source of mortality to mammals. There would be a small reduction in peak summer-vehicle traffic on the Teton Park Road as more visitors use the multi-use pathways, and this would have negligible beneficial effects on mammals by reducing the potential road kill threat. Signage would also be provided to warn motorists of wildlife crossing or high use areas. Although wildlife-vehicle collisions usually cause the death of an animal, the relative infrequency of these mortalities ensures that these impacts occur only at an individual level and do not adversely affect mammals at a population level.

Mitigation measures would be implemented to reduce impacts to wildlife habitat, including preservation of larger trees and snags, avoidance of nesting and denning seasons, and conducting wildlife surveys (as needed) to ensure that impacts are avoided or minimized. Overall, Alternative 3

would have long-term, localized, minor, adverse impacts to mammals.

Reptiles and Amphibians

Direct and indirect effects to amphibians and reptiles resulting from Alternative 3 would be greater than those identified under Alternative 1 and similar to those described from Alternative 2. Direct impact to amphibians and reptiles would primarily involve loss of habitat from the construction of multi-use pathways. Approximately 63.8 acres (25.8 ha) (Table 19) of habitat would be permanently removed, of which 1.4 acres (0.6 ha) would be wetland vegetation (Table 18). Other wetlands not removed, but within the project area, would be protected from construction activities to minimize erosion and siltation. Direct impacts from the removal of riparian wetland habitat would result in the direct loss of potential amphibian breeding habitat. The removal of other habitats (i.e., sagebrush, conifer forest, willow, and cottonwood) for pathway construction could also cause indirect impacts to amphibians or reptiles that use these areas to forage or for cover. Direct and indirect mortality of adult amphibians or reptiles due to human activities and pathway construction could also occur. Overall, impacts from Alternative 3 on reptiles and amphibians would be negligible to be short term, localized, and negligible to minor.

Cumulative Impacts (General Wildlife)

Cumulative impacts to wildlife under Alternative 3 would be generally the same as those identified in Alternative 1 (i.e., long-term, localized, minor to moderate, and adverse). The permanent loss of approximately 63.8 acres (25.8 ha) of native vegetation would contribute to cumulative impacts affecting wildlife that relies upon sagebrush and lodgepole pine plant communities, but to a small degree since these impacts would mostly occur within established road corridors. The permanent or temporary loss of a small portion of wetlands would contribute to cumulative impacts affecting wildlife, especially reptiles, but only negligibly. Wetland mitigation requirements would ultimately result in total replacement and a possible net increase in park wetlands that are similar in type and function to impacted wetlands. Human uses of linear facilities resulting from implementing Alternative 3, including vehicles that might kill wildlife, would contribute to cumulative impacts. In total, the contribution to wildlife cumulative impacts resulting from Alternative 3 is expected to be long-term, localized, minor to moderate, and adverse.



Conclusion (Threatened and Endangered (Federally Listed) Species, Bird Species of Special Concern, and General Wildlife)

Threatened and Endangered (Federally Listed) Species

Alternative 3 “may affect, but is not likely to adversely affect” the bald eagle, Canada lynx, or yellow-billed cuckoo. Alternative 3 is “likely to adversely affect” the grizzly bear and gray wolf because vehicle collisions or mortality related to human conditioning (for bears) would occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species.

Bird Species of Special Concern

Alternative 3 would have long-term, localized, minor, adverse effects on bird species of special concern, neotropical migratory birds, and the greater sage-grouse. Cumulative impacts would be long-term, minor, and adverse.

General Wildlife

Alternative 3 would have an intermediate level of adverse impacts on wildlife among the action alternatives considered. Although Alternative 3 is not expected to have adverse population level impacts on mammals, reptiles, and amphibians, there would be long-term, localized, negligible to moderate, adverse effects. The increased disturbance (both spatially and in terms of recreation use levels) would further fragment habitats and erode habitat effectiveness. These impacts would be greater than under Alternative 2 because of the additional disturbance related to multi-use pathways between the south boundary and Antelope Flats. The potential for human-wildlife conflicts and associated management actions would be higher than under Alternative 1 due to the addition of multi-use pathways, which affects a larger area and consequently a greater number of species and individuals. Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Although no adverse population level impacts are anticipated, effects to local species distributions and habitat use patterns are likely. Cumulative impacts to general wildlife under this alternative would be long term, localized, minor to moderate, and adverse.

Because there would be no major, adverse impacts to wildlife resources or values, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park;

(2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s wildlife resources, including any listed species or species of special concern, and no unacceptable impacts.

Effects of Alternative 3a — Preferred Alternative

Endangered and Threatened Species (Federally Listed Species)

Bald Eagle

No direct adverse impacts to bald eagles would result from implementing Alternative 3a. The proposed pathway would not directly affect bald eagle nesting, foraging, or wintering habitat. Construction of multi-use pathways would not occur within one-half mile (0.8 km) of known bald eagle nests. The development of multi-use pathways in the vicinity of the Snake River near Moose Bridge along Cottonwood Creek and Jackson Lake Dam would be confined to the existing roadway. The proposed pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to the LSR Preserve would not be constructed within bald eagle habitat.

Indirect effects from construction activities, pedestrians, and bicyclist use along pathways and vehicle road use would cause a reduction in habitat effectiveness within the ZOI (see Alternative 1 analysis for the definition of ZOIs for bald eagles). Disturbance from human presence, noise, and recreation along the pathways, and from dispersed use off pathways, could displace eagles or occasionally flush birds from perches in areas that contain suitable eagle habitat, such as near Moose Bridge, Cottonwood Creek, and at Jackson Lake Dam. Other indirect effects from human disturbance would include modifications of behavior, habitat avoidance, and possibly changes in reproductive success. Activities associated with construction would be short term; however, pedestrian and bicyclist use along pathways would be long term. Impacts from Alternative 3a would be greater than under Alternative 1 and similar to Alternatives 2 and 3. These impacts would have long-term, minor effects on bald eagles.

Cumulative Impacts

Cumulative impacts to bald eagles associated with Alternative 3a would be generally the same as those identified in Alternatives 1, 2, and 3. Any disturbances to bald eagles from pathway construction would contribute only negligibly to cumulative impacts. Vehicle use of Grand

Teton National Park roads and pedestrian and bicyclist use of proposed pathways would contribute to cumulative impacts by a minor amount. Overall long-term cumulative impacts to bald eagle populations would be minor.

Impact Determination and Summary of Rationale

Under Alternative 3a, individual bald eagles would be displaced by human presence, noise, and activities associated with pathway construction, but given that the project area is outside of bald eagle nest territories, these effects are expected to be localized and minor. No actions are proposed in this alternative that would directly affect important bald eagle wintering or foraging habitats. Overall, impacts to local and regional bald eagle populations under Alternative 3a are expected to be long-term, localized, and minor. Therefore, this alternative “may affect, but is not likely to adversely affect” bald eagles.

Canada Lynx

The types of direct and indirect effects to lynx resulting from Alternative 3a would be similar to those occurring under Alternative 1, 2, and 3, including direct mortality and direct and indirect impacts to lynx habitat. Overall impacts would be long-term minor and adverse.

In addition to effects resulting from existing conditions, Alternative 3a includes construction of approximately 22.5 miles (36.0 km) of multi-use pathways outside the road corridor between the south entrance and North Jenny Lake Junction and 15.5 miles (25.0 km) of multi-use pathways inside the road corridor along the Teton Park Road between North Jenny Lake Junction and Colter Bay and along 3.3 miles (5.3 km) of the Moose-Wilson Road. The Moose-Wilson Road would also be realigned in two locations.

The impacts associated with pathways south of North Jenny Lake Junction would be similar to those described under Alternative 3, with the following exceptions. Alternative 3a includes: 1) a multi-use pathway between the Granite Canyon Entrance Station and the LSR Preserve that would generally be constructed within the road corridor, 2) a section of pathway outside the road corridor between North Jenny Lake Junction and String Lake, and 3) a section of pathway outside the road corridor along Spring Gulch Road between Gros Ventre Junction and the Park boundary. Conifer habitats represent potential habitat for lynx. The two segments of roadway realignment and the multi-use pathway along the Moose-Wilson Road would result in a direct loss of 1.4 acres (0.6 ha) of conifer forest vegetation types (Appendix B, Table B-1). Constructing the pathway within the road corridor along the Moose-

Wilson Road would reduce impacts to lynx habitat by a small amount. Pathway construction in the other two segments would result in a direct loss of 5.9 acres (2.4 ha) of coniferous forest.

The addition of multi-use pathways inside the road corridor from North Jenny Lake Junction to Colter Bay would result in greater impacts to lynx habitat in comparison to Alternatives 1, 2 and 3. Disturbance impacts to lynx could occur from noise and human presence associated with construction and use of shoulders and pathways. All pathway segments proposed under this alternative (except the U.S. Highway 26/89/191 segment) traverse areas of relatively contiguous conifer habitat, which are mapped as lynx habitat. The width of existing linear corridors range from 18 to 30 ft (5.5 to 9.1 m). Pathway construction would increase corridor widths, including the area along the Moose-Wilson Road, to a maximum of 82 to 94 ft (25 to 28.65 m) (assuming pathway is 50 ft [15.2 m] from the road), with an attendant increase in the ZOI. The multi-use pathway would affect an additional 58.0 acres (23.0 ha) of coniferous forest habitat beyond the existing 400-m ZOI. Lynx are generally crepuscular animals and may rest in secure habitat during the day and emerge at night to use areas where human activity has stopped or decreased. Consequently, because pathway use would occur primarily during daylight hours, disturbance impacts to lynx habitats adjacent to the road and pathway corridors would be minimal.

Motor vehicle traffic levels under this alternative are expected to be similar to those predicted under the other alternatives and represent a negligible to minor potential source of mortality for lynx. The overall risk of direct mortality is not expected to increase from pathway construction and use.

Cumulative Impacts

Other activities occurring in the GYA that would affect lynx or their habitat include timber management, wildland fire management (including prescribed burns both inside and outside the Park), grazing (outside and inside the Park), winter recreation, and trapping of other furbearers. With the exception of trapping, all of these activities have the potential to affect forest successional stages, and consequently, snowshoe hare and lynx.

Cumulative impacts to Canada lynx associated with Alternative 3a would be generally the same as those identified in Alternatives 1, 2, and 3. Although road density would not increase under this alternative, the overall density of linear features would increase with an addition



of roughly 41.3 miles (66.3 km) of multi-use pathway inside and outside of the road corridor. The physical footprint of the road would increase slightly, and construction of the multi-use pathway would result in additional direct habitat loss and reduced habitat effectiveness. Disturbance to lynx from road realignment and pathway construction would represent a small contribution to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of multi-use pathways, would contribute only minor cumulative impacts.

Effects Determination and Summary of Rationale

Under Alternative 3a, individual Canada lynx would be displaced by human presence and noise associated with routine maintenance and continued use of the transportation system. Even though Alternative 3a would result in the total loss of 7.1 acres (2.9 ha) of habitat; these losses would still be minor given the large amount of coniferous forest remaining within the project area that would not be impacted. No actions proposed in this alternative are likely to affect important lynx linkage areas. The likelihood of a lynx being struck and killed by a vehicle is anticipated to be low; lynx likely occur in the Park at low densities, if at all, and no vehicle mortalities have been reported to date. Impacts to lynx or lynx habitat are expected to be greater than those described under the other action alternatives but are still expected to be long-term, localized, and minor, but not adverse. Based on the above assumptions and conclusions, Alternative 3a “may affect, but is not likely to adversely affect” Canada lynx.

Grizzly Bear

Direct and indirect effects to grizzly bears resulting from Alternative 3a would include those resulting from road use and maintenance, as described under Alternative 1. The presence and ongoing maintenance of existing park roads within or adjacent to bear habitat adversely affects grizzly bears, both directly and indirectly. Direct effects include permanent loss of habitat caused by paving of roads and pullouts and the potential for vehicle-caused mortality. Indirect effects from road use and maintenance of existing primary roads would include a reduction in habitat effectiveness within the 1,312-ft (400-m) ZOI beyond the existing impacts (1,819 acres [735 ha]) within the designated recovery zone (Appendix B, Table B-3). The section of the Park road between North Jenny Lake Junction and Jackson Lake Junction is outside the grizzly bear recovery zone but is occupied by them. There would be a reduction of habitat within the 1,312-ft (400- m) ZOI of 31.5 acres (12.8 ha) within this segment of roadway associated with this alternative. A reduction in habitat

effectiveness could potentially result in slightly lower reproductive fitness of some individual bears within home ranges adjacent to the road corridor. However, range and population increases of grizzly bears in Grand Teton National Park suggest that impacts associated with roads have not yet reached a threshold impact level that jeopardize the survival of grizzly bears in the Park. Other indirect effects to grizzly bears include human-caused displacement of bears from areas adjacent to roads, habituation to humans, and possibly other behavior modifications.

In addition to the effects resulting from existing conditions, Alternative 3a includes the construction of approximately 41.3 miles (66.3 km) of multi-use pathways inside and outside of the roadway corridor and two areas of road realignment along the Moose-Wilson Road, which would have additional impacts. Throughout the project area, direct impacts associated with these proposed actions would include the permanent loss of approximately 83.0 acres (34.4 ha) of native vegetation (Tables 19 and 22) and an equal, additional temporary loss during construction and revegetation phases. Additional indirect habitat loss from extending the 1,312-ft (400-m) ZOI associated with roads and multi-use pathways under this alternative would equal 172 acres (70 ha) (Appendix B, Table B-2). The net change is estimated to be within the designated grizzly recovery zone and 146.2 acres (59.1 ha) (Appendix B, Table B-2) within the remainder of the Park. Direct and indirect vegetation loss adjacent to the grizzly bear recovery zone (from Jackson Lake Junction to Colter Bay) would be 9.7 acres (3.9 ha) and 19.7 acres (8.0 ha), respectively, while that in the remainder of currently occupied habitat (from North Jenny Lake Junction to Jackson Lake Junction) would be 15.2 acres (6.2 ha) and 31.5 acres (12.8 ha), respectively.

The addition of multi-use pathways within the road corridor from north Jenny Lake Junction to Colter Bay under Alternative 3a would result in higher impacts on grizzly bears because this area, in contrast to areas further south, supports a well-established population of grizzly bears. The proposed pathway passes through willow, sage/grass, and mixed lodgepole, spruce-fir cover types where grizzly bears are common. Beginning with Jackson Lake Junction and heading north, the pathway would occur immediately adjacent to the grizzly bear PCA (USFWS 2003). The PCA, or grizzly bear recovery zone as it was initially described (USFWS 1982), was delineated to define an area within which to focus grizzly bear recovery efforts after the species was listed in 1975. At the time the

boundary was delineated, grizzly bears were uncommon in Grand Teton National Park. Currently, however, grizzly bears are established in large areas outside of the PCA in Grand Teton National Park (Schwartz et al. 2002), and the line has little relevance in terms of grizzly bear distribution.

The impacts associated with pathways south of North Jenny Lake Junction along the Teton Park Road would be largely the same as in Alternative 3. Exceptions include 1) a multi-use pathway between the Granite Canyon Entrance Station and the LSR Preserve that would be built within the road corridor instead of outside of it, 2) a section of pathway outside the road corridor between North Jenny Lake Junction and String Lake, and 3) a section of pathway outside the road corridor between Gros Ventre Junction and the south boundary on Spring Gulch Road. Placing the pathway within the road corridor along the Moose-Wilson Road would reduce impacts on grizzly bears somewhat by keeping users and associated impacts closer to the road. It would also serve to increase sight distances in heavily vegetated areas, reducing the probability for dangerous bear-human encounters. On the other hand, adding a pathway outside of the road corridor between North Jenny Lake Junction and String Lake would increase impacts on grizzly bears. A short stretch of this alignment goes through grizzly bear habitat in a sparsely timbered area. Pathway construction and use in this area will extend the road corridor's ZOI and could result in an indirect loss of habitat. It would also increase the probability of dangerous bear-human encounters because of limited sight distances. Other parts of this alignment occur in sagebrush-grassland near known elk calving areas. As grizzly bears in the Park learn to search these areas for elk calves in the early summer, they could be displaced by pathway users. Finally, the pathway proposed between Gros Ventre Junction and the south boundary on Spring Gulch Road should have no impacts on grizzly bears because of the high level of human activity that already occurs in this area.

By maintaining multi-use pathways generally within 50 ft (15.2 m), of the road, much of the habitat loss associated with this alternative would occur adjacent to or within the existing roads' ZOI. While several studies suggest bears tend to avoid road corridors (e.g., Mace et al. 1996, McLellan et al. 1988), in Yellowstone and Grand Teton National Parks, where grizzly bear use of roadside habitats is tolerated, mounting evidence suggests these areas may be important to one or more individual bears annually (M. Haroldson 2006, pers. comm., S. Cain 2006, pers. comm.). In small areas where pathways diverge as much as 150 ft (45.72 m) from roadsides in the areas south of Jenny

Lake Junction, impacts would be increased. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. Indirect impacts associated with construction and use of the multi-use pathways inside and outside of the roadway corridor by more pedestrians and bicyclists would include human-caused displacement of bears from adjacent areas, potential habituation to humans (Herrero 1985), and possibly other behavior modifications. However, use of the roadsides by more people would make it more difficult for bears to habituate to this less predictable activity; thus, the loss in habitat effectiveness in the roads' ZOI could be expected to be greater than under Alternatives 1, 2, or 3.

The creation of non-motorized corridors (i.e., multi-use pathways) is expected to result in an increase in non-motorized use of these areas. Bear-human encounters in these areas would increase because of increased human use and because of the added surprise factor that quiet, non-motorized use represents (see Pathways and Wildlife Hazards discussion). This is particularly true where roads and pathways traverse habitats where terrain and/or vegetation limit sight distances, or where noise from streams can cover noise of approaching humans. Serious human injuries from such encounters are likely to occur; however, their frequency cannot be predicted.

Adding pathways in grizzly bear habitat that are easily utilized by large numbers of the public (potentially carrying food) also creates additional opportunities for bears to become conditioned to human food (Herrero 1985). Experience in the Park has shown that food-storage regulation compliance is poorest and hardest to enforce among dispersed recreationists. Therefore, while education efforts would help mitigate this potential, some bears may become conditioned to human food. Bears that become conditioned to human food often become aggressive and ultimately need to be destroyed. Because this alternative would have more pathways in grizzly bear habitat than Alternatives 1, 2, or 3, it would represent a greater potential for bear mortality associated with human food conditioning.

In this alternative, none of the proposed pathways occur within the grizzly bear recovery zone (USFWS 1993) or PCA identified in the final conservation strategy for the grizzly bear in the Yellowstone ecosystem (USFWS 2003), assuming the pathway between Jackson Lake Junction and Colter Bay is built on the west side of U.S. Highway 89/191/287. However, this 5.5-mile (8.8-km) section of



pathway borders the PCA through willow, sage/grass, and mixed lodgepole, spruce-fir cover types where grizzly bears are common.

The final conservation strategy for the grizzly bear in the Yellowstone ecosystem (USFWS 2003) was developed to guide grizzly bear management after the species is delisted. It includes a “no-net-loss” of secure habitat standard for all of the PCA. Thus, while the loss of secure habitat from multi-use pathways adjacent to the PCA would be technically allowable, considering the current distribution of bears, it would be contrary to the conservation goals of the conservation strategy, of which Grand Teton National Park is a signatory.

Currently, grizzly bears are uncommon in the area of proposed multi-use pathways on the Teton Park Road south of North Jenny Lake Junction. The probability of human-bear encounters in this area is further reduced because habitat cover types are predominately open with long sight distances. However, it is likely that grizzly bears would become more common in this area in the future. While grizzly bears are also currently uncommon along the Moose-Wilson Road corridor, individuals have been known to travel through the area. Adding multi-use pathways in this area, along with varied terrain, heavy cover, and several noisy stream crossings, would escalate the probability of human-grizzly bear encounters and associated human injuries. Realigning portions of the roadway in this area is not anticipated to increase the probability of human-grizzly bear encounters and associated human injuries above the current level. Improving social trails in and near campgrounds would perhaps help to keep visitors from straying into bear habitat but otherwise would have no effect on bears.

Most of these adverse impacts would be considered minor; however, impacts from vehicle mortality and from potential mortality from human conditioning could be considered moderate because this could affect one or more individual bears. There is the potential for vehicle mortality and potential mortality from human conditioning could affected adult female bears, possibly effecting reproductive rates in the local population causing them to decrease. However, these impacts but would not threaten the survival of the species.

Cumulative Impacts

Actions occurring on public lands within the recovery zone that would adversely affect grizzly bears or their habitat (i.e., oil and gas exploration and development, logging, and mining) are limited by the ESA (USFWS 1982) and are

analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect grizzly bears in the recovery zone include:

- Livestock grazing (which would impact grizzly bears through management actions).
- Private land development.
- Firewood cutting.
- Road use/management.
- Timber harvest (past).
- Recreation activities that leads to human-bear conflicts (especially big game hunting).
- Vegetation management.
- Wildland and prescribed fire.
- Loss or decline of important food sources (e.g., whitebark pine seeds due to fire suppression).
- Potential reduction in elk and bison populations.

These activities and issues cumulatively contribute to increased mortality risks, reduce availability of secure habitat, and diminish habitat effectiveness for grizzly bears. The total cumulative impact of the above-listed activities, as well as other unidentified actions occurring within the grizzly bear recovery zone, does not appear to be adversely affecting population recovery, as evidenced by the expanding grizzly bear population in the GYA (Eberhardt and Knight 1996; Schwartz et al. 2002; Pyare et al. 2004).

Cumulative impacts to grizzly bears in the GYA specific to this alternative would be similar to those under Alternatives 1, 2, and 3 and include road kills, recreation use, management removals, and road or project construction. Eighteen grizzly bears have been road-killed within the GYA since 1977 (Gunther et al. 2004, IGBST, unpublished data), including two in Grand Teton National Park within the last two years. The cumulative impacts of these actual losses and possible future road kills are likely to be minor because road kills are not a significant source of mortality to the population in the GYA.

Increases in backcountry recreation by humans in and around Grand Teton National Park would negatively affect grizzly bears if human-bear encounters increase. Elk hunting, as part of the Park’s annual elk reduction, occurs in approximately 66,600 acres (26,952 ha) of the Park’s backcountry, 29,100 acres (11,776 ha) of which are in the recovery zone or PCA. Hunting of elk and other

big game also occurs outside of and adjacent to the Park's boundaries. Conflicts between grizzly bears and hunters appear to be increasing (Gunther et al. 2004), and these encounters are a potential source of bear mortality. In 2004 and 2005, seven of 19 (37 percent) and four of 14 (28 percent) human-caused grizzly bear mortalities in the Yellowstone ecosystem, respectively, were attributed to hunter conflicts (M. Haroldson 2006, pers. comm.; M. Haroldson 2005, pers. comm.). In 2005, total human caused mortality rates were under the mortality threshold, but female mortalities exceeded the annual mortality threshold. This is the second consecutive year that the female mortality threshold has been exceeded (Haroldson and Frey 2006). However, unless hunter-related conflicts increase substantially, the cumulative adverse effects of these conflicts at current grizzly bear population levels are likely to be minor. Land and wildlife management agencies, including Grand Teton National Park, have active programs designed to educate backcountry users about grizzly bears and requirements designed to reduce human-bear conflicts.

Several privately owned and State of Wyoming owned in-holdings are present in Grand Teton National Park. Depending upon future human activities occurring on these properties, grizzly bears may be negatively affected. For many years, Grand Teton National Park has attempted to secure these in-holdings with lifetime leases and outright purchases and has been quite successful in doing so. No large-scale developments or land-based projects have been proposed for these in-holdings. The LSR Preserve (approximately 1,100 acres [445.2 ha] in southern Grand Teton National Park) will include an interpretive center, and much of the existing development has been removed and reclaimed. In addition, management of this in-holding eventually will be handed over to Grand Teton National Park. Recently, the federal government has made efforts to secure several parcels of state-owned land within Grand Teton National Park. The cumulative adverse effects of possible future development occurring on these in-holdings are likely to be minor.

The recent Teton County, Wyoming approval of the Snake River Associates development plan for Teton Village on private land adjacent to the Park's south boundary could have additional cumulative, long term impacts on grizzly bears. This development will likely result in higher numbers of park visitors and associated dispersed use. This may be particularly true in the southwest corner of the Park, where excellent bear habitat exists. It is likely that grizzly bears will eventually colonize this area, even though it is several miles outside of the PCA.

In the past 20 years, two grizzly bears have been removed from Grand Teton National Park for management reasons: one for cattle depredation and one because of human habituation and food conditioning. The latter bear came to Grand Teton National Park as a problem bear after being relocated from the northern to the southern part of the ecosystem. An additional bear that had broken into a cabin at the AMK Ranch in Grand Teton National Park was killed after being relocated from Grand Teton National Park to Montana and continuing its nuisance behavior there. Management removals within the PCA and a 10-mile (16-km) buffer around it are counted against recovery parameters (USFWS 2003) mortality limits in the Conservation Strategy (USFWS 2003), and likely those associated with the delisting proposal (Interagency Grizzly Bear Study Team 2005). Implementation of this alternative would increase the potential for management removals, adding cumulatively to removals throughout the ecosystem.

In summary, losses of habitat effectiveness, and potential lowering of reproductive fitness of some individual bears resulting from existing roads and approximately 41.3 miles (66.3 km) of new pathways, would have minor contributions to cumulative impacts. Vehicle use of Grand Teton National Park roads, pedestrian and bicyclist use of proposed pathways, and potential management removals associated with this use are expected to have minor cumulative impacts. Thus, overall long-term cumulative impacts to grizzly bears in the GYA because of this alternative would be minor.

Mitigation Measures

- "Bearwise" education would be conducted with all personnel involved in road and pathway construction and maintenance projects.
- All food and other attractants would be properly stored at all times, and all food materials, garbage, and other attractants would be packed out on a daily basis if they cannot be stored in bear-resistant containers.
- Project crews (other than law enforcement personnel) would not carry firearms.
- Project crews would carry bear pepper spray when conducting project activities and would be trained in bear safety.
- All project crews working in grizzly bear habitat would meet standards for sanitation, attractant storage, and access.
- All grizzly bear/human confrontations would be



reported to Science and Resource Management personnel.

Effects Determination and Summary of Rationale

Alternative 3a would have a higher level of adverse impacts than Alternatives 1, 2, or 3. The inclusion of multi-use pathways in grizzly bear habitat, much of which has limited sight distances, would result in loss of habitat effectiveness, a high potential for habituation and/or food conditioning by some bears, and bear mortalities associated with management removals. These activities are not expected to have adverse population level impacts on grizzly bears. However, management removals would contribute to cumulative mortalities in the ecosystem and could result in recovery delays. Removal of females would reduce the reproductive potential of grizzly bears locally, potentially resulting in a decrease in bear density. It is also reasonable to expect that one or more grizzly bears could be hit and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone grizzly bear population under Alternative 3a would be long-term, localized, and moderate since one or more individual bears are “likely to be adversely affected” by this alternative.

Gray Wolf

Direct and indirect effects to wolves resulting from Alternative 3a would include those resulting from road use and maintenance, as described under Alternative 1. The presence and ongoing maintenance of existing park roads within or adjacent to wolf habitat adversely affects wolves, both directly and indirectly. Direct effects include permanent loss of habitat caused by paving of roads and pullouts and the potential for vehicle-caused mortality. Radio-telemetry data have shown that the Teton and Sage packs regularly cross U.S. Highway 89/191 between Moran and Moose and between Moran and the Park’s east boundary. Other wolves from unknown pack affiliations have also been observed crossing park roads on many occasions (S. Cain 2006, pers. comm.). Indirect effects from road use and maintenance would include a reduction in habitat effectiveness within the 1,312-ft (400-m) ZOI of the existing road, which is estimated to be 14,577.2 acres (5,899.2 ha) (Appendix B, Table B-3) beyond the boundaries of the habitat actually paved by the road. Other indirect effects to wolves include human-caused displacement from areas adjacent to roads, possible habituation to humans, and possibly other behavior modifications.

In addition to the effects resulting from existing conditions, Alternative 3a includes the construction of approximately

41.3 miles (66.3 km) of multi-use pathways and two areas of roadway realignment along the Moose-Wilson Road, which would have additional impacts. Direct impacts associated with the proposed actions would include the permanent loss of approximately 83 acres (34 ha) of habitat for wolves and some of their prey species (Tables 19 and 22) and an equal additional temporary loss during construction and revegetation phases. Additional indirect habitat loss would occur from the net loss of 171.2 acres (69.2 ha) of habitat within the 1,312-ft (400-m) ZOI (Appendix B, Table B-2).

Large portions of the wolf habitat loss associated with Alternative 3a would occur adjacent to or within the existing roads’ current ZOI. However, wolves and most of their primary prey tend to avoid road corridors, so the loss in long-term habitat effectiveness would be minor. Indirect impacts associated with construction and use of the roadsides and multi-use pathways by more pedestrians and bicyclists would include human-caused displacement of wolves from adjacent areas, potential habituation to humans, and possibly other behavior modifications. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. Use of the pathways by more people would make it more difficult for wolves and their prey to habituate to this less predictable activity along the corridor as well; therefore, the total loss of habitat effectiveness in the pathways’ ZOI could be expected to be greater than under Alternatives 1, 2, or 3.

None of the proposed improved road shoulders, multi-use pathways, road realignment, or related construction activities would occur within 1 mile (1.6 km) of known wolf dens or rendezvous sites. If new dens or rendezvous sites were created within a mile of multi-use pathways, temporary pathway or adjacent area closures would be considered and implemented when necessary to protect breeding wolves. Improving social trails in and near campgrounds would have no effect on wolves.

Most of these adverse impacts would be considered minor; however, impacts from vehicle mortality could be considered moderate because this could affect one or more individual wolves but would not threaten the survival of the species. Between 1995 and 2001, 13 wolves were killed by vehicles in the GYA, and 3 wolves were killed within the Park between 2004 and 2005. Existing road conditions and future road reconstruction will likely result in the death of additional wolves.

Cumulative Impacts

Activities occurring within wolf habitat that would adversely affect wolves in the GYA are limited and, for public land management agencies, are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect wolves occurring within the recovery zone include livestock grazing, private land development, vegetation management, potential reduction in elk and bison populations, and control actions.

These activities cumulatively contribute to increased mortality risks and reduce the availability of secure habitat. However, the total cumulative impact of the above-listed activities, as well as other unidentified actions occurring within the wolf habitat, does not appear to have adversely affected population recovery, as evidenced by the quick expansion of the wolf population following reintroduction and the continued expansion into areas outside of YNP. The proposed actions, in the long term, could be expected to increase human presence within or improve access to wolf habitat by a minor amount that would cumulatively reduce habitat security.

Effects Determination and Summary of Rationale

Alternative 3a is not expected to have substantial adverse population level impacts on wolves nor would it jeopardize the recovery of wolves within the GYA. However, habitat security would be reduced, and it is reasonable to expect that one or more wolves could be struck and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone wolf population under Alternative 3a would be long-term, localized, and moderate since one or more individual wolves are “likely to be adversely affected” by this alternative.

Yellow-billed Cuckoo

Similar to Alternatives 1, 2, and 3, no direct adverse impacts to yellow-billed cuckoo would result from implementing Alternative 3a. The proposed pathways along the Park’s roadways would not occur near any known cuckoo nesting or foraging areas; however, approximately 3.8 acres (1.5 ha) of cottonwood and riparian forests and willow habitat that are potential cuckoo habitat would be removed during construction of the pathway (Appendix B, Table B-2). Most of this direct loss would occur in the section of the project that is proposed along the Teton park road and Signal Mountain. The direct impact from removing this habitat would be minor because the amount removed would be small.

Indirect impacts to cuckoos include displacement of individuals due to human presence and noise associated with project activities in areas that contain cuckoo habitat, such as near the Moose Bridge, Gros Ventre Bridge, and Cottonwood Creek; however, no cuckoos have been reported in the project area. Reduction in effective habitat from pathway construction and increases in pedestrian and bicyclist use would be confined to the project’s immediate area, as well as within the 246-ft (75-m) ZOI (see Alternative 1 for discussion on ZOIs for cuckoos). Approximately 17 acres (6.9 ha) of cottonwood, riparian, and willow habitats would be within this 246-ft (75-m) ZOI under Alternative 3a (Appendix B). The effects human disturbance would have on cuckoos within the ZOI are unknown but would include displacement of individuals, changes in behavior, reduction in breeding and reproduction success, and movement to less desirable habitats. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. Although impacts during construction would be short term, effects from repeated human disturbance from recreational use along the pathways would be long term. Overall, impacts from Alternative 3a would be long term, minor, and greater than those from Alternatives 1 and 2 but similar to Alternative 3.

Cumulative Impacts

Cumulative impacts to yellow-billed cuckoos associated with Alternative 3a would be greater than those identified in Alternatives 1 and 2 and similar to Alternative 3. Loss of mature cottonwood forests and lack of recruitment have decreased suitable and future habitat for this species. Fragmentation of cottonwood forests has resulted in many areas with patch sizes below the recommended minimum. Any disturbances to yellow-billed cuckoos during pathway construction would contribute to cumulative impacts by a minor amount. Vehicle use of Grand Teton National Park roads and pedestrian and bicyclist use of proposed pathways would contribute to cumulative impacts by a minor amount. Overall long-term, cumulative impacts to yellow-billed cuckoo populations would be long-term, minor, and adverse.

Impact Determination and Summary of Rationale

Under Alternative 3a, individual yellow-billed cuckoos would be displaced by human presence, noise, and activities associated with pathway construction. Because the project area does not contain any known breeding



or nesting cuckoos, these effects are expected to be minor. No actions are proposed in this alternative that would affect important yellow-billed cuckoo nesting or foraging habitats. Overall, impacts to yellow-billed cuckoo populations under Alternative 3a are expected to be long-term, localized, and minor. Therefore, this alternative “may affect, but is not likely to adversely affect” the yellow-billed cuckoo.

Bird Species of Special Concern (Not Federally Listed) and Neotropical Migratory Birds

Neotropical Migratory Birds/Birds Species of Special Concern

Direct and indirect effects to bird species of special concern and neotropical migratory birds resulting from Alternative 3a would be greater than those identified under Alternatives 1, 2, or 3. Direct impact to birds would primarily be the permanent loss of approximately 82.9 acres (33.5 ha) of habitat (Appendix B) and an estimated 17,900 to 23,075 trees would be removed (Table 20). Road realignment and pathway development would result in a direct loss of several different habitat types (Appendix B). The greatest amount of habitat loss would occur in sagebrush (52.5 acres [21.1 ha]), conifer forests (7.3 acres [3.0 ha]), and meadows (3.1 acres [1.3 ha]) (Appendix B, Table B-1). The removal of these habitats would impact breeding, nesting, brood-rearing, and year-round foraging habitat of several bird species, such as sagebrush obligates, sagebrush near-obligates, forest bird dwellers (in particular coniferous dwelling birds), and cottonwood or aspen forest-dependent birds. Nests, eggs, or young could experience impacts if construction of multi-use pathways occurs during the breeding season (mid-May through mid-July); therefore, mitigation measures to reduce these losses would be implemented. The amount of habitat removed under Alternative 3a would result in negligible to minor impacts to neotropical migratory birds and bird species of special concern.

Indirect impacts associated with the construction of multi-use pathways and their use by pedestrians and bicyclists could cause a reduction in effective habitat within a 246-ft (75-m) ZOI (see Alternative 1 discussion on bird species of concern and neotropical migratory bird species ZOIs). An estimated net loss of 181.9 acres (74.0 ha) of habitat could be impacted within this ZOI and in several different habitat types (Table 23). An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. The indirect impacts to birds from human disturbance

within the ZOI would be variable and difficult to quantify. Birds would respond to human use along a pathway in a variety of ways, and responses would differ depending upon an individual’s species, age, sex, reproductive status, and habitat requirements. Responses from disturbances can range from nothing to displacement of individuals, modifications in behavior, and a reduction of reproductive success (Boyle and Samson 1985, Knight and Temple 1995, Miller et al. 1998). Recreational disturbance to diurnal raptors may disrupt behavior when it deters foraging or flushes birds from foraging perches and roosts (Holmes et al. 1993). Recreational disturbance to diurnal raptors may also disrupt behavior when it deters foraging or flushes birds from foraging perches and roosts (Holmes et al. 1993). Additionally, species richness and abundance may change in areas adjacent to human disturbance. For example, avian predators have been shown to increase in areas of human intrusion resulting in a decline of songbird abundance and diversity (Martin 1988, Angelstam 1986, Buhler and Anderson 1999). Although individual disturbances would be brief, repeated encounters with recreationists could result in long-term and negligible effects to birds.

The construction of multi-use pathways along the Moose-Wilson Road and the Teton Park Road through contiguous conifer forests, sagebrush, and other habitats could also alter bird species composition, distribution, and abundance. Studies have shown that some species of birds dependent upon contiguous habitat types may decline due to the creation of habitat edges and fragmentation from trails, whereas habitat generalists increase (Hickman 1990; Miller et al. 1998). Furthermore, nest predation from avian and mammalian predators (e.g., corvids and coyotes) and nest parasitism from brown-headed cowbirds typically increases in areas where habitat edges are created (Miller et al. 1998, Hickman 1990, Paton 1994). Although it is uncertain what effects habitat edges created under Alternative 3a would have on birds, it is expected these effects would be long term and minor.

In general, impacts associated with Alternative 3a are expected to be variable; however overall impacts to bird species of special concern and neotropical migratory birds would be long term, localized, and minor. These impacts would be greater than those in Alternatives 1, 2, or 3.

Cumulative Impacts

Cumulative impacts to birds under Alternative 3a would be greater than those identified under Alternatives 1, 2, or 3, due to the amount of habitat loss and fragmentation, the loss of habitat effectiveness, and the potential for

human disturbance along the proposed pathway. A variety of habitat types used by birds would be removed from the construction of the pathway outside of the road corridor from the Park's south boundary to North Jenny Lake. The majority of this habitat would be sagebrush, thus bird species, such as sagebrush obligates and near-obligates, that use this habitat would be most impacted. Many of these species have shown range-wide declines due to habitat loss, fragmentation, increases in predation and parasitism, and other unknown factors. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness and could increase habitat fragmentation. Disturbances to birds from pathway construction and vehicle, pedestrian, and bicyclist use of proposed pathways would contribute to cumulative impacts by a minor amount. Overall, impacts to bird species of special concern and/or other migratory bird populations would be long-term, localized, minor, and adverse.

Mitigation Measures

To minimize the potential for "taking" a nest or egg of a migratory bird species, either (1) any activity that would destroy a nest or egg would occur after July 15 (a timeframe outside of the primary nesting season), or (2) a survey for any nests in the project area would be conducted prior to these activities.

Greater Sage-Grouse

Direct impact to sage-grouse resulting from Alternative 3a would primarily involve loss of habitat from the construction of multi-use pathways along roadways and increased human use. Approximately 39.7 acres (16.0 ha) of sagebrush habitat would be permanently removed outside of the road corridor along U.S. Highway 26/89/191 between the southern park boundary North Jenny Lake Junction and within the road corridor from North Jenny Lake Junction and Signal Mountain (Appendix B) in areas where sage-grouse have been documented to nest, brood-rear, and winter (Holloran and Anderson 2004). Sage-grouse have not been reported using sagebrush habitats along the Moose-Wilson Road and the Teton Park Road north of North Jenny Lake Junction; therefore, removal of sagebrush along this section of the project would not directly impact sage-grouse.

Indirect impacts associated with the construction of road shoulders and pathways and their use by pedestrians and bicyclists include a reduction in habitat effectiveness within a ZOI (see Alternative 1 for discussion on sage-grouse ZOIs). An estimated 57.8 acres (29.8 ha) of sagebrush

habitat would be impacted within this ZOI, along the Teton Park Road from south park boundary to Signal Mountain (Appendix B), beyond what is impacted from existing conditions. Potential indirect effects to sage-grouse due to human presence and noise associated with project activities include displacement of individuals, habitat avoidance, and modifications in behavior. Human activity along roadways and dispersed use beyond the roadway could cause occasional flushing of birds from nests or brood-rearing areas. Although impacts during construction would be short term, repeated human disturbance from recreational use along pathways would be long term. As a result, impacts from Alternative 3a would have long-term, minor impacts to the greater sage-grouse.

Cumulative Impacts

Any disturbances to sage-grouse from pathway construction would contribute negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of the proposed pathway, would contribute negligibly to cumulative impacts. Overall long-term cumulative impacts to greater sage-grouse in the Jackson Hole population would be negligible.

Cumulative impacts to greater sage-grouse associated with Alternative 3a would be greater than those identified in Alternatives 1 and 2 and similar to those from Alternative 3. Sage-grouse habitat management guidelines (Connelly et al. 2000) suggest protecting suitable breeding (nesting and early brood-rearing) habitats within 3.1 miles (5.0 km) from all occupied leks for non-migratory populations, such as the population residing in the Park. Based on research conducted in Grand Teton National Park, and due to the tenuous nature of the sage-grouse population in Jackson Hole, Holloran and Anderson (2004) suggest that sagebrush should not be manipulated within 4.7 miles (7.7 km) of any known leks in the Park. Alternative 3a would contribute to the loss of sagebrush habitat along U.S. Highway 26/89/191 and the inside Teton Park Road within a 4.7-mile (7.7-km) buffer from two active leks (the Airport and Timbered Island leks) and would therefore potentially add to cumulative impacts to local sage-grouse populations.

Any disturbances to sage-grouse from pathway construction would contribute negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of the proposed pathway, would contribute negligibly to cumulative impacts. Overall long-term cumulative impacts to greater sage-grouse in the Jackson Hole population would be localized and negligible.



Impacts associated with Alternative 3a would be greater than those in Alternatives 1 and 2 and similar to Alternative 3. The loss of sagebrush habitat and its effectiveness in the ZOI, as well as the possible displacement of sage-grouse along the proposed pathway, could result in long-term, localized, minor, adverse effects to the greater sage-grouse.

General Wildlife

Mammals

Direct and indirect effects to mammals resulting from Alternative 3a would be similar to those described for the other action alternatives, but at a slightly higher impact level because of the additional pathways in sensitive areas. Road realignment and pathway construction would result in a direct loss of approximately 82.9 acres (45.5 ha) (Table 22) of native vegetation. Sagebrush and conifer forest habitats would mainly be affected, although some cottonwood, aspen, willow, and riparian habitats would also be impacted. Most of these impacts would be concentrated at or within approximately 50 ft (15 m) of previously disturbed areas along road corridors and within the most common plant communities. In addition, mitigation measures would be implemented to reduce impacts to wildlife habitat. These include preservation of larger trees and snags, avoidance of nesting and denning seasons, and conducting wildlife surveys (as needed) to ensure that impacts are avoided or minimized.

The impacts associated with pathways south of North Jenny Lake Junction would be similar to those described under Alternative 3, with the following exceptions. Alternative 3a includes: 1) a multi-use pathway between the Granite Canyon Entrance Station and the LSR Preserve that would generally be constructed within the road corridor, 2) a section of pathway outside the road corridor between North Jenny Lake Junction and String Lake, and 3) a section of pathway outside the road corridor along Spring Gulch Road between Gros Ventre Junction and the Park boundary. Placing the pathway inside the road corridor along the Moose-Wilson Road would reduce impacts to some extent (compared to Alternative 3) because activity would be concentrated in a narrower corridor through the productive wildlife habitats adjacent to the road. However, adding pathway segments between North Jenny Lake Junction and String Lake and Gros Ventre Junction and the Park boundary along Spring Gulch Road would increase impacts to mammals. Habitats adjacent to North Jenny Lake Junction to String Lake segment include sparse timber and mixed sagebrush-grasslands. Wildlife, especially elk make daily use of and movements through these habitats

and have calving areas nearby. Habitat effectiveness would be reduced along this segment. The Gros Ventre River corridor provides important wildlife habitat and serves as a travel corridor for a range of wildlife species. A pathway along this section would therefore increase impacts to mammals. Elk in particular make use of the area between the airport and the Gros Ventre River in moving between seasonal ranges (Wacob and Smith 2002). Habitat effectiveness may be reduced along this segment.

In the short term, construction-related activity could temporarily displace any mammals present from habitat adjacent to the road; however, they may resume use in some areas once reclamation and revegetation activities are complete, depending upon their tolerance to human disturbance. The construction of multi-use pathways both inside and outside of the roadway corridor is expected to result in an increase in non-motorized recreation use in these areas and is likely to result in increased disturbance impacts and potential for wildlife-human conflicts. Disturbance impacts to mammals are likely to be highest under this alternative because of the multi-use pathways being located both inside and outside of the road corridor resulting in the increase in the width of the linear corridor and its area of influence. Multi-use pathways would increase the 246-ft (75-m) and 1,312-ft (400-m) corridor ZOI by 180.9 acres (73.1 ha) and 171.5 acres (69.2 ha), respectively (Table 23). In addition, separation of the pathway from the road would encourage more users to stop (as a result of improved safety), leading to increased levels of disturbance and an increased potential for human-wildlife conflicts. Impacts to ungulates would be greatest where cover is poor and least where cover is greatest.

Existing and anticipated vehicle traffic levels on roads in Grand Teton National Park would be similar to Alternative 1 and would represent a minor potential source of mortality to mammals. There would be a small reduction in peak summer-vehicle traffic on the Teton Park Road as more visitors use the multi-use pathways, and this would have negligible beneficial effects on mammals by reducing the potential road kill threat. Signage would also be provided to warn motorists of wildlife crossing or high use areas. Although wildlife-vehicle collisions usually cause the death of an animal, the relative infrequency of these mortalities would ensure that these impacts occur only at an individual level and do not adversely affect mammals at a population level. Overall, Alternative 3a would have long-term, localized, minor, adverse impacts to mammals.

Reptiles and Amphibians

Direct and indirect effects to amphibians and reptiles resulting from Alternative 3a would be greater than those identified under Alternative 1 and similar to those described from Alternatives 2 and 3. Direct impact to amphibians and reptiles would primarily involve loss of habitat from the construction of multi-use pathways. Approximately 82.9 acres (45.5 ha) of habitat would be permanently removed, of which an estimated 5.3 acres (2.1 ha) would be riparian wetland (Table 18). Other wetlands not removed, but within the project area, would be protected from construction activities to minimize erosion and siltation. Direct impacts from the removal of riparian wetland habitat would result in the direct loss of potential amphibian breeding habitat. The removal of other habitats (i.e., sagebrush, conifer forest, willow, and cottonwood) for pathway construction could also cause indirect impacts to amphibians or reptiles that use these areas to forage or for cover. Direct and indirect mortality of adult amphibians or reptiles due to human activities and pathway construction could also occur. Overall, impacts to amphibians and reptiles from Alternative 3a would be short term, localized, negligible to minor, and adverse.

Cumulative Impacts (General Wildlife)

Cumulative impacts to general wildlife under Alternative 3a would be generally the same as those identified in Alternative 1 (i.e., long-term, localized, minor to moderate, and adverse). The permanent loss of approximately 82.9 acres (45.5 ha) (Table 22) of native vegetation would contribute to cumulative impacts affecting wildlife that relies upon sagebrush and coniferous forest plant communities. The permanent or temporary loss of a small portion of wetlands would contribute to cumulative impacts affecting wildlife, especially reptiles, but only negligibly. Wetland mitigation requirements would ultimately result in total replacement and a possible net increase in park wetlands that are similar in type and function to impacted wetlands. Direct mortality, habitat loss, and reduced habitat effectiveness associated with impacts from implementing Alternative 3a, would contribute to cumulative impacts, although the overall contribution is expected to be minor.

Conclusion (Threatened and Endangered (Federally Listed) Species, Bird Species of Special Concern, and General Wildlife)

Threatened and Endangered (Federally Listed) Species

Alternative 3a “may affect, but is not likely to adversely affect” the bald eagle, Canada lynx, or yellow-billed cuckoo. Alternative 3a is “likely to adversely affect” the grizzly bear and gray wolf because vehicle collisions or mortality related to human conditioning (for bears) may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species.

Bird Species of Special Concern

Alternative 3a would have minor adverse effects on bird species of special concern, neotropical migratory birds, and the greater sage-grouse. Cumulative impacts would be long-term, localized, and minor.

General Wildlife

Alternative 3a would have a higher level of adverse impacts on wildlife than Alternatives 1, 2, and 3. Although direct habitat impacts on mammals, reptiles, and amphibians would be relatively small, the increased disturbance (both spatially and in terms of recreation use levels) would further fragment habitats and erode habitat effectiveness. These impacts would be greater than under Alternative 3 because of a greater area of impact caused by more linear feet of multi-use pathways both inside and outside of the roadway corridor are proposed. The addition of multi-use pathways, particularly along the Moose-Wilson corridor but also between Jackson Lake Junction and Colter Bay, would affect some of the Park’s most diverse and productive habitats. The potential for human-wildlife conflicts and associated management actions would be greater under this alternative than under Alternatives 1, 2, or 3 due to the larger area affected by the proposed pathways and the diverse habitats they traverse (i.e., greater number of species and individuals affected). Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Although no adverse population level impacts are anticipated, effects to local species distributions and habitat use patterns are likely and would be negligible to moderate and adverse. Cumulative impacts to wildlife under this alternative would be long term, minor to moderate, and adverse.

Because there would be no major, adverse impacts to wildlife resources or values, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant



NPS planning documents, there would be no impairment of the Park's wildlife resources, including any listed species or species of special concern.

Effects of Alternative 4 — Multi-Use Pathways

Endangered and Threatened Species (Federally Listed Species)

Bald Eagle

No direct adverse impacts to bald eagles would result from implementing Alternative 4. The proposed pathway would not directly affect bald eagle nesting, foraging, or wintering habitat. Construction of multi-use pathways would not occur within one-half mile (0.8 km) of known bald eagle nests. The development of multi-use pathways in the vicinity of the Snake River near the Moose Bridge along Cottonwood Creek and Jackson Lake Dam would be confined to the existing roadway. The proposed pathway along the Moose-Wilson Road from the Granite Canyon Entrance Station to the LSR Preserve would not be constructed within bald eagle habitat.

Indirect effects from construction activities, pedestrians, and bicyclist use along pathways and vehicle road use would cause a reduction in habitat effectiveness within the ZOI (see Alternative 1 analysis for the definition of ZOIs for bald eagles). Disturbance from human presence, noise, and recreation along the pathways, and from dispersed use off pathways, could displace eagles or occasionally flush birds from perches in areas that contain suitable eagle habitat, such as near the Moose Bridge, Cottonwood Creek, and at Jackson Lake Dam. Other indirect effects from human disturbance would include modifications of behavior, habitat avoidance, and possibly changes in reproductive success. Activities associated with construction would be short term; however, pedestrian and bicyclist use along pathways would be long term. Impacts from Alternative 4 would be greater than under Alternatives 1 and 2, and similar to Alternatives 3 and 3a. These impacts would have long-term, minor effects on bald eagles.

Cumulative Impacts

Cumulative impacts to bald eagles associated with Alternative 4 would be generally the same as those identified in Alternatives 1, 2, 3, and 3a. Any disturbances to bald eagles from pathway construction would contribute only negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads and pedestrian and bicyclist use of proposed multi-use pathways would contribute to

cumulative impacts by a minor amount. Overall long-term cumulative impacts to bald eagle populations would be long-term, minor, and adverse.

Impact Determination and Summary of Rationale
Under Alternative 4, individual bald eagles would be displaced by human presence, noise, and activities associated with pathway construction, but given that the project area is outside of bald eagle nest territories, these effects are expected to be minor. No actions are proposed in this alternative that would directly affect important bald eagle wintering or foraging habitats. Overall, impacts to local and regional bald eagle populations under Alternative 4 are expected to be short-term, localized, and minor. Therefore, this alternative “may affect, but is not likely to adversely affect” bald eagles.

Canada Lynx

The types of direct and indirect effects to lynx resulting from Alternative 4 would be similar to those occurring under the other action alternatives, including direct mortality and direct and indirect impacts to lynx habitat. Overall impacts would be minor and adverse.

In addition to effects resulting from existing conditions, Alternative 4 includes construction of approximately 42.6 miles (68.4 km) of multi-use pathways outside the road corridor from the south boundary to Antelope Flats Road (a distance 9.4 miles [15.0 km]), from Moose Junction to Colter Bay (approximately 26.1 miles [42.0 km]), except for a section between Signal Mountain Lodge and Jackson Lake Dam where an improved road shoulder would be constructed, and from the Granite Canyon Entrance Station to Moose (a distance of approximately 7.1 miles [11.4 km]). There would also be a realignment of the Moose-Wilson Road in two locations associated with Alternative 4. Conifer habitats represent potential habitat for lynx. The two segments of roadway realignment along the Moose-Wilson Road and the installation of 7.1 miles (11.4 km) of multi-use pathway outside of the road corridor from the Granite Canyon Entrance Station to Moose would result in a direct loss of 3.9 acres (1.6 ha) of conifer forest vegetation types (Appendix B). An additional 11.6 acres (4.7 ha) of conifer forest would be lost due to construction of multi-use pathways outside of the road corridor through the remainder of the project area (Table 19).

Disturbance impacts to lynx could occur from noise and human presence associated with construction and use of shoulders and pathways. All pathway segments proposed under this alternative (except the U.S. Highway 26/89/191 segment) traverse areas of relatively contiguous conifer

habitat, which are mapped as lynx habitat. The width of existing linear corridors range from 18 to 30 ft (5.5 to 9.1 m). Pathway construction would increase corridor widths, including the area along the Moose-Wilson Road, to a maximum of 82 to 94 ft (25.0 to 28.7 m) (assuming pathway is 50 ft [15.2 m] from the road), with an attendant increase in the ZOI. The multi-use pathway would affect an additional 90.3 acres (36.5 ha) of coniferous forest habitat beyond the existing 400-m ZOI (Appendix B). Lynx are generally crepuscular animals and may rest in secure habitat during the day and emerge at night to use areas where human activity has stopped or decreased. Consequently, because pathway use would occur primarily during daylight hours, disturbance impacts to lynx habitats adjacent to the road and pathway corridors would be minimal.

Motor vehicle traffic levels under this alternative are expected to be similar to those predicted under the other alternatives and represent a minor potential source of mortality for lynx. The overall risk of direct mortality is not expected to increase from pathway construction and use.

Cumulative Impacts

Other activities occurring in the GYA that would affect lynx or their habitat include timber management, wildland fire management (including prescribed burns both inside and outside the Park), grazing (outside and inside the Park), winter recreation, and trapping of other furbearers. With the exception of trapping, all of these activities have the potential to affect forest successional stages, and consequently, snowshoe hare and lynx.

Cumulative impacts to Canada lynx associated with Alternative 4 would be generally the same as those identified in Alternatives 1, 2, 3, and 3a. Although road density would not increase under this alternative, the overall density of linear features would increase with an addition of roughly 42.6 miles (68.4 km) of multi-use pathway outside of the road corridor. The construction of the multi-use pathway would result in additional direct habitat loss and reduced habitat effectiveness. Disturbance to lynx from road realignment and pathway construction would represent a small contribution to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of multi-use pathways, would contribute only minor cumulative impacts.

Effects Determination and Summary of Rationale

Under Alternative 4, individual Canada lynx would be displaced by human presence and noise associated

with routine maintenance and continued use of the transportation system. Of the action alternatives considered, direct loss of coniferous forest habitat would be greatest under Alternative 4; however, the total amount of habitat loss (15.5 acres [6.3 ha] total) would still be minor given the large amount of coniferous forest remaining that would not be impacted. The likelihood of a lynx being struck and killed by a vehicle is anticipated to be low; lynx likely occur in the Park at low densities, if at all, and no vehicle mortalities have been reported to date. Impacts to lynx or lynx habitat are expected to be greater than those described under the other action alternatives but are still expected to be long-term, localized, and minor. Based on the above assumptions and conclusions, Alternative 4 “may affect, but is not likely to adversely affect” Canada lynx.

Grizzly Bear

Direct and indirect effects to grizzly bears resulting from Alternative 4 would include those resulting from road use and maintenance, as described under Alternative 1. The presence and ongoing maintenance of existing park roads within or adjacent to bear habitat adversely affects grizzly bears, both directly and indirectly. Direct effects include permanent loss of habitat caused by paving of roads and pullouts and the potential for vehicle-caused mortality. Indirect effects from road use and maintenance would include a reduction in habitat effectiveness within the 1,312-ft (400-m) ZOI which is estimated to be approximately 1,819 acres (735 ha) within the grizzly bear PCA and recovery zone and 13,842 acres (5,593 ha) (Appendix B, Table B-3) within the remainder of the Park. The section of the Park road between North Jenny Lake Junction and Jackson Lake Junction is outside the grizzly bear recovery zone but is occupied by them. There would be a reduction of habitat within the 1,312-ft (400-m) ZOI of 44.8 acres (110.9 ha) within this segment of roadway associated with this alternative. A reduction in habitat effectiveness could potentially result in slightly lower reproductive fitness of some individual bears within home ranges adjacent to the road corridor. However, range and population increases of grizzly bears in Grand Teton National Park suggest that impacts associated with roads have not yet reached a threshold impact level that jeopardize the survival of grizzly bears in the Park. Other indirect effects to grizzly bears include human-caused displacement of bears from areas adjacent to roads, habituation to humans, and possibly other behavior modifications.



In addition to the effects resulting from existing conditions, Alternative 4 includes the construction of approximately 42.6 miles (68.4 km) of multi-use pathways outside of the roadway corridor and two areas of road realignment along the Moose-Wilson Road, which would have additional impacts. Throughout the project area, direct impacts associated with these proposed actions would include the permanent loss of approximately 85.1 acres (34.4 ha) of native vegetation (Tables 19 and 22) and an equal, additional temporary loss during construction and revegetation phases. Additional indirect habitat loss from extending the 400 m ZOI associated with roads and multi-use pathways under this alternative would equal 215.9 acres (87.4 ha) (Appendix B, Table B-2). Direct and indirect vegetation loss adjacent to the grizzly bear recovery zone (from Jackson Lake Junction to Colter Bay) would be 10.6 and 30.1 acres (26.2 and 74.5 ha) respectively, while that in the remainder of currently occupied habitat (from North Jenny Lake Junction to Jackson Lake Junction) would be 17.6 acres (43.6 ha) and 44.8 acres (110.9 ha), respectively.

The impacts associated with pathways between the south park entrance and North Jenny Lake Junction along the Teton Park Road would be largely the same as in Alternative 3 and 3a. Not including pathways between North Jenny Lake Junction and String Lake and between Gros Ventre Junction and the south boundary on Spring Gulch Road would lower impacts in those areas. However, there would be an increase in impacts associated with the road segment between North Jenny Lake Junction and Colter Bay caused by the pathway being located outside of the roadway corridor; as well as the installation of a multi-use pathway outside the road corridor along the entire segment of road between the Granite Canyon Entrance Station and Moose.

The addition of multi-use pathways outside of the road corridor from North Jenny Lake Junction to Colter Bay under Alternative 4 would result in higher impacts on grizzly bears because this area, in contrast to areas further south, supports a well-established population of grizzly bears. The proposed pathway passes through willow, sage/grass, and mixed lodgepole, spruce-fir cover types where grizzly bears are common. Beginning with Jackson Lake Junction and heading north, the pathway would occur immediately adjacent or within the grizzly bear PCA (USFWS 2003), assuming it would be placed on the west side of highway 89/191/287. The PCA, or grizzly bear recovery zone as it was initially described (USFWS 1982), was delineated to define an area within which to focus grizzly bear recovery efforts after the species was listed in 1975. At the time the boundary was delineated, grizzly

bears were uncommon in Grand Teton National Park. Currently, however, grizzly bears are established in large areas outside of the PCA in Grand Teton National Park (Schwartz et al. 2002), and the line has little relevance in terms of grizzly bear distribution.

Under Alternative 4 multi-use pathways in the area between North Jenny Lake and Colter Bay would be designed for placement along a route that accommodates a combination of design, safety, and expense concerns, but which would result in higher resource impacts. Maintaining the route within 50 ft of the road would be attempted wherever possible, but there would likely be several sections where the pathway would diverge from road as much as 150 ft (45.7 m). This would result in greater direct, indirect, and long term habitat loss than under the other alternatives. While several studies suggest bears tend to avoid road corridors (Mace et al. 1996, McLellan et al. 1988), in Yellowstone and Grand Teton National Parks, where grizzly bear use of roadside habitats is tolerated, mounting evidence suggests these areas may be important to one or more individual bears annually (M. Haroldson 2006, pers. comm., S. Cain 2006, pers. comm.). An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. Indirect impacts associated with construction and use of the multi-use pathways outside of the roadway corridor by more pedestrians and bicyclists would include human-caused displacement of bears from adjacent areas, potential habituation to humans (Herrero 1985), and possibly other behavior modifications. However, use of the roadsides by more people would make it more difficult for bears to habituate to this less predictable activity; thus, the loss in habitat effectiveness in the roads' ZOI could be expected to be greater than under Alternatives 1, 2, 3, or 3a.

The creation of non-motorized corridors (i.e., multi-use pathways) is expected to result in an increase in non-motorized use of these areas. Bear-human encounters in these areas may increase because of increased human use and because of the added surprise factor that quiet, non-motorized use represents (see Pathways and Wildlife Hazards discussion). This is particularly true where roads and pathways traverse habitats where terrain and/or vegetation limit sight distances, or where noise from streams can cover noise of approaching humans. Serious human injuries from such encounters are likely to occur; however, their frequency cannot be predicted.

Adding pathways in grizzly bear habitat that are easily utilized by large numbers of the public (potentially carrying food) also creates additional opportunities for bears to become conditioned to human food (Herrero 1985). Experience in the Park has shown that food-storage regulation compliance is poorest and hardest to enforce among dispersed recreationists. Therefore, while education efforts would help mitigate this potential, some bears would become conditioned to human food. Bears that become conditioned to human food often become aggressive and ultimately need to be destroyed. Because this alternative would have more pathways in grizzly bear habitat than any other alternative, it would represent the highest potential for bear mortality associated with human food conditioning.

In this alternative, none of the proposed separated pathways occur within the grizzly bear recovery zone (USFWS 1993) or PCA identified in the final conservation strategy for the grizzly bear in the Yellowstone ecosystem (USFWS 2003). However, the 5.5-mile (8.8-km) section of separated pathway proposed between Jackson Lake Junction and Colter Bay would border the PCA through willow, sage/grass, and mixed lodgepole, spruce-fir cover types where grizzly bears are common.

The final conservation strategy for the grizzly bear in the Yellowstone ecosystem (USFWS 2003) was developed to guide grizzly bear management after the species is delisted. It includes a “no-net-loss” of secure habitat standard for all of the PCA. Thus, while the loss of secure habitat from multi-use pathways adjacent to the PCA would be technically allowable, the areas that would potentially be impacted within the PCA and considering the current distribution of bears, implementation of this alternative, if location of segments of the multi-use pathways are within the PCA, would be contrary to the conservation goals of the conservation strategy, of which Grand Teton National Park is a signatory.

Currently, grizzly bears are uncommon in the area of proposed multi-use pathways on the Teton Park Road south of North Jenny Lake Junction. The probability of human-bear encounters in this area is further reduced because habitat cover types are predominately open with long sight distances. However, it is likely that grizzly bears would become more common in this area in the future. While grizzly bears are also currently uncommon along the Moose-Wilson Road corridor, individuals have been known to travel through the area. Adding multi-use pathways in this area, along with varied terrain, heavy

cover, and several noisy stream crossings, would escalate the probability of human-grizzly bear encounters and associated human injuries. Realigning the roadway in this area is not anticipated to increase the probability of human-grizzly bear encounters and associated human injuries above the current level. Improving social trails in and near campgrounds would perhaps help to keep visitors from straying into bear habitat but otherwise would have no effect on bears.

Most of these adverse impacts would be considered minor; however, impacts from vehicle mortality and from potential mortality from human conditioning could be considered moderate because this could affect one or more individual bears. In 2006, a radio-marked adult female grizzly (number 399) and her 3 cubs of the year used roadside habitats extensively in this area. If impacts from vehicle mortality and from potential mortality from human conditioning affected adult female bears, reproductive rates in the local population could decrease. However, these impacts would not threaten the survival of the species.

Cumulative Impacts

Actions occurring on public lands within the recovery zone that would adversely affect grizzly bears or their habitat (i.e., oil and gas exploration and development, logging, and mining) are limited by the ESA (USFWS 1982) and are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect grizzly bears in the recovery zone include:

- Livestock grazing (which would impact grizzly bears through management actions).
- Private land development.
- Firewood cutting.
- Road use/management.
- Timber harvest (past).
- Recreation activities that leads to human-bear conflicts (especially big game hunting).
- Vegetation management.
- Wildland and prescribed fire.
- Loss or decline of important food sources (e.g., whitebark pine seeds due to fire suppression).
- Potential reduction in elk and bison populations.

These activities and issues cumulatively contribute to increased mortality risks, reduce availability of secure



habitat, and diminish habitat effectiveness for grizzly bears. The total cumulative impact of the above-listed activities, as well as other unidentified actions occurring within the grizzly bear recovery zone, does not appear to be adversely affecting population recovery, as evidenced by the expanding grizzly bear population in the GYA (Eberhardt and Knight 1996; Schwartz et al. 2002; Pyare et al. 2004).

Cumulative impacts to grizzly bears in the GYA specific to this alternative would be similar to those under Alternatives 1, 2, 3 and 3a and include road kills, recreation use, management removals, and road or project construction. Eighteen grizzly bears have been road-killed within the GYA since 1977 (Gunther et al. 2004, IGBST, unpublished data), including two within Grand Teton National Park during the last two years. Thus, existing road conditions and grizzly bear distribution suggest that future road kills are likely. The cumulative impacts of these actual losses and possible future road kills are likely to be minor; however, because road kills are not a significant source of mortality to the population in the GYA.

Increases in backcountry recreation by humans in and around Grand Teton National Park would negatively affect grizzly bears if human-bear encounters increase. Elk hunting, as part of the Park's annual elk reduction, occurs in approximately 66,600 acres (26,952 ha) of the Park's backcountry, 29,100 acres (11,776 ha) of which are in the recovery zone or PCA. Hunting of elk and other big game also occurs outside of and adjacent to the Park's boundaries. Conflicts between grizzly bears and hunters appear to be increasing (Gunther et al. 2004), and these encounters are a potential source of bear mortality. In 2004 and 2005, seven of 19 (37 percent) and four of 14 (28 percent) human-caused grizzly bear mortalities in the Yellowstone ecosystem, respectively, were attributed to hunter conflicts (M. Haroldson 2006, pers. comm.; M. Haroldson 2005, pers. comm.). In 2005, total human caused mortality rates were under the mortality threshold, but female mortalities exceeded the annual mortality threshold. This was the second consecutive year that the female mortality threshold has been exceeded (Haroldson and Frey 2006). However, unless hunter-related conflicts increase substantially, the cumulative adverse effects of these conflicts at current grizzly bear population levels are likely to be minor. Land and wildlife management agencies, including Grand Teton National Park, have active programs designed to educate backcountry users about grizzly bears and requirements designed to reduce human-bear conflicts. Several privately owned and State of Wyoming-owned

in-holdings are present in Grand Teton National Park. Depending upon future human activities occurring on these properties, grizzly bears may be negatively affected. For many years, Grand Teton National Park has attempted to secure these in-holdings with lifetime leases and outright purchases and has been quite successful in doing so. No large-scale developments or land-based projects have been proposed for these in-holdings. The LSR Preserve (approximately 1,100 acres [445.2 ha] in southern Grand Teton National Park) will include an interpretive center, and much of the existing development has been removed and reclaimed. In addition, management of this in-holding eventually will be handed over to Grand Teton National Park. Recently, the federal government has made efforts to secure several parcels of state-owned land within Grand Teton National Park. The cumulative adverse effects of possible future development occurring on these in-holdings are likely to be minor.

The recent Teton County, Wyoming approval of the Snake River Associates development plan for Teton Village on private land adjacent to the Park's south boundary could have additional cumulative, long term impacts on grizzly bears. This development will likely result in higher numbers of park visitors and associated dispersed use. This may be particularly true in the southwest corner of the Park, where excellent bear habitat exists. Grizzly bears will probably eventually colonize this area, even though it is several miles outside of the PCA.

In the past 20 years, two grizzly bears have been removed from Grand Teton National Park for management reasons: one for cattle depredation and one because of human habituation and food conditioning. The latter bear came to Grand Teton National Park as a problem bear after being relocated from the northern to the southern part of the ecosystem. An additional bear that had broken into a cabin at the AMK Ranch in Grand Teton National Park was killed after being relocated from Grand Teton National Park to Montana and continuing its nuisance behavior there. Management removals within the PCA and a 10-mile (16-km) buffer around it are counted against recovery parameters (USFWS 2003), mortality limits in the Conservation Strategy (USFWS 2003), and likely those associated with the delisting proposal (Interagency Grizzly Bear Study Team 2005). Implementation of this alternative would increase the potential for management removals, adding cumulatively to removals throughout the ecosystem.

In summary, losses of habitat effectiveness, and potential lowering of reproductive fitness of some individual bears

resulting from existing roads and approximately 42.6 miles (68.2 km) of new pathways, would have minor contributions to cumulative impacts. Vehicle use of Grand Teton National Park roads, pedestrian and bicyclist use of proposed pathways, and potential management removals associated with this use are expected to have minor cumulative impacts. Thus, overall long-term cumulative impacts to grizzly bears in the GYA resulting from this alternative would be long-term, minor, and adverse.

Mitigation Measures

- “Bearwise” education would be conducted with all personnel involved in road and pathway construction and maintenance projects.
- All food and other attractants would be properly stored at all times, and all food materials, garbage, and other attractants would be packed out on a daily basis if they cannot be stored in bear-resistant containers.
- Project crews (other than law enforcement personnel) would not carry firearms.
- Project crews would carry bear pepper spray when conducting project activities and would be trained in bear safety.
- All project crews working in grizzly bear habitat would meet standards for sanitation, attractant storage, and access.
- All grizzly bear/human confrontations would be reported to Science and Resource Management personnel.

Effects Determination and Summary of Rationale

Alternative 4 would have the highest level of adverse impacts among the alternatives considered. The inclusion of multi-use pathways in grizzly bear habitat, much of which has limited sight distances, would result in loss of habitat effectiveness, a high potential for habituation and/or food conditioning by some bears, and bear mortalities associated with management removals. These activities are not expected to have adverse population level impacts on grizzly bears. However, management removals would contribute to cumulative mortalities in the ecosystem and could result in recovery delays. Removal of females would reduce the reproductive potential of grizzly bears locally, potentially resulting in a decrease in bear density. It is also reasonable to expect that one or more grizzly bears could be hit and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone grizzly bear populations

under Alternative 4 would be long-term, localized, and moderate since one or more individual bears are “likely to be adversely affected” by this alternative.

Gray Wolf

Direct and indirect effects to wolves resulting from Alternative 4 would include those resulting from road use and maintenance, as described under Alternative 1. The presence and ongoing maintenance of existing park roads within or adjacent to wolf habitat adversely affects wolves, both directly and indirectly. Direct effects include permanent loss of habitat caused by paving of roads and pullouts and the potential for vehicle-caused mortality. Radio-telemetry data have shown that the Teton and Sage packs regularly cross U.S. Highway 89/191 between Moran and Moose and between Moran and the Park’s east boundary. Other wolves from unknown pack affiliations have also been observed crossing park roads on many occasions (S. Cain 2006, pers. comm.). Indirect effects from road use and maintenance would include a reduction in habitat effectiveness within the 1,312-ft (400-m) ZOI, which is estimated to be 14,577 acres (5,899 ha) (Appendix B, Table B-3) beyond the boundaries of the habitat actually paved by the road. Other indirect effects to wolves include human-caused displacement from areas adjacent to roads, possible habituation to humans, and possibly other behavior modifications.

In addition to the effects resulting from existing conditions, Alternative 4 includes the construction of approximately 42.6 miles (68.4 km) of multi-use pathways and two areas of roadway realignment along the Moose-Wilson Road, which would have additional impacts. Direct impacts associated with the proposed actions would include the permanent loss of approximately 85.1 acres (34.4 ha) of habitat for wolves and some of their prey species (Tables 19 and 22) and an equal additional temporary loss during construction and revegetation phases. Additional indirect habitat loss from extending the ZOI to 1,312 ft (400 m) under this alternative would result in a net difference of 215.9 acres (87.4 ha) (Appendix B, Table B-2).

Since much of the habitat loss associated with this alternative would occur adjacent to or within the existing roads’ current ZOI, and because wolves and most of their primary prey tend to avoid road corridors, the loss in long-term habitat effectiveness would be minor. Indirect impacts associated with construction and use of the multi-use pathways by more pedestrians and bicyclists would include human-caused displacement of wolves from adjacent areas, potential habituation to humans, and possibly



other behavior modifications. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. Use of the pathways by more people would make it more difficult for wolves and their prey to habituate to this less predictable activity along the corridor as well; therefore, the total loss of habitat effectiveness in the pathways' ZOI could be expected to be greater than under any of the other alternatives.

None of the proposed multi-use pathways, road realignment, or related construction activities would occur within 1 mile (1.6 km) of known wolf dens or rendezvous sites. If new dens or rendezvous sites were created within a mile of multi-use pathways, temporary pathway or adjacent area closures would be considered and implemented when necessary to protect breeding wolves. Improving social trails in and near campgrounds would have no effect on wolves.

Most of these adverse impacts would be considered minor to moderate; however, impacts from vehicle mortality could be considered moderate because this could affect one or more individual wolves but would not threaten the survival of the species. Between 1995 and 2001, 13 wolves were killed by vehicles in the GYA, and 3 wolves were killed within the Park during 2004 and 2005. Existing road conditions and future road reconstruction will likely result in the death of additional wolves.

Cumulative Impacts

Activities occurring within wolf habitat that would adversely affect wolves in the GYA are limited and, for public land management agencies, are analyzed both individually and cumulatively via the NEPA compliance process. Other activities and issues likely to affect wolves occurring within the recovery zone include livestock grazing, private land development, vegetation management, potential reduction in elk and bison populations, and control actions.

These activities cumulatively contribute to increased mortality risks and reduce the availability of secure habitat. However, the total cumulative impact of the above-listed activities, as well as other unidentified actions occurring within the wolf habitat, does not appear to have adversely affected population recovery, as evidenced by the quick expansion of the wolf population following reintroduction and the continued expansion into areas outside of YNP. The proposed actions, in the long term, could be expected to increase human presence within or improve access to

wolf habitat by a minor amount that would cumulatively reduce habitat security.

Effects Determination and Summary of Rationale

Alternative 4 is not expected to have substantial adverse population level impacts on wolves nor would it jeopardize the recovery of wolves within the GYA. However, habitat security would be reduced, and it is reasonable to expect that one or more wolves could be struck and killed by vehicles using park roads during the lifetime of this Plan. Therefore, impacts to the Park and Greater Yellowstone wolf population under Alternative 4 would be long-term, localized, and moderate because one or more individual wolves are "likely to be adversely affected" by this alternative.

Yellow-billed Cuckoo

Similar to Alternatives 1, 2, 3, and 3a, no direct adverse impacts to yellow-billed cuckoo would result from implementing Alternative 4. The proposed pathways along the Park's roadways would not occur near any known cuckoo nesting or foraging areas; however, approximately 4.4 acres (1.8 ha) of cottonwood and riparian forests and willow habitats that are potential cuckoo habitat would be removed during construction of the multi-use pathways (Appendix B, Table B-1). Most of this direct loss would occur in the section of the project that is proposed along the Teton Park Road. The direct impact from removing this habitat would be minor because the amount removed would be small.

Indirect impacts to cuckoos include displacement of individuals due to human presence and noise associated with project activities in areas that contain cuckoo habitat, such as near the Moose Bridge and Cottonwood Creek; however, no cuckoos have been reported in the project area. Reduction in effective habitat from pathway construction and increases in pedestrian and bicyclist use would be confined to the project's immediate area, as well as within the 246-ft (75-m) ZOI (see Alternative 1 for discussion on ZOIs for cuckoos). Approximately 18.8 acres (7.6 ha) of cottonwood and riparian forests and willow habitats would be within this 246-ft (75-m) ZOI under Alternative 4 (Appendix B). The effects human disturbance would have on cuckoos within the ZOI are unknown but may include displacement of individuals, changes in behavior, reduction in breeding and reproduction success, and movement to less desirable habitats. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. Although impacts

during construction would be short term, effects from repeated human disturbance from recreational use along the pathways would be long term. Overall, impacts from Alternative 4 would be long term, minor, and greater than those from Alternatives 1 and 2, but similar to Alternatives 3 and 3a.

Cumulative Impacts

Cumulative impacts to yellow-billed cuckoo associated with Alternative 4 would be greater than those identified in Alternatives 1 and 2 and similar to Alternative 3 and 3a. Loss of mature cottonwood forests and lack of recruitment have decreased suitable and future habitat for this species. Fragmentation of cottonwood forests has resulted in many areas with patch sizes below the recommended minimum. Any disturbances to yellow-billed cuckoos during pathway construction would contribute only negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads and pedestrian and bicyclist use of proposed pathways would contribute to cumulative impacts by a minor amount. Overall long-term, cumulative impacts to yellow-billed cuckoo populations would be minor.

Impact Determination and Summary of Rationale

Under Alternative 4, individual yellow-billed cuckoos would be displaced by human presence, noise, and activities associated with pathway construction. Because the project area does not contain any known breeding or nesting cuckoos, these effects are expected to be none. No actions are proposed in this alternative that would affect important yellow-billed cuckoo nesting or foraging habitats. Overall, impacts to yellow-billed cuckoo populations under Alternative 4 are expected to be long-term, localized, and minor. Therefore, this alternative “may affect, but is not likely to adversely affect” the yellow-billed cuckoo.

Bird Species of Special Concern (Not Federally Listed) and Neotropical Migratory Birds

Neotropical Migratory Birds/Birds Species of Special Concern

Direct and indirect effects to bird species of special concern and neotropical migratory birds resulting from Alternative 4 would be greater than those identified under Alternatives 1, 2, 3, or 3a. Direct impact to birds would primarily be the permanent loss of 85.1 acres (34.4 ha) of habitat (Appendix B) and an estimated 29,950 to 33,775 trees would be removed (Table 21). Road realignment and pathway development would result in a direct loss of several different habitat types (Appendix B). The greatest amount of

habitat loss would occur in sagebrush (55.7 acres [22.5 ha]) and conifer forest (15.1 acres [6.1 ha]), (Appendix B, Table B-1). The removal of these habitats would impact breeding, nesting, brood-rearing, and year-round foraging habitat of several bird species, such as sagebrush obligates, sagebrush near-obligates, forest bird dwellers (in particular those that use coniferous forests), and cottonwood or aspen forest-dependent birds. Nests, eggs, or young could experience impacts if construction of multi-use pathways occurs during the breeding season (mid-May through mid-July); therefore, mitigation measures to reduce these losses would be implemented. The amount of habitat removed under Alternative 4 would result in negligible to minor impacts to neotropical migratory birds and bird species of special concern.

Indirect impacts associated with the construction of multi-use pathways and their use by pedestrians and bicyclists could cause a reduction in effective habitat within a 246-ft (75-m) ZOI (see Alternative 1 discussion on bird species of concern and neotropical migratory bird species ZOIs). An estimated net loss of 226.5 acres (91.5 ha) of habitat could be impacted within this ZOI and in several different habitat types (Appendix B, Table B-2). An increase in off-trail use associated with pathway access would further reduce habitat effectiveness by an unknown but perhaps moderate amount at times. The indirect impacts to birds from human disturbance within the ZOI would be variable and difficult to quantify. Birds would respond to human use along a pathway in a variety of ways, and responses may differ depending upon an individual’s species, age, sex, reproductive status, and habitat requirements. Responses from disturbances can range from nothing to displacement of individuals, modifications in behavior, and a reduction of reproductive success (Boyle and Samson 1985, Knight and Temple 1995, Miller et al. 1998). Recreational disturbance to diurnal raptors may disrupt behavior when it deters foraging or flushes birds from foraging perches and roosts (Holmes et al. 1993). Additionally, species richness and abundance may change in areas adjacent to the proposed pathway due to human disturbance. For example, avian predators have been shown to increase in areas of human intrusion resulting in a decline of songbird abundance and diversity (Martin 1988, Angelstam 1986, Buhler and Anderson 1999). Although individual disturbances may be brief, repeated encounters with recreationists could result in long-term and minor effects to birds.

The construction of multi-use pathways outside of the road corridor through contiguous conifer forests,



sagebrush, and other habitats could also alter bird species composition, distribution, and abundance. Studies have shown that some species of birds dependent upon contiguous habitat types may decline due to the creation of habitat edges and fragmentation from trails, whereas habitat generalists increase (Hickman 1990; Miller et al. 1998). Furthermore, nest predation from avian and mammalian predators (e.g., corvids and coyotes) and nest parasitism from brown-headed cowbirds typically increases in areas where habitat edges are created (Miller et al. 1998, Hickman 1990, Paton 1994). Although it is uncertain what effects habitat edges created under Alternative 4 would have on birds, it is expected these effects would be long term and minor.

In general, impacts associated with Alternative 4 are expected to be variable; however overall adverse impacts to bird species of special concern and neotropical migratory birds would be long term, localized, and minor. These impacts would be greater than those in Alternatives 1, 2, 3, and similar to Alternative 3a.

Cumulative Impacts

Cumulative impacts to birds under Alternative 4 would be greater than those identified under Alternatives 1 and 2, and similar to Alternatives 3 and 3a, due to the amount of habitat loss and fragmentation, the loss of habitat effectiveness, and the potential for human disturbance along the proposed pathway. An increase in off-trail use associated with pathway access would further reduce habitat effectiveness and could increase habitat fragmentation. Disturbances to birds from pathway construction and vehicle, pedestrian, and bicyclist use of proposed pathways would contribute to cumulative impacts by a minor amount. Overall, cumulative impacts to bird species of special concern and/or other migratory bird populations would be long-term, localized, minor, and adverse.

Mitigation Measures

To minimize the potential for “taking” a nest or egg of a migratory bird species, either (1) any activity that would destroy a nest or egg would occur after July 15 (a timeframe outside of the primary nesting season), or (2) a survey for any nests in the project area would be conducted prior to these activities.

Greater Sage-Grouse

Direct impact to sage-grouse resulting from Alternative 4 would primarily involve loss of habitat from the construction of multi-use pathways and increased human

use. Approximately 55.7 acres (22.5 ha) of sagebrush habitat would be permanently removed between the southern park boundary and Signal Mountain (Appendix B) in areas where sage-grouse have been documented to nest, brood-rear, and winter (Holloran and Anderson 2004). Sage-grouse have not been reported using sagebrush habitats along the Moose-Wilson Road and the Teton Park Road north of North Jenny Lake Junction; therefore, removal of sagebrush in these habitats would not directly impact sage-grouse.

Indirect impacts associated with the construction of road shoulders and pathways and their use by pedestrians and bicyclists include a reduction in habitat effectiveness within a ZOI (see Alternative 1 for discussion on sage-grouse ZOIs). An estimated 215.9 acres (87.2 ha) of sagebrush habitat would be impacted within this ZOI, along the Teton Park Road from south park boundary to North Jenny Lake Junction (Appendix B), beyond what is impacted from existing conditions. Potential indirect effects to sage-grouse due to human presence and noise associated with project activities include displacement of individuals, habitat avoidance, and modifications in behavior. Human activity along roadways and dispersed use beyond the roadway could cause occasional flushing of birds from nests or brood-rearing areas. Although impacts during construction would be short term, repeated human disturbance from recreational use along pathways would be long term. As a result, impacts from Alternative 4 would have long-term, minor, localized, adverse impacts to the greater sage-grouse.

Cumulative Impacts

Any disturbances to sage-grouse from pathway construction would contribute negligibly to cumulative impacts. Vehicle use of Grand Teton National Park roads, and pedestrian and bicyclist use of the proposed pathway, would contribute negligibly to cumulative impacts. Overall long-term cumulative impacts to greater sage-grouse in the Jackson Hole population would be long-term, localized, minor, and adverse.

Cumulative impacts to greater sage-grouse associated with Alternative 4 would be greater than those identified in Alternatives 1 and 2 and similar to those from Alternatives 3 and 3a. Sage-grouse habitat management guidelines (Connelly et al. 2000) suggest protecting suitable breeding (nesting and early brood-rearing) habitats within 3.1 miles (5 km) from all occupied leks for non-migratory populations, such as the population residing in the Park. Based on research conducted in Grand Teton National

Park, and due to the tenuous nature of the sage-grouse population in Jackson Hole, Holloran and Anderson (2004) suggest that sagebrush should not be manipulated within 4.7 miles (7.7 km) of any known leks in the Park. Alternative 4 would contribute to the loss of sagebrush habitat along U.S. Highway 26/89/191 and the inside Teton Park Road within a 4.7-mile (7.7-km) buffer from two active leks (the Airport and Timbered Island leks) and would therefore potentially add to cumulative impacts to local sage-grouse populations.

Impacts associated with Alternative 4 would be greater than those in Alternatives 1 and 2 and similar to Alternative 3 and 3a. The loss of sagebrush habitat and its effectiveness in the ZOI, as well as the possible displacement of sage-grouse along the proposed pathway, could result in long-term, localized, minor, adverse effects to the greater sage-grouse.

General Wildlife

Mammals

Direct and indirect effects to mammals resulting from Alternative 4 would be similar to those described for other action alternatives, but at a slightly higher impact level because of the additional pathways in sensitive areas. Road realignment and multi-use pathway construction outside of the roadway corridor would result in a direct loss of approximately 85.1 acres (34.4 ha) (Table 19) of native vegetation. Sagebrush and conifer forest habitats would mainly be affected, although some cottonwood, aspen, willow, and riparian habitats would also be impacted.

Although these vegetative impacts translate into habitat loss to some species of mammals, some of these impacts associated with the construction of the multi-use pathways would occur within the most common plant communities. In addition, mitigation measures would be implemented to reduce impacts to wildlife habitat. These include preservation of larger trees and snags, avoidance of nesting and denning seasons, and conducting wildlife surveys (as needed) to ensure that impacts are avoided or minimized.

In the short term, construction-related activity could temporarily displace any mammals present from habitat adjacent to the road; however, they may resume use in some areas once reclamation and revegetation activities are complete, depending upon their tolerance to human disturbance. The construction of multi-use pathways both inside and outside of the roadway corridor is expected to result in an increase in non-motorized recreation use in these areas and is likely to result in increased disturbance

impacts and potential for wildlife-human conflicts. Disturbance impacts to mammals are likely to be highest under this alternative because of the multi-use pathways being located both inside and outside of the road corridor resulting in the increase in the width of the linear corridor and its area of influence. Multi-use pathways would increase the net difference between the existing 246-ft (75-m) and 1,312-ft (400-m) corridor ZOI and those associated with the proposed actions in Alternative 4 by 226.5 acres (91.7 ha) and 215.9 acres (87.4 ha), respectively (Appendix B). In addition, separation of the pathway from the road would encourage more users to stop (as a result of improved safety), leading to increased levels of disturbance and an increased potential for human-wildlife conflicts. Impacts to ungulates would be greatest where cover is poor and least where cover is greatest.

Existing and anticipated vehicle traffic levels on roads in Grand Teton National Park would be similar to Alternative 1 and would represent a minor potential source of mortality to mammals. There would be a small reduction in peak summer-vehicle traffic on the Teton Park Road as more visitors use the multi-use pathways, and this would have negligible beneficial effects on mammals by reducing the potential road kill threat. Signage would also be provided to warn motorists of wildlife crossing or high use areas. Although wildlife-vehicle collisions usually cause the death of an animal, the relative infrequency of these mortalities would ensure that these impacts occur only at an individual level and do not adversely affect mammals at a population level. Overall, Alternative 4 would have long-term, localized, minor, adverse impacts to mammals.

Reptiles and Amphibians

Direct and indirect effects to amphibians and reptiles resulting from Alternative 4 would be greater than those identified under Alternative 1 and similar to those described from Alternatives 2, 3, and 3a. Direct impact to amphibians and reptiles would primarily involve loss of habitat from the construction of multi-use pathways. Approximately 85.1 acres (34.4 ha) (Table 19) of habitat would be permanently removed, of which an estimated 4.3 acres (1.7 ha) would be riparian wetland (Tables 18). Other wetlands not removed, but within the project area, would be protected from construction activities to minimize erosion and siltation. Direct impacts from the removal of riparian wetland habitat would result in the direct loss of potential amphibian breeding habitat. The removal of other habitats (i.e., sagebrush, conifer forest, willow, and cottonwood) for pathway construction could also cause indirect impacts to amphibians or reptiles



that use these areas to forage or for cover. Direct and indirect mortality of adult amphibians or reptiles due to human activities and pathway construction could also occur. Overall, impacts to amphibians and reptiles from Alternative 4 would be short term, localized, negligible to minor, and adverse.

Cumulative Impacts (General Wildlife)

Cumulative impacts to general wildlife under Alternative 4 would be generally the same as those identified in Alternative 1 (i.e., long-term, minor to moderate, and adverse). The permanent loss of approximately 85.1 acres (34.4 ha) (Table 19) of native vegetation would contribute to cumulative impacts affecting wildlife that relies upon sagebrush and coniferous forest plant communities. The permanent or temporary loss of a small portion of wetlands would contribute to cumulative impacts affecting wildlife, especially reptiles, but only negligibly. Wetland mitigation requirements would ultimately result in total replacement and a possible net increase in park wetlands that are similar in type and function to impacted wetlands. Direct mortality, habitat loss, and reduced habitat effectiveness associated with impacts from implementing Alternative 4, would contribute to cumulative impacts, although the overall contribution is expected to be long-term, localized, minor, and adverse.

Conclusion (Threatened and Endangered (Federally Listed) Species, Bird Species of Special Concern, and General Wildlife)

Threatened and Endangered (Federally Listed) Species

Alternative 4 “may affect, but is not likely to adversely affect” the bald eagle, Canada lynx, or yellow-billed cuckoo. Alternative 4 is “likely to adversely affect” the grizzly bear and gray wolf because vehicle collisions may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species.

Bird Species of Special Concern

Alternative 4 would have long-term, minor, adverse effects on bird species of special concern, neotropical migratory birds, and the greater sage-grouse. Cumulative impacts would be long-term, minor, and adverse.

General Wildlife

Alternative 4 would have the highest level of adverse impacts on wildlife of the alternatives considered. Although direct habitat impacts on mammals, reptiles,

and amphibians would be relatively small, the increased disturbance (both spatially and in terms of recreation use levels) would further fragment habitats and erode habitat effectiveness. These impacts would be greater than any other alternative considered because of a greater area of impact caused by more linear feet of multi-use pathways outside of the roadway corridor. The addition of multi-use pathways outside of the roadway corridor, particularly along the Moose-Wilson corridor but also between Jackson Lake Junction and Colter Bay, would affect some of the Park’s most diverse and productive habitats. The potential for human-wildlife conflicts and associated management actions would be greatest under this alternative due to the larger area affected by the proposed pathways and the diverse habitats they traverse (i.e., greater number of species and individuals affected). Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Although no adverse population level impacts are anticipated, effects to local species distributions and habitat use patterns are likely and would be localized, negligible to moderate and adverse. Cumulative impacts to wildlife under this alternative would be localized, long term, minor to moderate, and adverse.

Because there would be no major, adverse impacts to wildlife resources or values, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s wildlife resources, including any listed species or species of special concern, and no unacceptable impacts.

Cultural Resources

Methods and Assumptions

Section 106 of the NHPA requires a federal agency to take into account the effects of its undertakings on properties included in, eligible for inclusion in, or potentially eligible for inclusion in the NRHP, and afford the following a reasonable opportunity to comment on such undertakings: the SHPO, affiliated American Indian Tribes and, as appropriate, the ACHP, individuals and organizations with a demonstrated interest in the undertaking, and the general public.

In accordance with the ACHP’s regulations implementing Section 106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources were identified and evaluated by (1) determining the area of potential effects (APEs); (2) identifying cultural resources present in the APE that are either listed in or eligible to be listed in the NRHP (categorized as “historic properties”); (3) applying the criteria of adverse effects to affected historic properties; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the ACHP’s regulations, a determination of either “adverse effect” or “no adverse effect” is made for affected historic properties. An “adverse effect” occurs whenever an impact alters, directly or indirectly, any characteristic of a property that qualifies it for inclusion in the NRHP (i.e., diminishing the integrity of the resource’s location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects that would occur later in time, be farther removed in

distance, or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of “no adverse effect” means that the property would be affected; however, the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

CEQ regulations and Director’s Order #12, Conservation Planning, Environmental Impact Analysis and Decision Making, also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (i.e., reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect, as defined by Section 106, is similarly reduced. Although adverse effects under Section 106 would be mitigated, the effect remains adverse.

Impact Threshold Definitions	
Negligible	Impact at the lowest levels of detection; barely measurable, with no perceptible consequences. For purposes of Section 106 of the NHPA, the determination of effect would be no historic properties affected.
Minor	Adverse impact - Disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for Section 106 would be no adverse effect.
	Beneficial impact - Maintenance and preservation of a site(s). The determination of effect for Section 106 would be no historic properties affected
Moderate	Adverse impact - Disturbance of a site(s) results in loss of integrity. Section 106-effect determination would be adverse effect. A Memorandum of Agreement (MOA) is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the ACHP in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
	Beneficial impact - Stabilization of a site(s). The determination of effect for Section 106 would be no historic properties affected.
Major	Adverse impact - Disturbance of a site(s) results in loss of integrity. The determination of effect for Section 106 would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or ACHP are unable to negotiate and execute an MOA in accordance with 36 CFR 800.6(b).
	Beneficial impact - Active intervention to preserve a site(s). The determination of effect for Section 106 would be no historic properties affected
Duration	Short term — Recovers in less than 3 years.
	Long term — Takes more than 3 years to recover.
Area of Analysis	Within park boundary.



Archeological Resources

Direct impacts to archeological resources are measured by the extent of physical disturbance or degradation of the resource. This can occur because of grading, trenching, or other activities that damage the structure of an archeological site. Indirect impacts can occur because of increasing visitor activity or management action in the immediate vicinity, leading to unfortunate consequences (i.e., artifact collection, accelerated soil compaction, and erosion).

Proposed roadway shoulder, pathway, and other improvements were located on a base sheet provided by park staff that identified known archeological resources and the completeness and adequacy of related survey data. It should be noted that this analysis considers only known archeological sites. Additional field survey work is required before construction to identify additional sites, as well as their data potential and potential for inclusion in the NRHP.

Impacts to archeological resources are considered permanent unless otherwise noted. Every effort would be made to avoid historic properties (i.e., those archeological site listed on or considered eligible for listing in the NRHP) through careful project design and subsequent site-specific environmental compliance. If sites cannot be avoided, all data recovery to retrieve important information would be done in consultation with the Wyoming SHPO and in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (SGAHP).

Effects of Alternative 1 — No Action

Under Alternative 1, no new road improvements would occur, and impacts to archeological resources would be attributable to future increases in visitation or continued road maintenance. As noted previously, it is assumed that visitation would increase only slightly over the life of this Final Plan/EIS. Expected types of impacts include the erosion of vegetative cover and soil layers in heavily traveled areas and exposure of new artifacts and features to potential loss through theft or destruction before they can be documented by staff. Areas of highest intensity of use with known resources include South Jenny Lake, Jenny Lake Lodge, String/Leigh Lake, the Moose area, and Taggart Lake. Areas of road improvements would include repair of existing pavement and possible widening, as needed. Construction of separate entrance lanes and installation of improved signage for pedestrian and wildlife safety and two variable messaging signs would occur on

existing disturbed grounds and would not result in new net disturbance; therefore, there would be no impacts to archeological resources.

Because archeological survey work has not been completed in many segments, or has not been completed in accordance with SGAHP, the data potential for such resources is unknown, and thus it is difficult to estimate the intensity of impacts. Because visitation is expected to grow relatively slowly during the period, and road improvements would be conducted in areas that have already been disturbed during the initial construction of the road, impacts would be long-term, localized, negligible to minor, and adverse, depending on the number of resources affected in a given area and their data potential. Known sites would be avoided, and archeological surveys would be conducted in those areas where impacts are anticipated.

Cumulative Impacts

Recent, current, and planned projects within Grand Teton National Park that would affect archeological resources include rehabilitation and adaptive use of the Murie Ranch, construction of a new visitor center at Moose, replacement of the Moose Entrance Station, construction of an interpretive center for the LSR Preserve, upgrades to the Jenny Lake Lodge visitor accommodations and employee housing facilities, reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone, replacement of the Snake River Bridge near Flagg Ranch, and the chip-and-seal project from Moran to Jackson Lake Lodge. Widening of North Park Road would take place within an existing road corridor within the Park. In addition, WYDOT is planning reconstruction of U.S. Highway 26/287 (Togwotee Pass), U.S. Highway 26/89 from Hoback Junction to South Park, Wyoming Highway 22 from Jackson to Wilson, and Wyoming Highway 390 (Teton Village Road).

All of these developments would occur in areas where human activities are already concentrated, thus minimizing the likelihood that previously unknown archeological resources would be disturbed. Of these projects, the Moose Visitor Center is the only project that would be expected to impact previously recorded archeological sites in the area due to increased ground disturbance related to construction. A surface survey of the proposed site located three historic pits of unknown use or origin, one foundation, two abandoned two-track roads, and isolated areas of historic debris (none in high concentrations). No proposed facilities would be located in areas where these resources have been found. Should additional resources

be discovered during construction, they would be properly documented and evaluated for NRHP eligibility. The impacts of these related actions, in conjunction with the impacts of Alternative 1, would result in long-term, localized, negligible to minor, cumulative impacts to archeological resources within the Park.

Conclusion

Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts on known archeological sites located within the Park, depending on the number of resources affected and their data potential. Because many areas where resources are known to exist have either not been surveyed or have not been surveyed in accordance with SGAHP, additional research, fieldwork, and consultation with the Wyoming SHPO and Native American tribal governments would be needed to determine whether these sites are eligible for listing in the NRHP. Should the sites be considered eligible for listing in the NRHP, consultation with the Wyoming SHPO and Native American governments would be required to make a determination of “no adverse effect” or “adverse effect,” in compliance with Section 106 of the NHPA. Cumulative impacts would be long term, localized, negligible to minor, and adverse.

Because there would be no major, adverse impacts to an archeological resource or value, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s archeological resources and no unacceptable impacts.

Effects of Alternative 2 — Improved Road Shoulders

Alternative 2 proposes limited shoulder improvement (widening to 5 ft [1.5 m]) from Moose Junction to Signal Mountain Lodge. The small amount of disturbance (13.3 acres [5.4 ha]) resulting from the construction of the shoulder would be limited to the areas immediately adjacent to the existing roadway. Field surveys would need to be carried out in these areas before any ground-disturbing activities occur. Should sites be found, the NPS would undertake required consultations with the Wyoming SHPO and Native American governments to determine whether the project constitutes a “no adverse effect” or “adverse effect.” If adverse, a mitigation plan would be developed, again in consultation with the Wyoming SHPO and affiliated tribal governments.

Information kiosks would be added to South Jenny Lake, Signal Mountain Lodge, Jackson Lake Lodge, and Colter Bay as part of this alternative. To avoid impacts to archeological resources, these facilities would be sited in locations without known resources. Because known archeological resources would be avoided wherever possible, potential long-term, localized impacts could range from negligible to minor depending on the number of resources affected and their data potential and would be adverse. Construction of separate entrance lanes and installation of improved signage for pedestrian and wildlife safety and additional variable messaging signs would have the same effects as those described for Alternative 1.

Cumulative Impacts

Current and planned projects within Grand Teton National Park that would affect archeological resources are similar to those described under Alternative 1. The impacts of these related actions, in conjunction with the specific impacts of Alternative 2, would result in long-term, negligible to minor, cumulative impacts to archeological resources within the Park.

Conclusion

Alternative 2 would result in potentially long-term, localized, negligible to minor, adverse impacts on known archeological sites located within the Park, depending on the number of resources affected and their data potential. Because many areas where resources are known to exist have either not been surveyed or have not been surveyed in accordance with SGAHP, additional research, fieldwork and consultation with the Wyoming SHPO and Native American tribal governments would be needed to determine whether these sites are eligible for listing in the NRHP. Should the sites be determined eligible for listing in the NRHP, the NPS would undertake required consultations with the Wyoming SHPO and Native American governments to make a determination of “no adverse effect” or “adverse effect.” Cumulative impacts would be long term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to an archeological resource or value, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s archeological resources and no unacceptable impacts.



Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Impacts to cultural resources under Alternative 3 would range from negligible to minor depending upon the chosen location. The majority of the area has not been surveyed for archeological resources, and a complete inventory would be conducted prior to construction activities to identify previously undocumented archeological, historic, ethnographic, and/or cultural landscape resources. If any are found, the Park staff would consult with the Wyoming SHPO regarding additional actions needed to protect cultural resources. Direct and indirect effects could be mitigated by diverting the pathway in such a way as to avoid archaeological and ethnographic resources.

Construction of multi-use pathways outside the road corridor along approximately 23.3 miles (37.3 km) of roads and improving road shoulders along the Teton Park Road and North Park Road between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]) would permanently disturb approximately 63.8 acres [25.8 ha], and cause temporary disturbance to approximately 63.8 additional acres (25.8 ha) where construction equipment would be used adjacent to the main work area.

From the south boundary to North Jenny Lake Junction effects to archeological resources from pathway construction outside the road corridor would be long term, localized, negligible to minor, and adverse. Ninety-seven acres have been surveyed along the roadway between Dornan's and South Jenny Lake; 12 archaeological sites were already known to exist in this area and four new sites were identified during the survey, most of which occur east of the existing road. Placing the pathway on the west side of the road would most likely have fewer impacts to cultural resources than placing the pathway on the east side, based on past survey results and predictive factors. The rest of this corridor would be surveyed before implementation.

The potential effects to archeological resources from improved shoulders from North Jenny Lake Junction to Colter Bay would be long term, localized, negligible, and adverse because construction would occur adjacent to the existing road. Both Jenny Lake and Colter Bay developed areas have been inventoried for cultural resources; however, the area between these two locations has not been inventoried. Known sites located on the west side of the road would be avoided and surveys of the rest of the area would occur before implementation.

Construction of a multi-use pathway outside the road corridor from the Granite Canyon Entrance Station to the LSR Preserve along the Moose-Wilson Road could require the removal of 2,925 to 3,725 trees, depending on the specific design. The areas around the Granite Canyon Entrance Station and Poker Flats have been inventoried. No other archeological surveys have been conducted in the areas along the Moose-Wilson Road. Two sites occur on the west side of the road. It is likely that placing the pathway on the east side of the road would have fewer impacts to cultural resources than placing it on the west, based on past survey results and predictive factors. An inventory of all locations would be conducted prior to any construction activity resulting in long-term, localized, negligible to minor, adverse effects.

The proposed road realignment passing to the east of the wetland area on the Moose-Wilson Road would have long-term, localized, negligible, adverse impacts if all disturbance remains within the footprint of a previous road alignment. The section of the Moose-Wilson Road that would be realigned to intersect with the Teton Park Road has been inventoried. The areas of the existing road where removal and restoration to natural conditions would take place are near archaeological sites, which would be protected during restoration activities.

Construction of separate entrance lanes and installation of improved signage for pedestrian and wildlife safety and additional variable messaging signs would have the same effects as those described for Alternative 1. As described for Alternative 2, installation of information kiosks would avoid impacts to archeological resources by siting these facilities in locations without known resources. Improving social trails would reduce the potential for impacts to unknown resources by decreasing the use of informal trails.

Cumulative Impacts

Current and planned projects within the Park that would affect archeological resources are similar to those described under Alternative 1. A combination of all past, present, and reasonably foreseeable future actions that could cause cumulative impacts would result in long-term, negligible to minor, adverse impacts, depending upon chosen location and what is yet to be identified through future cultural resource inventories. Adverse impacts to the majority of cultural resources should be avoided by diverting the pathways around site locations.

Conclusion

Alternative 3 would result in potentially long-term, localized, negligible to minor, adverse impacts on known archeological sites located within the Park, depending on the number of resources affected and their data potential. Because many areas where resources are known to exist have either not been surveyed or have not been surveyed in accordance with SGAHP, additional research, fieldwork and consultation with the Wyoming SHPO and Native American tribal governments would be needed to determine whether these sites are eligible for listing in the NRHP. Should the sites be determined eligible for listing in the NRHP, the NPS would undertake required consultations with the Wyoming SHPO and Native American governments to make a determination of “no adverse effect” or “adverse effect.” Cumulative impacts would be long term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to an archeological resource or value, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s archeological resources and no unacceptable impacts.

Effects of Alternative 3a — Preferred Alternative

Impacts to archeological resources under Alternative 3a would range from negligible to minor depending upon the chosen location. The majority of the area has not been surveyed for archeological resources, and an inventory would be conducted prior to construction activities to identify previously undocumented archeological, historic, ethnographic, and/or cultural landscape resources. If any are found, NPS staff would consult with the Wyoming SHPO regarding additional actions needed to protect cultural resources. Direct and indirect effects would be mitigated by diverting the pathway in such a way as to avoid known resources.

Construction of multi-use pathways outside the road corridor along approximately 22.5 miles (36.0 km) and pathways within the road corridor along approximately 18.8 miles (30.3 km) would permanently disturb approximately 82.9 acres (33.5 ha) and cause temporary disturbance to approximately 82.9 additional acres (33.5 ha). The main differences between Alternative 3 and Alternative 3a are as follows: Alternative 3a includes the addition of

pathway spurs in two areas (North Jenny Lake Junction to String Lake and along Sagebrush Drive and Spring Gulch Road), and replacing the widened shoulder from North Jenny Lake Junction to Colter Bay with a pathway located within the road corridor. While impacts to cultural resources in these areas would be greater than under Alternative 3, the increment is expected to be negligible.

From the south boundary to North Jenny Lake Junction the effects from construction of multi-use pathways outside the road corridor would be the same as described for Alternative 3 (i.e., long term, localized, negligible to minor, and adverse). Ninety seven acres have been surveyed along the roadway between Dornan’s and South Jenny Lake; 12 archeological sites were already known to exist in this area and four new sites were identified during the survey, most of which occur east of the existing road. Placing the pathway on the west side of the road would most likely have fewer impacts to archeological resources than placing the pathway on the east side. Pathway spurs are proposed in two areas along this segment: North Jenny Lake Junction to String Lake and along Sagebrush Drive and the Spring Gulch Road. While the potential for impacts would be greater because of these additions, the overall effects would still be negligible to minor and localized with the implementation of mitigation measures.

Construction of multi-use pathways within the road corridor between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]) would have potentially long-term, localized, negligible to minor, adverse effects on archeological resources. Due to the terrain, pathway construction in this area would require a large amount of disturbance because of the need for cut and fill along slopes. Improving road shoulders between Signal Mountain Lodge and Jackson Lake Dam would permanently disturb approximately 0.9 acres (0.36 ha) and cause temporary disturbance of another 0.9 acres (0.36 ha) where construction equipment would be used adjacent to the main work area. Both Jenny Lake and Colter Bay developed areas have been inventoried for archeological resources; however, the area between these two locations has not been inventoried. Known sites located on the west side of the road would be avoided and surveys of the rest of the area would occur before implementation.

Pathways are proposed within the road corridor from the Granite Canyon Entrance Station to the LSR Preserve under Alternative 3a. The areas around the Granite Canyon Entrance Station and Poker Flats have been inventoried. No other archeological surveys have been conducted in the



areas along the Moose Wilson Road. Two sites occur on the west side of the road. It is likely that placing the pathway on the east side of the road would have fewer impacts to cultural resources than placing it on the west, based on past survey results and predictive factors. An inventory of the entire area would be conducted prior to implementation to determine specific siting resulting in long-term, localized, negligible to minor, adverse effects.

Construction of separate entrance lanes and installation of improved signage for pedestrian and wildlife safety and additional variable messaging signs would have the same effects as those described for Alternative 1. As described for Alternative 2, installation of information kiosks and improved way-finding would avoid impacts to archeological resources by siting these facilities in locations without known resources. Realignment of the Moose-Wilson Road and improvements to social trails would have the same effects as described for Alternative 3.

Cumulative Impacts

Current and planned projects within the Park that would affect archeological resources are similar to those described under Alternative 1. A combination of all past, present, and reasonably foreseeable future actions that could cause cumulative impacts would result in long-term, negligible to minor, and adverse impacts, depending upon chosen location and what is yet to be identified through future cultural resource inventories. Adverse impacts to the majority of cultural resources would be avoided by diverting the pathways around site locations.

Conclusion

Alternative 3a would result in potentially long-term, localized, negligible to minor, adverse impacts on known archeological sites located within the Park, depending on the number of resources affected and their data potential. Because many areas where resources are known to exist have either not been surveyed or have not been surveyed in accordance with SGAHP, additional research, fieldwork and consultation with the Wyoming SHPO and Native American tribal governments would be needed to determine whether these sites are eligible for listing in the NRHP. Should the sites be determined eligible for listing in the NRHP, the NPS would undertake required consultations with the Wyoming SHPO and Native American governments to make a determination of “no adverse effect” or “adverse effect.” Cumulative impacts would be long term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to an archeological resource or value, for which conservation is

(1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s archeological resources and no unacceptable impacts.

Effects of Alternative 4 — Multi-Use Pathways

Impacts to cultural resources under Alternative 4 would range from negligible to minor depending upon the chosen location. The majority of the area has not been surveyed for archeological resources, and an inventory would be conducted prior to construction activities to identify previously undocumented archeological, historic, ethnographic, and/or cultural landscape resources. If any are found, staff would consult with the Wyoming SHPO regarding additional actions needed to protect cultural resources. Direct and indirect effects would be mitigated by diverting the pathway in such a way as to avoid archeological resources.

Under Alternative 4, construction of multi-use pathways outside the road corridor along approximately 42.6 miles (68.4 km) of roads would permanently disturb approximately 85.1 acres [34.4 ha] and cause temporary disturbance to approximately 85.1 additional acres (34.4 ha). The main differences between Alternative 3a and Alternative 4 are as follows: Alternative 4 includes the construction of multi-use pathways outside the road corridor rather than within the road corridor from North Jenny Lake Junction to Colter Bay, and construction of multi-use pathways outside the road corridor along the entire the Moose-Wilson Road rather than just to the LSR Preserve. In addition, the pathway spurs to String Lake and along Sagebrush Road and Spring Gulch Drive would not be constructed under Alternative 4.

From the south boundary to North Jenny Lake Junction the effects from construction of multi-use pathways outside the road corridor would be the same as for Alternatives 3 and 3a (i.e., long term, localized, negligible to minor, and adverse). Ninety seven acres have been surveyed along the roadway between Dornan’s and South Jenny Lake; 12 archeological sites were already known to exist in this area and four new sites were identified during the survey, most of which occur east of the existing road. Placing the pathway on the west side of the road would most likely have fewer impacts to cultural resources than placing the pathway on the east side. The additional areas in this corridor would be surveyed before implementation.

Construction of multi-use pathways outside the road corridor between North Jenny Lake Junction and Colter Bay has the potential for removal of large amounts of vegetation that could lead to soil erosion and long-term, localized, negligible to minor, adverse effects on archeological resources. Construction of improved road shoulders between Signal Mountain Lodge and Jackson Lake Dam would permanently disturb approximately 2.0 acres (0.8 ha) and cause temporary disturbance of another 2.0 acres (0.8 ha) where construction equipment would be used adjacent to the main work area. Both Jenny Lake and Colter Bay developed areas have been inventoried for archeological resources; however, the area between these two locations has not been inventoried. Known sites located on the west side of the road would be avoided and surveys of the rest of the area would occur before implementation.

Construction of a multi-use pathway outside the road corridor along the Moose-Wilson Road from the Granite Canyon Entrance Station all the way to Moose could require the removal of 6,375 to 7,575 trees, depending on the specific design, and has a greater potential for disturbing cultural resources than Alternatives 3 and 3a. The areas around the Granite Canyon Entrance Station and Poker Flats have been inventoried. No other archeological surveys have been conducted along this portion of the Moose-Wilson Road. Two sites occur on the west side of the road. It is likely that placing the pathway on the east side of the road would have fewer impacts to cultural resources than placing it on the west, based on past survey results and predictive factors. An inventory of all locations would be conducted prior to any construction activity resulting in long-term, localized, negligible to minor, adverse effects.

Construction of separate entrance lanes and installation of improved signage for pedestrian and wildlife safety and additional variable messaging signs would have the same effects as those described for Alternative 1. As described for Alternative 2, installation of information kiosks and improved way-finding would avoid impacts to archeological resources by siting these facilities in locations without known resources. Realignment of the Moose-Wilson Road and improvements to social trails would have the same effects as described for Alternative 3.

Cumulative Impacts

Current and planned projects within the Park that would affect archeological resources are similar to those described under Alternative 1. A combination of all past,

present, and reasonably foreseeable future actions that could cause cumulative impacts would result in long-term, negligible to minor, adverse impacts, depending upon chosen location and what is yet to be identified through future cultural resource inventories. Adverse impacts to the majority of cultural resources would be avoided by diverting the pathways around site locations.

Conclusion

Alternative 4 would result in potentially long-term, localized, negligible to minor, adverse impacts on known archeological sites located within the Park, depending on the number of resources affected and their data potential. Because many areas where resources are known to exist have either not been surveyed or have not been surveyed in accordance with SGAHP, additional research, fieldwork and consultation with the Wyoming SHPO and Native American tribal governments would be needed to determine whether these sites are eligible for listing in the NRHP. Should the sites be determined eligible for listing in the NRHP, the NPS would undertake required consultations with the Wyoming SHPO and Native American governments to make a determination of “no adverse effect” or “adverse effect.” Cumulative impacts would be long term, negligible to minor, and adverse.

Because there would be no major, adverse impacts to an archeological resource or value, for which conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Grand Teton National Park; (2) key to natural or cultural integrity of the Park; or (3) identified as a goal in the Park’s GMP or other relevant NPS planning documents, there would be no impairment of the Park’s archeological resources and no unacceptable impacts.

Transportation System and Traffic

Methods and Assumptions

Impacts to the transportation system and traffic were analyzed relative to travel mode options available to visitors and employees under each alternative.

Future Park Visitation

Grand Teton National Park has not experienced substantial growth in annual recreational visitation over the past decade. Summer visitation has actually been on a slight downward trend, while shoulder season (spring and fall) and winter visitation have shown a modest upward trend. Because summer visitation is the largest share of annual visitation, the overall trend is unclear. At the same time,



there is no compelling evidence to expect that future visits to the Park would trend downward permanently. For purposes of this analysis, the assumption for Grand Teton National Park is that visitation would increase slightly throughout the life of this plan, from the current visitation of approximately 2.8 million visitors per year.

Motor Vehicle Traffic

Due to the relatively modest increases in visitation predicted through the life of this plan, future motor vehicle traffic is also expected to remain at or near current levels.

Effects of Alternative 1 — No Action

Under Alternative 1, adaptive management strategies would be tested on the Moose-Wilson Road; the Park would develop the TBP, but there would be no introduction of transit service; and no improvements in bicycling facilities would be made. Traffic is expected to increase only minimally in the next 5 to 10 years, resulting in minor impacts to the transportation system and traffic.

Parking areas at some of the most popular destinations currently experience varying levels of crowding during the peak visitation season. For example, parking at South Jenny Lake frequently fills to capacity by late morning and remains full until mid to late afternoon. During this period, it can be difficult to find a parking space, although turnover rates are frequent enough that patient visitors can often find a space. A few other parking areas also experience crowding, but to a somewhat lesser degree. Reconfiguration of some parking lots would help alleviate this issue. Generally, long-term, localized, minor, adverse impacts would continue under this alternative.

The Moose-Wilson Road provides a different experience than many of the other main roads in the Park. Due to its narrow width, limited sight distances, and slow speeds, it provides opportunities for visitors to experience the Park in a different way. The corridor is rich in wildlife values and is highly scenic. The road is not well constructed, lacks shoulders, and has no striping. A 2-mile (3.2-km) long section between the Granite Canyon Trailhead and the LSR Preserve is unpaved. The speed limit is 25 mph. Traffic volumes on the road are approximately 1,600 vehicles per day on the south end, and somewhat higher on the north end. Higher traffic volumes could result in deterioration of the road, especially the unpaved section, which already develops a rough and washboard surface during periods of peak use. In addition, the road is susceptible to congestion when wildlife or other attractions are present. Because the road is narrow and has few turnouts, visitors who stop to enjoy the views can easily block it.

Under this alternative, several different management strategies would be tested during the next 5 to 10 years, with the goal of maintaining the existing character of the road and protecting its important wildlife and scenic values. Management of the Moose-Wilson Road is expected to result in long-term, localized, minor to moderate, beneficial impacts on traffic in this area. Limitations on the amount of use on the Moose-Wilson Road could lead to commensurate increases in traffic volumes on routes outside the Park.

Improved signage for pedestrian and wildlife safety, installation of variable messaging signs, and separate entrance lanes would have a long-term, localized, minor, beneficial impact on traffic and transportation systems

Impact Threshold Definitions	
Negligible	The effects would not be detectable and would have no discernable effect on traffic flow and/or road conditions.
Minor	The effects would be slightly detectable, but there would not be an overall effect on traffic flow and/or road conditions.
Moderate	The effects would be clearly detectable, and the action could have an appreciable effect on traffic flow and/or road conditions.
Major	The effects would be substantial, with a highly noticeable influence, and the traffic flow and/or road conditions could be permanently altered.
Duration	Short term — effects last 2 years or less.
	Long term — effects last longer than 2 years.
Area of Analysis	The principal paved and unpaved roadways within the Park, as described below, as well as parking areas located at pullouts, trailheads, and activity centers along these roadway corridors

within the Park. Changes in the amount and timeliness of information dispersed to motorists would increase efficiency of roadway traffic and personal travel within the Park. Providing information to motorists about locations of congestion early on in their travels would enable motorists to choose other routes and reduce the amount of time spent waiting.

Cumulative Impacts

Within the Park, construction of a new visitor center at Moose and the LSR Preserve may increase visitation into the Park to see these new features in the short term. Reconstruction and widening of North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone would improve this route for bicycling use. Related projects near Grand Teton National Park that would impact the transportation system include the reconstruction of Wyoming Highway 22, Wyoming Highway 390, U.S. Highway 26/287, and the expansion of Teton Village, all of which would occur outside the Park. WYDOT has anticipated traffic increases in these corridors as part of overall regional traffic, potentially increasing traffic coming into the Park. However, additional bike and pedestrian facilities planned around the Park, such as Jackson Hole Pathways Program, may encourage visitors to use alternative modes, thereby decreasing traffic in the Park. Overall, cumulative impacts under Alternative 1 are expected to be long term, minor, and adverse.

Conclusion

Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts on roadways within the Park. On the Moose-Wilson Road, impacts would be long-term, localized, minor to moderate and beneficial. Long-term, localized, minor, adverse impacts would be expected at parking areas throughout the Park. Cumulative impacts would be long term, minor, and adverse.

Effects of Alternative 2 — Improved Road Shoulders

Under Alternative 2, short-term, minor construction-related activity affecting roadways would include the construction of improved shoulders along the Teton Park Road. These minor construction activities are expected to last a season or less and to incur only brief traffic impacts, such as short spells of on-site traffic control or flagmen. All construction activities are expected to have short-term, localized, negligible to minor, adverse impacts on traffic, as the construction activities would generate some traffic from construction vehicles and construction workers' personal vehicles. The additional traffic is expected to be short in

duration and relatively low. This alternative requires a limited amount of construction, and the transportation impacts would be long term, localized, negligible to minor, and adverse. In the long-term bicyclists would be able to travel this road on the improved shoulder. The Park would limit motorized traffic on Signal Mountain Road at certain times in order to provide increased access to bicyclists and pedestrians, which would cause some confusion for drivers in the short term while adjusting to this change.

Development of the TBP would determine whether it is feasible to begin a transit system in and around Grand Teton National Park. Under this alternative, pilot transit could be implemented based on the results of the TBP. Because the TBP would guide specific implementation details, it is difficult to estimate the impacts of a transit system in the Park. In general, however, the effects to traffic and transportation would be expected to be long term, regional, negligible to minor, and beneficial. A transit system would reduce personal vehicular traffic by slight amounts and would help reduce some traffic congestion (negligible, beneficial impacts).

As in Alternative 1, several different management strategies would be tested on the Moose-Wilson Road under this alternative during the next 5 to 10 years, with the goal of maintaining the existing character of the road and protecting its important wildlife and scenic values. Management of the Moose-Wilson Road is expected to result in long-term, localized, minor to moderate, beneficial impacts on traffic in this area. Limitations on the amount of use on the Moose-Wilson Road could lead to commensurate increases in traffic volumes on routes outside the Park.

Effects from improved signage for pedestrian and wildlife safety, installation of additional variable messaging signs, parking lot reconfiguration, and separate entrance lanes would be the same as described for Alternative 1. Information kiosks would be added and way finding would be improved, which could reduce vehicle trips and improve traffic flow in busy areas resulting in long-term, localized, minor, beneficial impacts. Changes in the amount and timeliness of information dispersed to motorists would increase efficiency of roadway traffic and personal travel within the Park. Providing information to motorists about locations of congestion early on in their travels would enable motorists to choose other routes and reduce the amount of time spent waiting. In addition, information would be provided to visitors about existing transit service



available in the area, which would lead some people to ride transit rather than take their own vehicle.

Cumulative Impacts

Cumulative impacts under Alternative 2 would be expected to be similar to those under Alternative 1, with a minor beneficial impact due to improving shoulders within the Park, which would connect to trails being planned outside of the Park, and the potential for implementation of transit. Overall, cumulative impacts would be long term, minor, and both beneficial and adverse.

Conclusion

Alternative 2 would generally result in impacts similar to those under the No Action Alternative, with the exception of short-term, localized, negligible to minor, adverse impacts resulting from construction of improved shoulders on the Teton Park Road. Improvements in the dissemination of information to park visitors would result in long-term, localized, minor, beneficial impacts. Long-term, regional, minor, beneficial impacts would also be expected from the connection to trails outside of the Park provided by widening shoulders, and the potential for implementation of transit. Cumulative impacts would be long term, minor, and both beneficial and adverse.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Under Alternative 3, short-term construction-related activity affecting roadways would include the construction of multi-use pathways outside the road corridor along approximately 23.3 miles (37.3 km) of roads, construction of improved shoulders along the Teton Park Road and North Park Road between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]), and realignment of two segments of the Moose-Wilson Road. In this alternative, the addition of roadway shoulders and construction to realign the Moose-Wilson Road would be the main sources of short-term construction-related transportation impacts, which would be localized, minor, and adverse, and the impacts from the rest of the construction activities would be negligible.

From the south boundary to North Jenny Lake Junction the effects from pathway construction outside the road corridor to transportation and traffic would be short term, localized, negligible to minor, and adverse, because the activity would not occur within the road corridor. Construction of a multi-use pathway outside the road corridor along a portion of the Moose-Wilson Road would also result in short-term, localized, negligible to minor, adverse, effects for the same reason.

Because improvements to shoulders from North Jenny Lake Junction to Colter Bay would require construction immediately adjacent to the existing roadway, short-term, localized, minor, adverse effects to traffic and transportation would occur in that area for the duration of the construction period. Realignment of the Moose-Wilson Road would also result in short-term, localized, minor, adverse construction impacts.

Realignment of the Moose-Wilson Road would alleviate some of the congestion that occurs because of wildlife viewing in those areas, resulting in a long-term, localized, minor, beneficial impact. Development of a system of multi-use pathways would also result in minor to moderate beneficial effects, due to the increased mode choices available to visitors in the Park. The system of multi-use pathways and improved shoulders would provide greater opportunities for bicyclists and pedestrians, which would slightly decrease vehicular traffic within the Park. However, the pathways system would actually increase demand for parking in some areas. When fully constructed, the pathways would provide a connection from Jackson to points along the Teton Park Road corridor (assuming construction by Teton County of a link to the south boundary). Many visitors, however, would likely choose to drive to locations within the Park, for example Moose or the Taggart Lake Trailhead, and begin bicycling from there. The additional demand for parking in order to accommodate this new use could result in long-term, localized, minor to moderate, adverse impacts at certain parking areas.

Development of the TBP would determine whether it is feasible to begin a transit system in and around Grand Teton National Park. Under this alternative pilot transit could be implemented based on the results of the TBP. Because the TBP would guide specific implementation details, it is difficult to estimate the impacts of a transit system in the Park. In general, however, the effects to traffic and transportation would be expected to be long term, regional, negligible to minor, and beneficial. A transit system would reduce personal vehicular traffic by slight amounts and would help reduce some traffic congestion (negligible, beneficial impacts).

Under this alternative, no changes to the management of roadways other than the Moose-Wilson Road would be made. As described under Alternative 1, different management options would be tested, resulting in variable effects along the Moose-Wilson Road, with potential beneficial effects if traffic volumes are moderated. The

AMP would potentially help reduce traffic on the north section of the road where there would be mixed use because no pathway is proposed. Limitations on the amount of use on the Moose-Wilson Road could lead to commensurate increases in traffic volumes on routes outside the Park.

Effects from improved signage for pedestrian and wildlife safety, installation of additional variable messaging signs, parking lot reconfiguration, and separate entrance lanes would be the same as described for Alternative 1. Information kiosks would be added and way-finding would be improved, which could reduce vehicle trips and improve traffic flow in busy areas resulting in long term, localized, minor, beneficial impacts as described for Alternative 2. Changes in the amount and timeliness of information dispersed to motorists would increase efficiency of roadway traffic and personal travel within the Park. Providing information to motorists about locations of congestion early on in their travels would enable motorists to choose other routes and reduce the amount of time spent waiting. In addition, information would be provided to visitors about existing transit service available in the area, which would lead some people to ride transit rather than take their own vehicle.

Cumulative Impacts

Cumulative impacts would occur from other past, present, and future actions that affect the Park's transportation system and traffic, as described under Alternative 1, but with additional beneficial and adverse impacts due to the creation of the multi-use pathways system. Impacts during construction would be short term, localized, negligible to minor, and adverse. Overall, cumulative impacts would be long term, minor, and beneficial.

Conclusion

Alternative 3 would result in both beneficial and adverse impacts to transportation and traffic. If implemented under Alternative 3, the transit system would provide additional options for visitors, but would not measurably alter the amount of traffic on the Park roads. Therefore, long-term impacts on traffic and park roadways because of this action would generally be regional, negligible to minor, and beneficial; however, the management strategies employed on the Moose-Wilson Road would result in long-term, localized, moderate, beneficial impacts. Long-term, localized, minor, adverse impacts would continue to affect some parking areas due to crowding at certain times, and selected parking areas would experience long-term, localized, minor to moderate, adverse impacts because of

new parking demand associated with use of the pathway system. Short-term impacts from the construction activities required for the addition of roadway shoulders and realignment of the Moose-Wilson Road would be localized, minor, and adverse, and the impacts from the rest of the construction activities would be negligible. Cumulative impacts to the transportation system are expected to be long term, minor, and beneficial.

Effects of Alternative 3a — Preferred Alternative

Under Alternative 3a, short-term construction-related activity affecting roadways would include the construction of multi-use pathways outside the road corridor along approximately 22.5 miles (36.0 km), pathways within the road corridor along approximately 18.8 miles (30.3 km), and realignment of two segments of the Moose-Wilson Road. Construction within the road corridor and realignment of the Moose-Wilson Road would be the main sources of short-term construction-related transportation impacts, which would be short term, localized, minor, and adverse, and the impacts from the rest of the construction activities would be negligible.

The main differences between Alternative 3 and Alternative 3a are as follows: Alternative 3a includes the addition of pathway spurs outside the road corridor in two areas (North Jenny Lake Junction to String Lake and along Sagebrush Drive and Spring Gulch Road), and a pathway within the road corridor rather than a widened shoulder from North Jenny Lake Junction to Colter Bay. Impacts from these actions would be similar to those described for Alternative 3 (short-term, localized, minor, and adverse).

From the south boundary to North Jenny Lake Junction the effects from construction of multi-use pathways outside the road corridor would be the same as described for Alternative 3 (i.e., short term, localized, negligible to minor, and adverse).

Construction of multi-use pathways within the road corridor between North Jenny Lake Junction and Colter Bay (15.5 miles [25.0 km]), including improving road shoulders between Signal Mountain Lodge and Jackson Lake Dam, would require construction immediately adjacent to the existing roadway; therefore, short-term, localized, minor, adverse effects to traffic and transportation would occur in that area for the duration of the construction period.

Pathways are proposed within the road corridor from the Granite Canyon Entrance Station to the LSR Preserve



under Alternative 3a resulting in impacts similar to those from work within the road corridor from North Jenny Lake Junction and Colter Bay. The temporary effects to traffic and transportation in this area would likely be greater however due to the narrow road corridor (i.e., short-term, localized, minor to moderate, adverse effects).

Realignment of the Moose-Wilson Road would alleviate some of the congestion that occurs because of wildlife viewing in those areas, resulting in a long-term, localized, minor, beneficial impact. Development of a system of multi-use pathways would also result in long-term, regional, minor to moderate, beneficial effects, due to the increased mode choices available to visitors in the Park. The system of multi-use pathways and improved shoulders would provide greater opportunities for bicyclists and pedestrians, which would slightly decrease vehicular traffic within the Park. The pathway proposed along the Moose-Wilson Road under this alternative would provide additional opportunities for bicyclists to travel along this corridor.

However, the expanded pathways system would actually increase demand for parking in some areas. When fully constructed, the pathways would provide a connection from Jackson to points along the Teton Park Road corridor (assuming construction by Teton County of a link to the south boundary). Many visitors, however, would likely choose to drive to locations within the Park, for example Moose or the Taggart Lake Trailhead, and begin bicycling from there. The additional demand for parking in order to accommodate this new use could result in long-term, localized, minor to moderate, adverse impacts at certain parking areas.

Development of the TBP would determine whether it is feasible to begin a transit system in and around Grand Teton National Park. As described for Alternatives 2 and 3, pilot transit could be implemented based on the results of the TBP. Because the TBP would guide specific implementation details, it is difficult to estimate the impacts of a transit system in the Park. In general, however, the effects to traffic and transportation would be expected to be long term, regional, negligible to minor, and beneficial. A transit system would reduce personal vehicular traffic by slight amounts and would help reduce some traffic congestion (negligible, beneficial impacts).

As described under Alternative 1, different management options would be tested, resulting in variable effects along the Moose-Wilson Road, with potential beneficial effects if traffic volumes are moderated. The AMP would potentially

help reduce traffic on the north section of the road where there would be mixed use because no pathway is proposed. Limitations on the amount of use on the Moose-Wilson Road could lead to commensurate increases in traffic volumes on routes outside the Park.

Effects from improved signage for pedestrian and wildlife safety, installation of additional variable messaging signs, parking lot reconfiguration, and separate entrance lanes would be the same as described for Alternative 1. Information kiosks would be added and way-finding and social trails would be improved, which could reduce vehicle trips and improve traffic flow in localized areas resulting in long term, localized, minor, beneficial impacts as described for Alternative 2. Changes in the amount and timeliness of information dispersed to motorists would increase efficiency of roadway traffic and personal travel within the Park. Providing information to motorists about locations of congestion early on in their travels would enable motorists to choose other routes and reduce the amount of time spent waiting. In addition, information would be provided to visitors about existing transit service available in the area, which would lead some people to ride transit rather than take their own vehicle.

Cumulative Impacts

Cumulative impacts would occur from other past, present, and future actions that affect the Park's transportation system and traffic, as described under Alternative 1, but with additional beneficial and adverse impacts due to the expansion of the multi-use pathways system and the potential for the development of transit within the Park. Overall, cumulative impacts to the transportation system are expected to be long term, minor, and beneficial.

Conclusion

Alternative 3a would result in both beneficial and adverse impacts to transportation and traffic. If implemented under Alternative 3a, the transit system would provide additional options for visitors but would not measurably alter the amount of traffic on the Park roads. Therefore, long-term impacts on traffic and park roadways as a result of this action would generally be regional, negligible to minor, and beneficial; however, the management strategies employed on the Moose-Wilson Road would result in long-term, localized, moderate, beneficial impacts. Minor adverse impacts would continue to affect some parking areas due to crowding at certain times, and selected parking areas would experience long-term, localized, minor to moderate, adverse impacts because of new parking demand associated with use of the pathway system. Short-term impacts from

the construction activities required for the widening of roadway shoulders and realignment of the Moose-Wilson Road would be localized, minor, and adverse, and the impacts from the rest of the construction activities would be negligible. Cumulative impacts to the transportation system are expected to be long term, minor, and beneficial.

Effects of Alternative 4 — Multi-Use Pathways

Under Alternative 4, short-term construction-related activity affecting roadways would include the construction of 42.6 miles (68.4 km) of multi-use pathways outside the road corridor and realignment of two segments of the Moose-Wilson Road. Construction to realign the Moose-Wilson Road would be the main source of short-term construction-related transportation impacts, which would be short-term, localized, minor, and adverse, and the impacts from the rest of the construction activities would be short term, localized, negligible to minor, and adverse.

The main differences between Alternative 3a and Alternative 4 are as follows: Alternative 4 includes the construction of multi-use pathways outside the road corridor rather than within the road corridor from North Jenny Lake Junction to Colter Bay, and construction of multi-use pathways outside the road corridor along the entire the Moose-Wilson Road rather than just to the LSR Preserve. In addition the pathway spurs to String Lake and along Sagebrush Drive and Spring Gulch Road would not be constructed.

From the south boundary to North Jenny Lake Junction the effects from construction of multi-use pathways outside the road corridor would be the same as for Alternative 3 (i.e., short-term, localized, negligible to minor, and adverse).

Construction of multi-use pathways outside the road corridor between North Jenny Lake Junction and Colter Bay would have short-term, localized, negligible to minor, adverse effects on traffic and transportation because the construction activities would not occur within the road corridor. Construction of a multi-use pathway outside the road corridor along the entire the Moose-Wilson Road would have similar effects (i.e., short term, localized, negligible to minor, and adverse) for the same reason.

Realignment of the Moose-Wilson Road would alleviate some of the congestion that occurs because of wildlife viewing in those areas, resulting in a long-term, localized, minor, beneficial impact. Development of a system of multi-use pathways would also result in long-term, regional, minor to moderate, beneficial effects, due to the increased mode choices available to visitors in the Park. The system of

multi-use pathways and improved shoulders would provide greater opportunities for bicyclists and pedestrians, which would slightly decrease vehicular traffic within the Park. The pathway proposed outside the Moose-Wilson Road corridor under this alternative would provide additional opportunities for bicyclists to travel along this corridor.

However, the expanded pathways system would actually increase demand for parking in some areas. When fully constructed, the pathways would provide a connection from Jackson to points along the Teton Park Road corridor (assuming construction by Teton County of a link to the south boundary). Many visitors, however, would likely choose to drive to locations within the Park, for example Moose or the Taggart Lake Trailhead, and begin bicycling from there. The additional demand for parking in order to accommodate this new use could result in long-term, localized, minor to moderate, adverse impacts at certain parking areas.

Development of the TBP would determine whether it is feasible to begin a transit system in and around Grand Teton National Park. As described for Alternatives 2, 3, and 3a, pilot transit could be implemented based on the results of the TBP. Because the TBP would guide specific implementation details, it is difficult to estimate the impacts of a transit system in the Park. In general, however, the effects to traffic and transportation would be expected to be long term, regional, negligible to minor, and beneficial. A transit system would reduce personal vehicular traffic by slight amounts and would help reduce some traffic congestion (negligible, beneficial impacts).

As described under Alternative 1, different management options would be tested, resulting in variable effects along the Moose-Wilson Road, with potential beneficial effects if traffic volumes are moderated. Limitations on the amount of use on the Moose-Wilson Road could lead to commensurate increases in traffic volumes on routes outside the Park.

Effects from improved signage for pedestrian and wildlife safety, installation of additional variable messaging signs, parking lot reconfiguration, and separate entrance lanes would be the same as described for Alternative 1. Information kiosks would be added and way-finding and social trails would be improved, which could reduce vehicle trips and improve traffic flow in localized areas resulting in long term, localized, minor beneficial impacts as described for Alternative 2. Changes in the amount and timeliness of information dispersed to motorists would increase efficiency of roadway traffic and personal travel within the Park. Providing information to motorists about locations of



congestion early on in their travels would enable motorists to choose other routes and reduce the amount of time spent waiting. In addition, information would be provided to visitors about existing transit service available in the area, which would lead some people to ride transit rather than take their own vehicle.

Cumulative Impacts

Cumulative impacts would occur from other past, present, and future actions that affect the Park's transportation system and traffic, as described under Alternative 1, but with additional beneficial and adverse impacts due to the expansion of the multi-use pathways system. Overall, cumulative impacts to the transportation system are expected to be long term, minor, and beneficial.

Conclusion

Alternative 4 would result in both beneficial and adverse impacts to transportation and traffic. If implemented under Alternative 4, the transit system would provide additional options for visitors but would not measurably alter the amount of traffic on park roads. Therefore, long-term impacts on traffic and park roadways as a result of this action would generally be regional, negligible to minor, and beneficial; however, the management strategies employed on the Moose-Wilson Road would result in long-term, localized, moderate, beneficial impacts. Long-term, localized, minor, adverse impacts would continue to affect some parking areas due to crowding at certain times, and selected parking areas would experience long-term, localized, minor to moderate, adverse impacts because of new parking demand associated with use of the pathway system. Short-term impacts from the construction activities required for the realignment of the Moose-Wilson Road would be localized, minor, and adverse, and the impacts from the rest of the construction activities would be short-term, localized, negligible to minor, and adverse. Cumulative impacts to the transportation system are expected to be long term, minor, and beneficial.

Visitor and Employee Use and Experience

Methods and Assumptions

For park visitors, this impact analysis considers various aspects of visitor use and experience at Grand Teton National Park, including the effects on:

- Visitors' ability to experience the Park's primary resources and their natural and cultural settings (e.g., vistas, natural sounds and scents, and wildlife viewing).

- Access and quality of movement throughout the Park (e.g., level of freedom/spontaneity, reliability, affordability, timeliness, availability of facilities, access to places of interest, convenience, minimal congestion, continuous system of connections, and level of universal access).
- Access to orientation and interpretation information (e.g., availability and appropriateness).
- Access to high quality recreation opportunities (e.g., access to diverse recreation opportunities, including turn-around trips, new recreation activities, tranquil/contemplative environments, opportunities for social interaction with family/friends, and opportunities to meet new people).
- Visitor safety (both real and perceived).

The analysis is based on how visitor use and experiences would change with the way potential management actions were applied in the alternatives. A major focus of the impact assessment is the degree to which visitors are able to visit the major destinations in the Park safely, comfortably, and freely.

Information gathered in the visitor survey discussed in Chapter 3, "Affected Environment," along with public input during the planning process, was used to evaluate the potential impacts of each alternative on visitors. Based on these sources of information, visitors have expressed that scenic views and preservation of native plants and animals are important to their experiences in the Park. In addition, visitors have expressed concern about congestion and crowding at major destination points, conflicts with traffic along roadways, unsafe bicycle and pedestrian access, and lack of continuous pathway and multi-use pathway opportunities for both recreation and travel opportunities. An important consideration regarding evaluation of visitor experience impacts is that impacts would vary based on visitor expectations and desires, which are often a result of level of experience with the Park or similar park environments.

For park employees, two measures of transportation system impacts on employee experience are considered: the employee's level of mobility to work sites and locations associated with activities of daily living (shopping, worship, etc.), and the quality of the travel experience, as measured by reliability of transportation, cost, and commuting time. These variables have been assessed in a qualitative manner using information from the 2001 Employee Transportation Survey on employees' current mobility options and

constraints, as well as typical destinations. It has been assumed that responses to the employee survey are an accurate representation of those that would be given by the employee population as a whole.

Effects of Alternative 1 — No Action

Visitor Use and Experience

Under the No Action Alternative (Alternative 1), no changes would be made regarding the types of recreational opportunities and experiences that are available to park visitors. Popular activities include general sightseeing, driving for pleasure, hiking, floating the Snake River, wildlife viewing, mountain climbing, bicycling, and fishing. Annual surveys of park visitors taken between 2000 and 2004 in order to comply with the Government Performance and Results Act have indicated that on average, 99 percent of visitors are satisfied overall with the services, facilities, and recreational opportunities provided at Grand Teton National Park (University of Idaho 2004).

Visitation to the Park over the next 5 to 10 years is expected to remain relatively steady or increase slightly. Visitation trends are difficult to predict and are influenced by a wide variety of factors including population growth, economic trends, demographics, recreational preferences, gas prices, and weather. The anticipated visitation trends over this period would result in some popular parking areas becoming full earlier in the day and staying full longer and possibly extending the length of the peak visitation season, resulting in generally long-term, localized, minor, adverse impacts on visitor experience.

Pleasure driving would continue to be a highly popular activity and visitors would continue to have the freedom to travel throughout the Park at their own pace and choose destinations of interest. Localized traffic congestion would continue to occur, generally in conjunction with wildlife sightings. Although traffic congestion can be assumed to cause short-term, localized, moderate, adverse impacts on visitor experience, the opportunity to stop and view wildlife is considered by most visitors to be beneficial to their visit and enhances their enjoyment of the Park. The TBP would be developed under this alternative; however, no transit would be implemented.

Within some of the activity areas in the Park, visitors currently choose to drive relatively short distances rather than walk between nearby destinations. For example, at Jenny Lake, it is common for campers to drive their cars between the campground and the Jenny Lake Store, even though the two destinations are within easy walking distance. Pedestrians within the activity areas often tend to walk through parking lots or on social trails. Inadequate signing and a lack of clearly identifiable walking paths contribute to this activity, which results in unnecessary auto travel and competition for parking spaces. Under the No Action Alternative, these issues would be addressed on a case-by-case basis, with existing conditions persisting based on the availability of resources available to address the problems. Impacts on visitor experience because of this would be expected to be short and long term, localized, minor, and adverse. Construction of separate entrance lanes and reconfiguration of some parking areas would improve the visitor experience by reducing congestion and waiting times.

Impact Threshold Definitions	
Negligible	Visitors or employees would not be affected, or changes in their experience would be below or at the level of detection. The visitor or employee would not likely be aware of the effects associated with the alternative.
Minor	Changes in visitor or employee use and/or experience would be slight but detectable, would affect few individuals, and would not appreciably limit or enhance experiences identified as fundamental to the Park's purpose and significance.
Moderate	Some characteristics of visitor or employee use and/or experience would change, and many individuals would likely be aware of the effects associated with implementation of the alternative; some changes to experiences identified as fundamental to the Park's purpose and significance would be apparent.
Major	Multiple characteristics of visitor or employee experience would change, including experiences identified as fundamental to park purpose and significance; most individuals would be aware of the effects associated with implementation of the alternative and would likely express a strong opinion about the changes.
Duration	Short term — occurs only during the treatment effect.
	Long term — occurs after the treatment effect.
Area of Analysis	Within park boundary and, for employees, areas within and outside of the Park frequented by employees, including the major transportation corridors; the employee housing areas and major commuting patterns; and major commercial and civic destinations in the Town of Jackson.



Opportunities for bicycling exist throughout the Park; however, bicycles are limited to the same roadways used by automobiles. The relatively flat topography of Jackson Hole makes bicycling an attractive recreational option, although only a small percentage of park visitors engage in this activity while visiting the Park. In recent years, approximately 180 organized commercial bicycling tours have served approximately 2,000 visitors annually. A 2001 survey indicated that 2.3 percent of inbound vehicles at the Moose Entrance Station carried one or more bicycles.

While bicycling is permitted on all the Park roads, not all visitors are comfortable with sharing the road with high-speed motor vehicle traffic. Road shoulders vary in width from almost non-existent to 5.0 ft (1.5 m). The inherent and perceived risks of bicycling on road shoulders would discourage some visitors from bicycling altogether, and would adversely affect the experience for others by requiring them to concentrate on traffic and their own safety rather than the scenic views. Although rare, accidents have the potential to be serious, and two fatalities have occurred in recent years. Under the No Action Alternative, no improvements would be made with regard to bicycling facilities, resulting in long-term, localized, minor to moderate, adverse impacts on visitor experience.

Several different adaptive management strategies would be tested on the Moose-Wilson Road over the next few years, with the objective of managing traffic volumes to retain the existing character of the road corridor. Under all strategies, two-way traffic would be maintained from Moose to the LSR Preserve and from the Granite Canyon Entrance Station to the Granite Canyon Trailhead. Between the Granite Canyon Trailhead and the LSR Preserve, the NPS may test strategies such as direction of traffic flow or other techniques to manage vehicle use of the road. In any event, the Park would work closely with the local community in order to develop and publicize adaptive management strategies well in advance of their implementation in order to avoid confusion and disruption, and mitigate potential impacts.

The effect of these adaptive management strategies would result in both beneficial and adverse impacts on visitor experience, and would vary between different strategies. Overall, most visitors using the Moose-Wilson Road would experience a long-term, localized, negligible to minor, beneficial impact because the current character of the road would be maintained. Some visitors would be inconvenienced under some management strategies if they were not able to travel in the direction they desired

or reach one of the trailheads without driving around through Jackson. In general, implementation of the various strategies would result in long-term, localized, minor, beneficial and adverse impacts.

Employee Use and Experience

Under this alternative, no changes in the management of employee transportation in the Park would be expected. Employees with access to vehicles would continue to have high mobility to their work sites. Employees without access to a personal vehicle would continue to rely on concession-provided transit, ride to work with colleagues, or walk or bike to and from work.

The slight increase in traffic volumes on park roadways through the life of this plan (5 to 10 years) would have an effect on the length of employee commutes and the quality of that commute. Long-term impacts on commuting times would be regional, negligible to minor, and adverse. Construction of separate entrance lanes for employees would reduce the time waiting at the gate resulting in long term, localized, negligible to minor, beneficial impacts. The TBP would be developed under this alternative; however, no transit would be implemented. Managing traffic volumes by testing management strategies on the Moose-Wilson Road could reduce the options available for commuting on this route.

Cumulative Impacts

Grand Teton National Park is one component of the GYA, which includes YNP, several national forests, the National Elk Refuge, and communities such as Jackson and Cody, Wyoming; West Yellowstone, Gardiner, and Bozeman, Montana; and Idaho Falls, Idaho. Visits to Grand Teton National Park are often combined with visits to a wide variety of destinations elsewhere in the three-state area, and a virtually unlimited array of opportunities and experiences are available throughout the GYA.

Within the Park, a new visitor center is under construction at Moose, which will provide improved opportunities for education and information about the Park, as well as how to best visit it. Reconstruction of North Park Road would facilitate travel between the south entrance of Yellowstone and Lizard Creek Campground. Improved shoulders on that section of road would provide improved opportunities for bicycling. Likewise, reconstruction of U.S. Highway 287/26 over Togwotee Pass by WYDOT would improve opportunities for both automobile and bicycle travel.

The impacts of these related actions, in conjunction with the impacts of Alternative 1, would result in long-term, negligible to minor, adverse cumulative impacts to employee commuting time, and long-term, negligible, beneficial cumulative impacts on employee mobility choices; cumulative impacts on visitor experience would be long-term, moderate, and beneficial.

Conclusion

Overall, implementation of Alternative 1 would result in short and long term, localized and regional, minor to moderate, beneficial and adverse impacts on visitor and employee use and experience. Cumulative impacts would include long-term, negligible to minor, adverse cumulative impacts to employee commuting time; long-term, negligible, beneficial cumulative impacts on employee mobility choices; and long-term, moderately beneficial cumulative impacts on visitor experience.

Effects of Alternative 2 — Improved Road Shoulders

Visitor Use and Experience

The effects of Alternative 2 would be generally the same as described for Alternative 1, except that improved road shoulders from Moose to Signal Mountain Lodge would provide a long term, regional, minor to moderate, beneficial impact on visitor use and experience by enhancing the quality and safety of bicycling opportunities. In addition, periodic closure of Signal Mountain Road to allow for non-motorized uses would also provide a long-term, localized, minor, beneficial impact on visitor experience for some visitors; conversely, visitors who desire to visit the summit by automobile could be adversely affected if they were unable to schedule that activity around the periods when the road was closed.

As described for Alternative 1, the effect of adaptive management strategies on the Moose-Wilson Road would result in both beneficial and adverse impacts on visitor experience, and would vary between different strategies. Overall, most visitors using the Moose-Wilson Road would experience a long-term, localized, negligible to minor, beneficial impact because the current character of the road would be maintained. Some visitors could be inconvenienced under certain management strategies if they were not able to travel in the direction they desire, travel all the way through, or reach one of the trailheads without driving around through Jackson. In general, implementation of the various strategies would result in short-term, localized, negligible to moderate impacts, both beneficial and adverse.

The TBP will be developed under this alternative, and a pilot transit program could be implemented pending the results of the study. Visitors would receive additional information about existing transit in the area that would help with trip planning and would reduce traffic congestion.

Construction of separate entrance lanes and reconfiguration of some parking areas would improve the visitor experience by reducing congestion and waiting times. Beneficial impacts relative to the No Action Alternative would also result from improved traveler information, such as information kiosks, improved way-finding, enhanced use of four additional variable messaging signs, and traveler information radio broadcasts.

Employee Use and Experience

Under this alternative, improved shoulders would be constructed along the Teton Park Road. The 5.0 ft (1.5 m) shoulder from Jackson to Moose would be extended to Signal Mountain Lodge along the Teton Park Road, providing employees that choose to bicycle commute from Jackson a continuous bike lane along the shoulder, a long-term, regional, minor to moderate, beneficial impact. Employees with access to vehicles would continue to have high mobility to work sites. Those employees without access to a personal vehicle would continue to rely on concession-provided transit, rides from co-workers, or walking or bicycling to and from work.

Short-term construction-related impacts on visitor and employee experience would be expected to consist of short delays on some localized areas of roadways, which would affect visitor access to certain locations, the commute to and from work, and work-related travel within the Park. The overall short-term impact to visitor and employee experience would be localized, negligible to moderate, and adverse.

Construction of separate entrance lanes for employees would reduce the time waiting at the gate resulting in long term, localized, negligible to minor, beneficial impacts. The TBP would be developed under this alternative and a pilot transit program would be implemented pending the results of the study. Depending on the transit options chosen, employee level of mobility and quality of travel experience could increase, decrease or stay the same, similar to Alternative 1. Managing traffic volumes by testing management strategies on the Moose-Wilson Road would also have an effect on employee use of the road by reducing the options available for commuting on this route.



Cumulative Impacts

Cumulative impacts would be generally the same as those described under Alternative 1, with long-term, negligible to minor, adverse cumulative impacts to employee commuting time, long-term, negligible, beneficial cumulative impacts on employee mobility choices; and long-term, moderately beneficial cumulative impacts on visitor experience.

Conclusion

Overall, implementation of Alternative 2 would result in long-term, regional and localized, minor to moderate, beneficial impacts, and short-term, localized, negligible to moderate, adverse impacts on visitor and employee use and experience. Cumulative impacts would include long-term, negligible to minor, adverse cumulative impacts to employee commuting time; long-term, negligible, beneficial cumulative impacts on employee mobility choices; and long-term, moderately beneficial cumulative impacts on visitor experience.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Visitor Use and Experience

Compared to Alternative 1, implementation of Alternative 3 would result in additional long-term, regional, moderate to major, beneficial impacts on visitor experience due to the availability of approximately 23.3 miles (37.3 km) of multi-use pathways outside the road corridor and 15.5 miles (25.0 km) of improved road shoulders. These improvements would enhance opportunities for safe and enjoyable bicycling in the Park, a moderate to major beneficial impact. Although a relatively small percentage of visitors currently engage in bicycling while visiting the Park, it could be expected that the popularity of this activity would increase because of the new facilities.

In addition, implementation of a limited transit system, pending the results of the TBP, would result in long-term, regional, minor, beneficial impacts by providing a means for visitors to access certain areas of the Park without the need to depend on private automobiles. It is anticipated that this additional service would tend to serve visitors (and employees) having a single or limited number of destinations for the day (or a large portion of a day), rather than as an alternative to pleasure driving or touring the Park. For example, the shuttle service could allow lodge and campground guests to access a trailhead in the Park from which to begin a hike, without having the need for a car. It could also provide a shuttle between various trailheads, making possible circuit hikes that cannot currently be done without having two cars. Transit vehicles

would be equipped with bicycle carriers in order to allow visitors to reach certain parts of the pathway system without having to ride the entire distance. Visitors would receive additional information about existing transit in the area that would help with trip planning and would reduce traffic congestion.

Adverse effects on visitor use and experience would result from the construction of approximately 23.3 miles (37.3 km) of multi-use pathways. These new facilities would, to varying degrees, intrude upon the natural landscape and therefore adversely affect the experience of some visitors by increasing the development footprint and thereby altering the character of the road corridors from less developed to more developed.

Realignment of the Moose-Wilson Road would have short-term, localized, moderate, adverse effects on commuting times and quality of travel experience for both visitors and park personnel; however, these would only be short-term construction-related impacts and would have a long-term, localized, minor to moderate, beneficial impact on transportation and traffic along the Moose-Wilson Road.

As described for Alternative 1, the effect of adaptive management strategies on the Moose-Wilson Road would result in both beneficial and adverse impacts on visitor experience, and would vary between different strategies. Overall, most visitors using the Moose-Wilson Road would experience a long-term, localized, minor, beneficial impact because the current character of the road would be maintained. Some visitors could be inconvenienced under some management strategies if they were not able to travel in the direction they desired or reach one of the trailheads without driving around through Jackson. In general, implementation of the various strategies would result in short-term, localized, minor impacts, both beneficial and adverse.

Construction of separate entrance lanes and reconfiguration of some parking areas would improve the visitor experience by reducing congestion and waiting times. Long-term, localized, negligible to minor, beneficial impacts relative to the No Action Alternative would also result from improved traveler information, such as information kiosks, improved way finding, enhanced use of four additional variable messaging signs, and traveler information radio broadcasts. Work to improve the management of social trails and additional way finding would occur under this alternative improving the visitor experience.

Employee Use and Experience

Under this alternative, multi-use pathways would be provided outside the road corridor along high-use roadways, safer bicycling routes would be available for employees, and social trails would be improved and delineated in several activity areas. The safety, convenience, and quality of travel for employees who cycle or walk to and from work would be improved. Pathways would connect Jackson to Moose and Beaver Creek to Moose. An improved bicycle shoulder would connect Colter Bay and Jackson Lake Lodge. Improvements in pathway systems at activity areas would connect employee housing to the main activity areas within Colter Bay and Signal Mountain Lodge.

The TBP would be developed under this alternative, and a pilot transit service could be implemented. Pilot transit could include routes between Jackson and Moose, Jenny Lake, and Colter Bay via the Teton Park Road. Employees with access to vehicles could continue to commute to work by personal vehicle. The pilot transit service would provide a convenient alternative, though with possibly longer commute times. Employees without access to a personal vehicle would experience improved mobility options. Access to work sites and recreation opportunities would be available for almost all employees in the Park.

Short-term construction-related impacts on employee experience would be expected to consist of short delays on some localized areas of roadways, which would affect access to certain locations, the commute to and from work, and work-related travel within the Park for some employees (see “Transportation System and Traffic” section above). The impact to employee experience would be short-term, localized, negligible to minor, and adverse.

Construction of separate entrance lanes for employees would reduce the time waiting at the gate resulting in long term, localized, negligible to minor, beneficial impacts. Managing traffic volumes by testing management strategies on the Moose-Wilson Road would have an effect on employee use of the road by reducing the options available for commuting on this route.

Cumulative Impacts

Cumulative impacts on visitor experience would be generally the same as under the other alternatives. Recent, current, and planned projects within Grand Teton National Park that would influence employee mobility within the Park are the same as for Alternative 1. The impacts of these related actions, in conjunction with the impacts of Alternative 3, would result in long-term, negligible to

minor, adverse cumulative impacts to employee commuting time, long-term, negligible, beneficial cumulative impacts on employee mobility choices; and long-term, moderately beneficial cumulative impacts on visitor experience.

Conclusion

Overall, implementation of Alternative 3 would result in long-term, localized and regional, minor to major, beneficial impacts associated with the additional pathways and transit, and short- and long-term, localized, negligible to moderate, adverse impacts on visitor and employee use and experience associated with the change to the landscape. Cumulative impacts would include long-term, negligible to minor, adverse cumulative impacts to employee commuting time; long-term, negligible, beneficial cumulative impacts on employee mobility choices; and long-term, moderately beneficial cumulative impacts on visitor experience.

Effects of Alternative 3a — Preferred Alternative

Visitor Use and Experience

Compared to the No Action Alternative, implementation of Alternative 3a would result in additional long-term, localized and regional, moderate to major, beneficial impacts on visitor experience due to the availability of approximately 22.5 miles (36.0 km) of multi-use pathways outside the road corridor and 18.8 miles (30.3 km) of multi-use pathways within the road corridor. These improvements would enhance opportunities for safe and enjoyable bicycling in the Park, a moderate to major beneficial impact. Although a relatively small percentage of visitors currently engage in bicycling while visiting the Park, it could be expected that the popularity of this activity would increase because of the new facilities.

The main differences between Alternative 3 and Alternative 3a are as follows: Alternative 3a includes the addition of pathway spurs in two areas (North Jenny Lake Junction to String Lake and along Sagebrush Drive and Spring Gulch Road), and the pathway within the road corridor rather than a widened shoulder from North Jenny Lake Junction to Colter Bay. These actions would result in long-term, beneficial impacts to visitor experience.

In addition, implementation of a limited transit system, pending the results of the TBP, would result in long-term, regional, minor, beneficial impacts by providing a means for visitors to access certain areas of the Park without the need to depend on private automobiles. It is anticipated that this additional service would tend to serve visitors



(and employees) having a single or limited number of destinations for the day (or a large portion of a day), rather than as an alternative to pleasure driving or touring the Park. For example, the shuttle service could allow lodge and campground guests to access a trailhead in the Park from which to begin a hike, without having the need for a car. It could also provide a shuttle between various trailheads, making possible circuit hikes that cannot currently be done without having two cars. Transit vehicles would be equipped with bicycle carriers in order to allow visitors to reach certain parts of the pathway system without having to ride the entire distance. Visitors would receive additional information about existing transit in the area that would help with trip planning and could reduce traffic congestion.

Adverse effects on visitor use and experience would also result from the construction of multi-use pathways. These new facilities would, to varying degrees, intrude upon the natural landscape and therefore adversely affect the experience of some visitors by increasing the development footprint and altering the character of the road corridor through increased development. Construction of a pathway within the road corridor along a portion of the Moose-Wilson Road would noticeably alter the character of the area resulting in long-term, localized, minor to moderate, adverse impacts on visitor use and experience. Similar impacts would also occur on forested sections of the Teton Park Road and North Park Road.

Realignment of the Moose-Wilson Road would have short-term, localized, moderate, adverse effects on commuting times and quality of travel experience for both visitors and park personnel; however, these would only be short-term construction-related impacts and would have a long-term, localized, minor to moderate, beneficial impact on transportation and traffic along the Moose-Wilson Road.

As described for Alternative 1, the effect of management strategies on the Moose-Wilson Road would result in both beneficial and adverse impacts on visitor experience, and would vary between different strategies. Overall, most visitors using the Moose-Wilson Road would experience a long-term, localized, minor, beneficial impact because the current character of the road would be maintained. Some visitors could be inconvenienced under some management strategies if they were not able to travel in the direction they desired or reach one of the trailheads without driving around through Jackson. In general, implementation of the various strategies would result in short-term, localized, minor impacts, both beneficial and adverse.

Construction of separate entrance lanes at entrance stations and reconfiguration of some parking areas would improve the visitor experience by reducing congestion and waiting times. Long-term, localized, negligible to minor, beneficial impacts relative to the No Action Alternative would also result from improved traveler information, such as information kiosks, improved way finding, enhanced use of four additional variable messaging signs, and traveler information radio broadcasts. Work to social trails and additional way finding in high visitor use areas would occur under this alternative improving the visitor experience.

Employee Use and Experience

Under this alternative, a larger system of multi-use pathways would be provided along high-use roadways, safer bicycling routes would be available for employees, and social trails would be improved and delineated in several activity areas. The safety, convenience, and quality of travel for employees who bicycle and walk to and from work would be improved. Multi-use pathways would connect Moose to Jackson, Teton Village, Beaver Creek, South Jenny Lake, and points further north. Improvements in pathway systems at activity areas would connect employee housing to the main activity areas within Colter Bay and Signal Mountain Lodge.

If implemented pending the results of the TBP, a pilot transit program could provide service between Jackson and Moose, Jenny Lake, and Colter Bay via the Teton Park Road. Employees with access to vehicles could continue to commute to work by personal vehicle. The pilot transit service could provide a convenient alternative, though with possibly longer commute times. Employees without access to a personal vehicle would experience improved mobility options. Access to work sites and recreation opportunities would be available for almost all employees in the Park.

Short-term construction-related impacts on employee experience would be expected to consist of short delays on some localized areas of roadways, which would affect access to certain locations, the commute to and from work, and work-related travel within the Park, for some employees. The impact to employee experience would be short-term, localized, negligible to minor, and adverse. Construction of separate entrance lanes for employees would reduce the time waiting at the gate resulting in long term, localized, negligible to minor, beneficial impacts. Managing traffic volumes by testing management strategies on the Moose-Wilson Road would have an effect on employee use of the road by reducing the options available for commuting on this route.

Cumulative Impacts

Cumulative impacts on visitor experience would be generally the same as under the other alternatives. Recent, current, and planned projects within Grand Teton National Park that would influence employee mobility within the Park are the same as for Alternative 1. The impacts of these related actions, in conjunction with the impacts of Alternative 3a, would result in long-term, minor to moderate, beneficial cumulative impacts on employee mobility options; short-term, negligible to minor, adverse cumulative impacts on commuting time; and long-term, moderately beneficial cumulative impacts on visitor experience.

Conclusion

Overall, implementation of Alternative 3a would result in long-term, localized and regional, minor to major, beneficial impacts associated with the additional pathways and transit, and short- and long-term, localized, minor to moderate, adverse impacts on visitor and employee experience. Cumulative impacts would include long-term, negligible to minor, adverse cumulative impacts to employee commuting time; long-term, negligible, beneficial impacts on employee mobility choices; and long-term, moderately beneficial impacts on visitor experience.

Effects of Alternative 4 — Multi-Use Pathways

Visitor Use and Experience

Compared to the No Action Alternative, implementation of Alternative 4 would result in additional long-term, localized and regional, moderate to major, beneficial impacts on visitor experience due to the availability of approximately 42.6 miles (68.4 km) of multi-use pathways outside the road corridor. These improvements would enhance opportunities for safe and enjoyable bicycling in the Park, a moderate to major beneficial impact. Although a relatively small percentage of visitors currently engage in bicycling while visiting the Park, it could be expected that the popularity of this activity would increase because of the new facilities.

The main differences between Alternative 3a and Alternative 4 are as follows: Alternative 4 includes the construction of multi-use pathways outside the road corridor rather than inside the road corridor from North Jenny Lake Junction to Colter Bay, and construction of multi-use pathways outside the road corridor along the entire the Moose-Wilson Road rather than just to the LSR Preserve. In addition, the pathway spurs to String Lake and along Sagebrush Drive and Spring Gulch Road would not be constructed.

Implementation of a limited transit system, pending the results of the TBP, would result in long-term, localized and regional, minor, beneficial impacts by providing a means for visitors to access certain areas of the Park without the need to depend on private automobiles. It is anticipated that this additional service would tend to serve visitors (and employees) having a single or limited number of destinations for the day (or a large portion of a day), rather than as an alternative to pleasure driving or touring the Park. For example, the shuttle service could allow lodge and campground guests to access a trailhead in the Park from which to begin a hike, without having the need for a car. It could also provide a shuttle between various trailheads, making possible circuit hikes that cannot currently be done without having two cars. Transit vehicles would be equipped with bicycle carriers in order to allow visitors to reach certain parts of the pathway system without having to ride the entire distance. Visitors would receive additional information about existing transit in the area that would help with trip planning and would reduce traffic congestion.

Adverse effects on visitor use and experience would result from the construction of multi-use pathways. These new facilities would, to varying degrees, intrude upon the natural landscape and therefore adversely affect the experience of some visitors by increasing the development footprint and thereby altering the character of the road corridor through increased development. Construction of a pathway along the Moose-Wilson Road corridor would noticeably alter the character of the area due to the removal of large numbers of trees in segments of the corridor that are forested, resulting in long-term, localized, minor to moderate, adverse impacts on visitor use and experience. Similar impacts would also occur on forested sections of the Teton Park Road and North Park Road.

Realignment of the Moose-Wilson Road would have short-term, localized, moderate, adverse effects on commuting times and quality of travel experience for both visitors and park personnel; however, these would only be short-term construction-related impacts and would have a long-term, localized, minor to moderate, beneficial impact on transportation and traffic along the Moose-Wilson Road.

As described for Alternative 1, the effect of management strategies on the Moose-Wilson Road would result in both beneficial and adverse impacts on visitor experience, and would vary between different strategies. Overall, most visitors using the Moose-Wilson Road would experience a beneficial impact because traffic levels



would be maintained or reduced. Some visitors could be inconvenienced under some management strategies if they were not able to travel in the direction they desired or reach one of the trailheads without driving around through Jackson. In general, implementation of the various strategies would result in short-term, localized, minor impacts both beneficial and adverse.

Construction of separate entrance lanes and reconfiguration of some parking areas would improve the visitor experience by reducing congestion and waiting times resulting in long term, localized, negligible to minor, beneficial impacts. Beneficial impacts relative to the No Action Alternative would also result from improved traveler information, such as information kiosks, improved way finding, enhanced use of four additional variable messaging signs, and traveler information radio broadcasts. Work to social trails and additional way finding would occur under this alternative improving the visitor experience.

Employee Use and Experience

Under this alternative, a large system of multi-use pathways would be provided along high-use roadways, safer bicycling routes would be available for employees, and social trails would be improved and delineated in several activity areas. The safety, convenience, and quality of travel for employees who bicycle and walk to and from work would be improved. Multi-use pathways would connect Moose to Jackson, Teton Village, Beaver Creek, South Jenny Lake, and points further north. Improvements in pathway systems at activity areas would connect employee housing to the main activity areas within Colter Bay and Signal Mountain Lodge.

If implemented pending the results of the TBP, a pilot transit program could provide service between Jackson and Moose, Jenny Lake, and Colter Bay via the Teton Park Road. Employees with access to vehicles could continue to commute to work by personal vehicle. The pilot transit service could provide a convenient alternative, though with possibly longer commute times. Employees without access to a personal vehicle would experience improved mobility options. Access to work sites and recreation opportunities would be available for almost all employees in the Park.

Short-term construction-related impacts on visitor and employee experience would be expected to consist of short delays on some localized areas of roadways, which would affect visitor access to certain locations, the commute to and from work, and work-related travel within the Park, for some employees. The impact to employee experience would

be negligible to minor and adverse. Construction of separate entrance lanes for employees would reduce the time waiting at the gate resulting in long term, localized, negligible to minor, beneficial impacts. Managing traffic volumes by testing management strategies on the Moose-Wilson Road would have an effect on employee use of the road by reducing the options available for commuting on this route.

Cumulative Impacts

Cumulative impacts on visitor experience would be generally the same as under the other four alternatives. Recent, current, and planned projects within Grand Teton National Park that would influence employee mobility within the Park are the same as for Alternative 1. The impacts of these related actions, in conjunction with the impacts of Alternative 4, would result in long-term, minor to moderate, beneficial impacts on employee mobility options; short-term, negligible to minor, adverse impacts on commuting time; and long-term, moderately beneficial, impacts on visitor experience.

Conclusion

Overall, implementation of Alternative 4 would result in long-term, localized and regional, minor to major, beneficial impacts associated with the additional pathways and transit, and short- and long-term, localized, minor to moderate, adverse impacts on visitor and employee use and experience. Cumulative impacts would include long-term, negligible to minor, adverse impacts to employee commuting time; long-term, negligible, beneficial impacts on employee mobility choices; and long-term, moderately beneficial impacts on visitor experience.

Social and Economic Environment

Methods and Assumptions

This analysis considers effects of the five alternatives on the population, economic activity, housing, community infrastructure, public sector fiscal conditions, local governance, social institutions, and quality of life. The approach to assessing the socioeconomic impacts of the transportation alternatives relies on three factors: (1) existing conditions at Grand Teton National Park in the context of the surrounding socioeconomic environment; (2) the linkages between different elements of the economic and social environment; and (3) the aspects of the transportation alternatives that would trigger changes in the contextual relationships. Given these factors, the direct, indirect, and induced socioeconomic consequences of the transportation-related changes were assessed. The

analysis considers the magnitude or intensity and duration of consequences, as well as the temporal, spatial, and distributional dimensions of their incidence.

The existing economic and social linkages between the Park and Jackson/regional environment are predicated on the Park’s proximity to the community, the relatively limited private land in the area, the geographical relationship between the Park and regional highway network, and the outstanding scenic beauty and rich recreational, historical, and cultural resources of the Park. These factors combined with annual visitation that consistently ranks Grand Teton National Park among the top 10 national parks administered by the NPS, create conditions wherein the Park’s presence plays a substantial role in shaping the local economic and social environment.

A review of the transportation alternatives identified the primary aspects of the alternatives that could trigger socioeconomic impacts. Those events and actions include:

- Construction and related capital expenditures associated with implementation.
- Annual transportation system operating and maintenance expenditures.
- Changes in business opportunities, particularly those of concessioners, associated with transportation-related changes in accessibility.

Beyond the actions identified above, a fundamental assumption of the analysis is that the transportation alternatives would slightly alter the geographical distribution of visitors within the Park or the activity profile of their visits, but the overall level of future visitation would be essentially unaffected or negligibly increase. In light of the assumption regarding visitation, the socioeconomic analysis is relatively straightforward. Quantitative estimates of direct costs and employment serve as the basis for estimating the associated indirect and induced effects using a traditional “economic multiplier” approach. The subsequent incidence of those effects is then determined based on comparisons to changes under the No Action Alternative and professional judgment.

Impact Threshold Definitions	
Negligible	No effects would occur, or the effects to socioeconomic conditions would be below or at the level of detection and with no discernible effect on the character of the social and economic environment.
Minor	The effects to socioeconomic conditions would be detectable. Any effects would be small and, if mitigation is needed to offset potential adverse effects, would be simple and successful and not expected to alter the character of the established social and economic environment.
Moderate	The effects to socioeconomic conditions would be readily apparent. Any effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive but would likely be successful and could have an appreciable effect on the social and economic environment.
Major	The effects to socioeconomic conditions would be readily apparent and would cause substantial changes to socioeconomic conditions in the region. Mitigation measures to offset potential adverse effects would be extensive and their success could not be guaranteed and are likely to have a noticeable influence on the social and economic environment.
Duration	Short term — occurs only during the treatment effect/project period.
	Long term — occurs after the treatment effect/beyond project period.
Area of Analysis	The two-county area encompassing Teton County, Wyoming, and neighboring Teton County, Idaho.



Effects of Alternative 1 — No Action

Population, Demographics, and Mobility

The underlying economic conditions that have stimulated the region's population growth, high levels of immigration and economic expansion are expected to continue over the foreseeable future. Consequently, long-term population growth would occur under the No Action Alternative.

The resident population of Teton County, Wyoming, is projected to increase to 26,179 by 2010, a 43 percent increase over the year 2000, and the population of Teton County, Idaho, is expected to climb to 6,579, or 14 percent, over the same period (Table 25). Seasonal and visitor populations would also increase.

The strong growth would sustain high levels of net immigration to the region. Teton County, Idaho, would likely see a continuation of the spillover effects of the growth in the Jackson area as some new residents opt to live in Teton County, Idaho, and commute to jobs in neighboring Teton County, Wyoming.

The economic and social influences associated with the Park's presence, its operations and staff, and visitors attracted to the area would continue with no fundamental change. Thus, while the Park would remain an important factor in the socioeconomic landscape, its operations and functioning under Alternative 1 would result in no substantial changes to current conditions in altering that landscape, representing at most an indirect response to slight increases in visitation levels.

	2000	2005	2010	Changes
Teton County, Wyoming	18,251	21,951	26,179	+7,928/+43%
Teton County, Idaho	5,793	6,177	6,579	+783/+14%

Sources: Teton County Housing Authority 2002 and Idaho Commerce and Labor 2005

Cumulative Impacts

Long-term changes in socioeconomic conditions in the region would occur over the next 10 to 20 years. Economic and population growth in the region are driven not so much by discrete and foreseeable activities or events (i.e., the recruitment of a large new employer), but by a series of many smaller, largely independent actions on behalf of individuals, businesses, and governmental

agencies. Together, these actions are expected to increase employment by about 10,000 jobs, result in population growth of 43 percent between 2000 and 2010, spur construction of upwards of 4,000 new dwellings units, and affect local quality-of-life. These changes themselves constitute major long-term changes in regional socioeconomic conditions.

The socioeconomic impacts of Alternative 1, in combination with the major effects from other actions identified above, would result in major cumulative socioeconomic impacts both beneficial and adverse. However, the increment associated with Alternative 1 would be negligible, relative to the overall cumulative socioeconomic impacts.

Conclusion

Alternative 1 would result in long-term, regional, negligible, and slightly beneficial socioeconomic impacts. The economic and social influences associated with the presence of the Park, its operations, staff and the visitors attracted to the area would continue with no fundamental change and there would be no substantial changes in the socioeconomic landscape, representing at most an indirect response to slight increases in visitation levels. Cumulative impacts would be long-term, both beneficial and adverse, and major, with the increment associated with this alternative considered negligible.

Effects of Alternative 2 — Improved Road Shoulders

The transportation system management changes proposed under Alternative 2 would generate a small amount of economic stimulus into the regional economy beyond that associated with the No Action Alternative. The TBP would be developed to determine whether or not it is feasible to begin a transit system in and around Grand Teton National Park. Under this alternative pilot transit could be implemented based on the results of the TBP. The direct stimuli associated with Alternative 2 would be the capital investment of approximately \$13 million (Table 4) to improve road shoulders for use by bicyclists, for development of the TBP, and to add to the information system. Because the specific implementation details would be guided by the TBP it is difficult to estimate the impacts of a transit system in the Park.

Population, Demographics and Mobility

Any temporary impacts due to construction activities involving non-local contractors would be within the scope of such activities that already occur within the regional

economy from time to time during short periods of construction. Implementation of transit could add jobs in the long-term; however, the exact effects are not known. Population changes over the long term under Alternative 2 are estimated at fewer than 20 people. The temporary and long-term population impacts of Alternative 2 are of such a limited scale as to have only a negligible impact. The overall effects would be short- and long-term, regional, negligible to minor, and beneficial.

Cumulative Impacts

The incremental impacts of Alternative 2 would contribute little to long-term cumulative social and economic impacts in the region. Project-related effects, including employment, population and housing demand, would be seasonal in nature and small in magnitude. While the traveling public and residents of the local community would be aware of some of the physical equipment and devices associated with Alternative 2, few would be cognizant of the presence of any additional staff at the Park, or their incomes within the community.

Thus, the impacts of Alternative 2, in combination with the major regional socioeconomic impacts arising from underlying growth trends, would result in major cumulative socioeconomic impacts, both beneficial and adverse. However, the increment associated with Alternative 2 would be negligible in the context of overall cumulative socioeconomic impacts.

Conclusion

Alternative 2 would result in no readily discernible or apparent effect on local economic and social conditions, either temporary or long term. The overall effects would be short- and long-term, regional, negligible to minor, and beneficial. Cumulative impacts would be long-term, major, and both beneficial and adverse, with the increment associated with this alternative considered negligible.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Under Alternative 3, approximately 23.3 miles (37.3 km) of multi-use pathways would be developed outside the road corridor and shoulders would be improved along 15.5 miles (25.0 km) of roadway. The TBP would be developed to determine whether or not it is feasible to begin a transit system in and around Grand Teton National Park. Under this alternative, pilot transit could be implemented based on the results of the TBP. The pilot transit service and construction activities proposed under Alternative 3 would generate added economic stimulus into the regional

economy beyond that associated with Alternative 1. The direct stimuli associated with Alternative 3 would be a capital investment of approximately \$35 million (Table 4). Because the specific implementation details would be guided by the TBP it is difficult to estimate the impacts of a transit system in the Park.

Population, Demographics and Mobility

The temporary and long-term population impacts of Alternative 3 are comparable to those for Alternative 2, with a slight increase due to construction of the planned pathway system. Demand for housing for temporary workers would increase resulting in a short-term, regional, minor, adverse impact. Those impacts would be minor relative to the current population and the growth anticipated under Alternative 1, and neither inherently beneficial nor adverse in character. Overall, Alternative 3 would have minor economic and social impacts in the region.

Cumulative Impacts

The incremental socioeconomic effects of Alternative 3 represent a small portion of the underlying cumulative trends affecting economics, demographics, and quality-of-life in the region. Thus, the impacts of Alternative 3, in combination with the major regional socioeconomic impacts arising from underlying growth trends, would result in long-term, major cumulative socioeconomic impacts, both beneficial and adverse. However, the increment associated with Alternative 3 would be minor in the context of overall cumulative socioeconomic impacts.

Conclusion

Alternative 3 would result in minor economic and social impacts in the region. The impacts would consist of both direct and indirect elements and tend to be seasonal in nature, with both short-term and long-term dimensions. Impacts on local housing conditions would be minor, but adverse. These impacts would occur against a backdrop of other trends and influences that are likely to continue as the primary agents of change in the region. The overall effects would be short- and long-term, regional, minor, and beneficial and adverse. Cumulative impacts would be long term, major, and both beneficial and adverse, with the increment associated with this alternative considered minor.

Effects of Alternative 3a — Preferred Alternative

The pilot transit service and construction actions proposed under Alternative 3a would generate added economic stimulus into the regional economy beyond that associated



with Alternative 1. The TBP would be developed to determine whether or not it is feasible to begin a transit system in and around Grand Teton National Park. Under this alternative pilot transit could be implemented based on the results of the TBP. The direct stimuli associated with Alternative 3a would be a capital investment of approximately \$45 million (Table 4). Because the specific implementation details would be guided by the TBP it is difficult to estimate the impacts of a transit system in the Park.

The main differences between Alternatives 3 and 3a are as follows: Alternative 3a includes the addition of pathway spurs in two areas (North Jenny Lake Junction to String Lake and along Sagebrush Drive and Spring Gulch Road), and the pathway within the road corridor rather than a widened shoulder from North Jenny Lake Junction to Colter Bay. These differences would result in an increase in cost, particularly in the North Jenny Lake to Colter Bay area, but the increment would not affect socioeconomics at a regional level.

Population, Demographics and Mobility

The temporary and long-term population impacts of Alternative 3a are comparable to those for Alternative 3, with a slight increase due to the more expanded pathway system planned. Demand on housing for temporary workers would increase resulting in a short-term, regional, minor, adverse impact. Those impacts would be minor relative to the current population and the growth anticipated under Alternative 1, and neither inherently beneficial nor adverse in character. Overall, Alternative 3a would result in short- and long-term, regional, minor, beneficial economic and social impacts in the region.

Cumulative Impacts

The incremental socioeconomic effects of Alternative 3a represent a small portion of the underlying cumulative trends affecting economics, demographics, and quality-of-life in the region. Thus, the impacts of Alternative 3a, in combination with the major regional socioeconomic impacts arising from underlying growth trends, result in long-term, major cumulative socioeconomic impacts, both beneficial and adverse. However, the increment associated with Alternative 3a would be negligible in the context of overall cumulative socioeconomic impacts.

Conclusion

Alternative 3a would result in minor economic and social impacts in the region. The impacts would consist of both direct and indirect elements and tend to be seasonal in nature, with both short-term and long-term dimensions.

Impacts on local housing conditions would be minor, but adverse. These impacts would occur against a backdrop of other trends and influences that are likely to continue as the primary agents of change in the region. Overall, Alternative 3a would result in short- and long-term, regional, minor, beneficial and adverse, economic and social impacts in the region. Cumulative impacts would be long term, major, and both beneficial and adverse, with the increment associated with this alternative considered negligible.

Effects of Alternative 4 — Multi-Use Pathways

The pilot transit service and construction actions proposed under Alternative 4 would generate added economic stimulus into the regional economy beyond that associated with Alternative 1. The TBP would be developed to determine whether or not it is feasible to begin a transit system in and around Grand Teton National Park. Under this alternative pilot transit could be implemented based on the results of the TBP. The direct stimuli associated with Alternative 4 would be a capital investment of approximately \$48 million (Table 4). Because the specific implementation details would be guided by the TBP it is difficult to estimate the impacts of a transit system in the Park.

The main differences between Alternative 3a and Alternative 4 are as follows: Alternative 4 includes the construction of multi-use pathways outside the road corridor rather than within the road corridor from North Jenny Lake Junction to Colter Bay, and construction of multi-use pathways outside the road corridor along the entire the Moose-Wilson Road. In addition, the pathway spurs to String Lake and along Sagebrush Drive and Spring Gulch Road would not be constructed.

Population, Demographics and Mobility

The temporary and long-term population impacts of Alternative 4 are comparable to those for Alternatives 3 and 3a, with a slight increase due to the more expanded pathway system planned. Demand on housing for temporary workers would increase, a minor adverse impact. Those impacts would be minor relative to the current population and the growth anticipated under Alternative 1, and neither inherently beneficial nor adverse in character. Overall, Alternative 4 would result in short- and long-term, regional, minor, beneficial economic and social impacts in the region.

Cumulative Impacts

The incremental socioeconomic effects of Alternative 4 represent a small portion of the underlying cumulative trends affecting economics, demographics, and quality-of-life in the region. Thus, the impacts of Alternative 4, in combination with the major regional socioeconomic impacts arising from underlying growth trends, result in long-term, major cumulative socioeconomic impacts, both beneficial and adverse. However, the increment associated with Alternative 4 would be negligible in the context of overall cumulative socioeconomic impacts.

Conclusion

Alternative 4 would result in minor economic and social impacts in the region. The impacts would consist of both direct and indirect elements and tend to be seasonal in nature, with both short-term and long-term dimensions. Impacts on local housing conditions would be minor, but adverse. These impacts would occur against a backdrop of other trends and influences that are likely to continue as the primary agents of change in the region. Overall, Alternative 4 would result in short- and long-term, regional, minor, beneficial and adverse economic and social impacts in the region. Cumulative impacts would be long term, major, and both beneficial and adverse, with the increment associated with this alternative considered negligible.

Local Communities

Methods and Assumptions

This analysis considers opportunities afforded by each of the alternatives to increase collaboration and partnering between the Park and local gateway communities. This Final Plan/EIS offers opportunities for Grand Teton National Park to collaborate with local gateway communities in addressing common transportation problems and issues. For this planning effort, each of the action alternatives has been framed in a slightly different manner to promote future collaboration between the Park and surrounding communities, though measuring the extent of such collaboration is only possible in a qualitative sense.

Alternatives that maximize the ability of local communities (the public and cooperative agencies) to embrace or participate in transportation networking opportunities that promote or maximize the ability of the Park to cooperate and participate with the local community would be favored. Adverse impacts would be actions that would weaken or not maximize the Park’s relationship with the local community. Conversely, beneficial impacts would be actions that strengthen or maximize the relationship of the local community with the Park.

Impact Threshold Definitions	
Negligible	Changes in local community participation would be below the level of detection. Little noticeable change in opportunities for collaboration. Changes would affect a small proportion of park neighbor(s).
Minor	Changes in local community participation would be detectable, although the changes would be slight and likely short term. Detectable changes in collaboration, though highly limited in scope (e.g., a single project in a localized geographic area). Changes would affect a small proportion of park neighbor(s).
Moderate	Changes in local community participation would be readily apparent and mostly long term. Readily detectable changes in collaboration, across multiple projects or geographic areas. Changes would affect a moderate proportion of park neighbor(s).
Major	Changes in local community participation would be readily apparent and have substantial long-term consequences. Readily apparent changes in collaboration, across virtually all project and geographic areas, and involving substantial financial partnerships and cost sharing. Changes would affect a large proportion of park neighbor(s).
Duration	Short term — Effects extend only through the period of one project or event.
	Long term — Effects extend beyond the project or event and generally last for the duration of the Final Plan/EIS.
Area of Analysis	The developing areas of Teton County, Wyoming, surrounding Grand Teton National Park to the east and south, YNP to the north, and the Teton crest with several small communities on the “Idaho side” (which includes the western-most portions of Teton County, Wyoming, as well as Teton County, Idaho) to the west.



Effects of Alternative 1 — No Action

Under the No Action Alternative (Alternative 1), the Park could collaborate with town and county partners on future projects. The TBP would be developed but no action would be taken to implement a transit program in the Park. The Park would continue to permit Grand Teton Lodge Company to operate existing levels of transit service in the Park, serving mainly lodge guests, but would not encourage increased visibility for this transit service or any expansion. Finally, it is expected that the Park would respond to the construction of multi-use pathways in Teton County that would approach the south park boundaries on a case-by-case basis.

Several different adaptive management strategies would be tested on the Moose-Wilson Road over the next few years, with the objective of managing traffic volumes to retain the existing character of the road corridor. Under all strategies, two-way traffic would be maintained from Moose to the LSR Preserve and from the Granite Canyon Entrance Station to the Granite Canyon Trailhead. Between the Granite Canyon Trailhead and the LSR Preserve, the NPS may test strategies such as direction of traffic flow or other techniques to manage vehicle use of the road. In any event, the Park would work closely with the local community in order to develop and publicize adaptive management strategies well in advance of their implementation in order to avoid confusion and disruption, and mitigate potential impacts.

The overall level of coordination and integration between the Park and gateway communities would remain modest and focused on individual project opportunities, resulting in a long-term, negligible to minor, beneficial impact on collaboration and partnerships between the Park and its gateway communities. Only a limited number of visitors and local residents would benefit from the collaboration that did exist.

Lifestyle and Social Conditions

Local governments and the community at large would continue their multi-faceted efforts to address a wide spectrum of “quality of life” issues in the face of ongoing growth and development under the No Action Alternative. In addition to housing, those issues include the preservation of open space and scenic vistas, community infrastructure development, preservation of small town values and the area’s western heritage, supporting a socially and economically diverse population, and local public and other transportation needs. Alternative 1 would continue the status quo within the Park regarding transportation

needs, and it would not contribute beneficial or adverse effects on the regional quality of life.

Cumulative Impacts

Cumulative impacts to local communities include the opening of a major new visitor center at Moose and the addition of the LSR Preserve to the Park. Both of these may draw both local residents as well as visitors from out of town. Long-term impacts would be negligible to minor and beneficial.

Development in Teton County, especially around Jackson, Wilson, and Teton Village, is ongoing and private lands have not yet reached maximum build-out. The extent and timing of this build-out is unknown at this time. Projects that have been planned or recently completed could increase both residential and guest activity at the following sites: Four Seasons, Teton Mountain Lodge, Snake River Lodge & Spa, Moose Creek Townhomes, Teton Club, Millward Project (Wyoming Highway 390), and Jackson Hole Golf and Tennis. Together, these projects would add 100 to 140 dwelling units and between 300 and 350 guest units.

Teton County has developed and continues to expand its trail system primarily along existing roads. Among the recently completed and planned projects are:

- **Moose-Wilson Trail:** This project completes a trail for approximately 7.0 miles (11.2 km), from Wyoming Highway 22 to the southwest park boundary along Wyoming Highway 390.
- **Jackson-Moose Scenic Pathway:** This project would complete a trail of approximately 3.5 miles (5.6 km) from Jackson to the Park boundary.
- **Regional Trails:** The following trails are also scheduled for future construction – Teton Pass Millennium Trail (18.0 miles [28.9 km]) from Wilson to Victor; Hoback Junction Pathway (5.7 miles [9.2 km]) from Game Creek to Hoback Junction; Hoback Junction Pathway (5.7 miles [9.2 km]) from Game Creek to Hoback Junction; Wyoming Centennial Scenic Byway – U.S. Highway 26/191 (location unclear); and Wyoming Highway 22 Pathway and Snake River Bridge (95.5 miles [8.8 km]) from the Y-intersection to Wilson.

Long-term impacts would be negligible to minor and beneficial. Overall, impacts of actions described under Alternative 1, combined with impacts of other actions that could affect local communities, would result in long-term, negligible to minor, beneficial cumulative impacts on

inter-jurisdictional collaboration between the Park and surrounding gateway communities.

Conclusion

Alternative 1 would result in a long-term, regional, negligible to minor, beneficial impact on collaboration between the Park and its gateway communities.

Collaboration would continue at a modest and project specific level. Cumulative impacts on local communities would be long term, negligible to minor, and beneficial.

Effects of Alternative 2 — Improved Road Shoulders

Alternative 2 proposes increased publicity of existing transit services to park visitors. The TBP would be developed to determine whether or not it is feasible to begin a transit system in and around Grand Teton National Park. If a pilot transit service were implemented it could include routes between Jackson and Moose, Jenny Lake, and Colter Bay via the Teton Park Road. Transit would provide a means for visitors to access certain areas of the Park without the need to depend on private automobiles. It is anticipated that this additional service would tend to serve visitors (and employees) having a single or limited number of destinations for the day (or a large portion of a day), rather than as an alternative to pleasure driving or touring the Park. For example, the shuttle service could allow lodge and campground guests to access a trailhead in the Park from which to begin a hike, without having the need for a car. It could also provide a shuttle between various trailheads, making possible circuit hikes that cannot currently be done without having two cars. A transit service would be expected to have long-term, regional, negligible to minor, beneficial impacts on coordination between the Park and gateway communities. A small portion of visitors and local residents would be affected by implementation. Transit use would be purely voluntary.

There would be occasional road restrictions on Signal Mountain Road to provided non-motorized users the opportunity to use the roadway at certain times and improve the experience and safety of users. In all other areas of the Park, bicyclists and pedestrians would share the road with vehicular traffic. Selected shoulder improvements would be proposed to connect key destinations or correct measurable public safety hazards along the Teton Park Road. Implementation of this alternative would result in long-term, regional, negligible to minor, beneficial impacts on coordination between the Park and gateway communities.

Finally, Alternative 2 proposes substantial improvements to the Park's traveler information system, including dissemination of real time information to lodge guests; placement of variable messaging signs at key intersections to disseminate information about construction delays, congested areas, accidents, wildlife jams, and similar transportation problems; and improvement of the Park's website. These actions would provide long-term, localized and regional, minor, beneficial impacts for a segment of the local and out-of-area visitor population. Effects from implementation of the various strategies on the Moose-Wilson Road would result in short- and long-term, localized, negligible impacts, both beneficial and adverse, as described for Alternative 1.

Lifestyle and Social Conditions

Alternative 2 would trigger few changes in the local quality of life. Efforts to enhance motorist safety through the improvement of roadway shoulders on the Teton Park Road, and reduce congestion through providing additional travel options, would benefit residents of the region. However, some residents would perceive adverse effects related to temporal road restrictions on Signal Mountain Road and the Moose-Wilson Road. The scale and timing of these impacts would be such that they would be considered minor and indeterminate in character.

Cumulative Impacts

Cumulative impacts to local communities would be similar to those described under Alternative 1. Overall, cumulative actions would result in long-term, negligible, beneficial impacts on inter-jurisdictional collaboration, as a result of the improved shoulders; long-term, minor, beneficial impacts as a result of the traveler information system and possible transit; and long-term, negligible, adverse and beneficial impacts, as a result of roadway management on Signal Mountain Road and the Moose-Wilson Road.

Conclusion

Alternative 2 would result in long-term, regional, minor, beneficial impacts on inter-jurisdictional collaboration, as a result of the improved road shoulders that can be used as bicycling trails connecting to Moose; long-term, localized and regional, negligible to minor, beneficial impacts as a result of the traveler information system and implementation of a transit system (pending the results of the TBP), and short-and long-term, localized, minor, adverse and beneficial impacts as a result of roadway management on Signal Mountain and the Moose-Wilson Roads. Cumulative impacts on local communities would be long term, negligible to minor, and beneficial.



Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Alternative 3 proposes increased publicity of existing transit services to park visitors. The TBP would be developed to determine whether or not it is feasible to begin a transit system in and around Grand Teton National Park. If a pilot transit service were implemented it could include routes between Jackson and Moose, Jenny Lake, and Colter Bay via the Teton Park Road. Transit would provide a means for visitors to access certain areas of the Park without the need to depend on private automobiles. It is anticipated that this additional service would tend to serve visitors (and employees) having a single or limited number of destinations for the day (or a large portion of a day), rather than as an alternative to pleasure driving or touring the Park. For example, the shuttle service could allow lodge and campground guests to access a trailhead in the Park from which to begin a hike, without having the need for a car. It could also provide a shuttle between various trailheads, making possible circuit hikes that cannot currently be done without having two cars. A transit service would be expected to have long-term, regional, moderate, beneficial impacts on coordination between the Park and gateway communities. A small portion of visitors and local residents would be affected by implementation. Transit use would be purely voluntary.

Alternative 3 also proposes a system of multi-use pathways and improved road shoulders that would improve the safety and experience of bicyclists and pedestrians. At the south park boundary, a 23.3-mile (37.3-km) pathway outside the road corridor continuing to North Jenny Lake Junction would be designed to interface with the county system, maximizing coordination between facilities. Improved shoulders from North Jenny Lake Junction to Colter Bay (15.5 miles [25.0 km]) would provide a continued link further into the Park.

Likewise, the 3.3-mile (5.3-km) pathway outside the road corridor on a portion of the Moose-Wilson Road would connect with the pathway already constructed along Wyoming Highway 390 by Teton County. Implementation of this alternative would result in long-term, regional, minor to moderate, beneficial impacts on coordination between the Park and gateway communities.

Effects from implementation of the various strategies on the Moose-Wilson Road and improvements to the traveler information system would be the same as described for Alternative 2. Strategies in the AMP could help to reduce traffic on the north section of the road where there would

be mixed use (vehicles and bicyclists) because no pathway is proposed.

Lifestyle and Social Conditions

Alternative 3 could provide a higher level of transit service pending the results of the TBP that would benefit some residents and employees that do not have access to personal vehicles or who favor using transit for personal reasons. Outdoor enthusiasts would also benefit from the increased opportunities to cycle on the expanded pathways network. The net effect of Alternative 3 on the local quality of life would be minor, but indeterminate in character.

Cumulative Impacts

Cumulative impacts under Alternative 3 would be similar to those described under Alternatives 1 and 2, with the addition of multi-use pathways increasing mode choice within the Park. Overall, cumulative impacts to local communities would result in long-term, minor, beneficial cumulative impacts on inter-jurisdictional collaboration if a transit system is implemented and long-term, minor to moderate, beneficial cumulative impacts as a result of the pathway system.

Conclusion

Alternative 3 would result in long-term, regional, moderate, beneficial impacts on inter-jurisdictional collaboration if a transit system is implemented and long-term, regional, minor to moderate, beneficial impacts as a result of the pathway system. Cumulative impacts to local communities would be long-term, minor to moderate, and beneficial.

Effects of Alternative 3a — Preferred Alternative

Alternative 3a proposes increased publicity of existing transit services to park visitors. The TBP would be developed to determine whether or not it is feasible to begin a transit system in and around Grand Teton National Park. Under this alternative pilot transit could be implemented based on the results of the TBP. Because the specific implementation details would be guided by the TBP it is difficult to estimate the impacts of a transit system in the Park. If a pilot transit service were implemented it could include routes between Jackson and Moose, Jenny Lake, and Colter Bay via the Teton Park Road. Transit would provide a means for visitors to access certain areas of the Park without the need to depend on private automobiles. It is anticipated that this additional service would tend to serve visitors (and employees) having a single or limited number of destinations for the day (or a large portion of a day), rather than as an alternative to

pleasure driving or touring the Park. For example, the shuttle service could allow lodge and campground guests to access a trailhead in the Park from which to begin a hike, without having the need for a car. It could also provide a shuttle between various trailheads, making possible circuit hikes that cannot currently be done without having two cars. A transit service would be expected to have long-term, regional, moderate, beneficial impacts on coordination between the Park and gateway communities. A small portion of visitors and local residents would be affected by implementation. Transit use would be purely voluntary.

Alternative 3a also proposes a more expanded system of multi-use pathways that would improve the safety and experience of bicyclists and pedestrians. From the south park boundary, a pathway outside the road corridor to North Jenny Lake Junction and within the road corridor continuing from there to Colter Bay via the Teton Park Road would be designed to interface with the county system, maximizing coordination between facilities. Likewise, the 3.3 mile (5.3 km) pathway within the road corridor on a portion of the Moose-Wilson Road would connect with the pathway already constructed along Wyoming Highway 390 by Teton County.

The main differences between Alternatives 3 and 3a are as follows: Alternative 3a includes the addition of pathway spurs in two areas (North Jenny Lake Junction to String Lake and along Sagebrush Drive and Spring Gulch Road), and the pathway within the road corridor rather than a widened shoulder from North Jenny Lake Junction to Colter Bay. Implementation of Alternative 3a would result in long-term, regional, minor to moderate, beneficial impacts on coordination between the Park and gateway communities.

Effects from implementation of the various strategies on the Moose-Wilson Road and improvements to the traveler information system would be the same as described for Alternative 2. Strategies in the AMP could help to reduce traffic on the north section of the road where there would be mixed use (vehicle and bicyclist) because no pathway is proposed.

Lifestyle and Social Conditions

Alternative 3a could provide a higher level of expanded transit service pending the results of the TBP that would benefit some residents and employees that do not have access to personal vehicles or favor using transit for personal reasons. Outdoor enthusiasts would also benefit from the increased opportunities to cycle on the expanded pathways network. The net effect of Alternative 3a on the

local quality of life would be minor, but indeterminate in character.

Cumulative Impacts

Cumulative impacts under Alternative 3a would be similar to those described under the other alternatives, with the addition of a larger pathway system increasing mode choice within the Park. Overall, cumulative impacts to local communities would result in long-term, minor, beneficial cumulative impacts on inter-jurisdictional collaboration if a transit system is implemented and long-term, minor to moderate, beneficial cumulative impacts as a result of the pathway system.

Conclusion

Alternative 3a would result in long-term, regional, moderate beneficial impacts on inter-jurisdictional collaboration if a transit system is implemented and long-term, regional, minor to moderate, beneficial impacts as a result of the pathway system. Cumulative impacts to local communities would be long-term, minor to moderate, and beneficial.

Effects of Alternative 4 — Multi-Use Pathways

Alternative 4 proposes increased publicity of existing transit services to park visitors. The TBP would be developed to determine whether or not it is feasible to begin a transit system in and around Grand Teton National Park. Under this alternative pilot transit could be implemented based on the results of the TBP. Because the specific implementation details would be guided by the TBP it is difficult to estimate the impacts of a transit system in the Park. If a pilot transit service were implemented it could include routes between Jackson and Moose, Jenny Lake, and Colter Bay via the Teton Park Road.

Transit would provide a means for visitors to access certain areas of the Park without the need to depend on private automobiles. It is anticipated that this additional service would tend to serve visitors (and employees) having a single or limited number of destinations for the day (or a large portion of a day), rather than as an alternative to pleasure driving or touring the Park. For example, the shuttle service could allow lodge and campground guests to access a trailhead in the Park from which to begin a hike, without having the need for a car. It could also provide a shuttle between various trailheads, making possible circuit hikes that cannot currently be done without having two cars. A transit service would be expected to have long-term, regional, moderate, beneficial impacts on coordination



between the Park and gateway communities. A small portion of visitors and local residents would be affected by implementation. Transit use would be purely voluntary.

Alternative 4 would also propose a more expanded system of multi-use pathways that would improve the safety and experience of bicyclists and pedestrians. From the south park boundary, a pathway outside the road corridor all the way to Colter Bay would be designed to interface with the county system, maximizing coordination between facilities. Likewise, the 7.1 mile (11.4 km) pathway outside the road corridor on the entire Moose-Wilson Road would connect with the pathway already constructed along Wyoming Highway 390 by Teton County. This segment of pathway would provide greater connectivity because it would connect with the segments proposed all the way to Colter Bay via Moose or back to the south park boundary.

The main differences between Alternatives 3a and 4 are as follows: Alternative 4 includes the construction of multi-use pathways outside the road corridor rather than within the road corridor from North Jenny Lake Junction to Colter Bay, and construction of multi-use pathways outside the road corridor along the entire the Moose-Wilson Road rather than just to the LSR Preserve. In addition, the pathway spurs to String Lake and along Sagebrush Drive and Spring Gulch Road would not be constructed under Alternative 4. Implementation of this alternative would result in long-term, regional, minor to moderate, beneficial impacts on coordination between the Park and gateway communities.

Effects from implementation of the various strategies on the Moose-Wilson Road and improvements to the traveler information system would be the same as described for Alternative 2.

Lifestyle and Social Conditions

Alternative 4 could provide transit service pending the results of the TBP that would benefit some residents and employees that do not have access to personal vehicles or favor using transit for personal reasons. Outdoor enthusiasts would also benefit from the increased opportunities to cycle on the expanded bike/pathways network. The net effect of Alternative 4 on the local quality of life would be minor, but indeterminate in character.

Cumulative Impacts

Cumulative impacts under Alternative 4 would be similar to those described under the other alternatives, with the addition of a larger pathway system increasing mode choice within the Park. Overall, cumulative actions to local

communities would result in long-term, minor, beneficial cumulative impacts on inter-jurisdictional collaboration if a transit system is implemented and long-term, minor to moderate, beneficial cumulative impacts as a result of the pathway system.

Conclusion

Alternative 4 would result in long-term, regional, moderate, beneficial impacts on inter-jurisdictional collaboration if a transit system is implemented and long-term, regional, minor to moderate, beneficial impacts as a result of the pathway system. Cumulative impacts to local communities would be long-term, minor to moderate, and beneficial.

Park Operations

Methods and Assumptions

For the analysis of impacts to park operations, the principal measure of impact examined is the change in staff required to implement each alternative. The increasing rents and housing prices in the Jackson Hole area, which affect the Park's ability to hire and retain staff, were taken into account when determining the intensity of the impacts.

Estimates were also made of staff requirements for certain key positions that would be affected by implementation of the action alternatives. Park staff familiar with the requirements of these affected positions, including park maintenance, interpretative, and ranger staff, provided input for this analysis. Estimates were made of staff required for oversight and monitoring for proposed roadway improvements, interpretation, enforcement and emergency services for and maintenance of shared use pathways, and administrative support for additional staff. These estimates of staff requirements were compared with staffing under Alternative 1 to derive a measure of impact.

Impact Threshold Definitions	
Negligible	Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on park operations.
Minor	The effect would be detectable, but would be of a magnitude that would not have an appreciable effect on park operations. If mitigation was needed to offset adverse effects, it would be relatively simple and likely successful.
Moderate	The effects would be readily apparent and would result in a change in park operations in a manner noticeable to staff and the public. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
Major	The effects would be readily apparent and would result in a change in park operations in a manner noticeable to staff and the public, and would be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, would be extensive, and their success could not be guaranteed.
Duration	Short term — effects lasting for the duration of any construction.
	Long term — effects lasting longer than the duration of any construction.
Area of Analysis	Within park boundary.

Effects of Alternative 1 — No Action

Under this alternative, no changes in park operations other than those already planned or anticipated are expected, with the exception of the implementation of several different strategies for managing the Moose-Wilson Road. Visitation would remain at about or slightly above current levels through the life of this plan (5 to 10 years). Implementation of various management strategies for the Moose-Wilson Road would result in minor to moderate workload increases for park staff involved in the planning and coordination of these actions, as well as communicating with area residents and park visitors. The level of park staffing may or may not be adjusted to accommodate changes in operations or visitation, were these to occur. In the event that staff levels did not keep pace with workloads, long-term, localized, negligible to minor, adverse impacts could result.

Cumulative Impacts

Cumulative impacts to park operations would include a number of new facility projects planned, including construction and operation of a new visitor center at Moose, replacement of the Moose Entrance Station, acquisition and operation of the LSR Preserve, and adaptive reuse of the White Grass Ranch as a center for historic preservation work.

Each of these actions requires, to varying degrees, increases in budget and staffing levels. Some, but not all, of these additional operating requirements have already been accounted for in base operating increases, while other portions of the increases would be met or partially met through the help of volunteers and park partner organizations (e.g., Grand Teton Natural History

Association, etc.). Increasing rents and housing prices in Jackson Hole area would decrease the ability of Grand Teton National Park to hire and retain staff. The impacts of these related actions, in conjunction with the impacts of Alternative 1, would result in long-term, minor to moderate, adverse cumulative impacts on park operations.

Conclusion

Alternative 1 would result in long-term, localized, negligible to minor, adverse impacts on park operations, if staffing levels do not keep pace with workloads in the future and because increasing rents and housing prices in the local market would make it difficult to attract and retain employees. Cumulative impacts would be long term, minor to moderate, and adverse.

Effects of Alternative 2 — Improved Road Shoulders

Compared to the No Action Alternative, implementation of Alternative 2 would result in minor increases to the level of park operations. Primarily, these would result from the necessity of ranger staff to manage the recurring opening and closing of Signal Mountain Road during the summer. The addition of improved shoulders would result in a small incremental change in road maintenance activities; however, planning, design, and construction of the shoulders would result in a minor to moderate increase in workload and could result in the deferral of other priority projects. Implementation of various management strategies for the Moose-Wilson Road would result in minor to moderate workload increases for park staff involved in the planning and coordination of these actions, as well as communicating with local communities and park visitors.



Additional information about existing transit service would be provided to park visitors under this alternative and development and implementation of a pilot transit program pending the results of the TBP could result in a moderate increase in workload for park staff. Planning, coordinating, contracting, and other activities associated with introducing a new program into park operations would require the addition of new staff, and the time and attention of existing staff and managers.

Information kiosks and way-finding improvements would require periodic maintenance and would add to existing workloads. The enhanced use of information technology to communicate with visitors would also result in additional operating costs and staffing requirements. Beyond the capital costs of the equipment, operational costs would be incurred for such activities as updating the information content, developing and maintaining an improved website, and maintenance of the equipment. In the event that staff levels did not keep pace with workloads, Alternative 2 could result in long-term, localized, minor, adverse impacts.

Cumulative Impacts

Cumulative impacts under Alternative 2 would be essentially the same as those described under Alternative 1, with additional maintenance required on extended shoulders used by bicyclists and other additional needs described above. Overall, cumulative impacts to park operations would be long term, minor to moderate, and adverse.

Conclusion

Alternative 2 would result in long term, localized, minor, adverse impacts on park operations, because staffing levels to perform current functions would not keep pace with workloads in the future and the added responsibilities of expanded shoulders maintenance and other administrative and communication system functions would add to these responsibilities, possibly requiring still more staff. At the same time, increasing rents and housing prices in the local market would make it difficult to attract and retain employees. Cumulative impacts would be long term, minor to moderate, and adverse.

Effects of Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

The addition of multi-use pathways outside the road corridor along approximately 23.3 miles (37.3 km) of roads and improved road shoulders along 15.5 miles (25.0 km) of roads between North Jenny Lake Junction and Colter Bay

would result in an increased workload for park staff in order to perform routine and cyclic maintenance. Annual maintenance and operation cost increases for these additional pathways is estimated at \$417,000 (see Chapter 2). Routine patrols by park staff would be necessary for a variety of purposes related to managing visitor use, but also in order to identify any developing maintenance issues, especially those that could become safety concerns for bicyclists or other users if not addressed promptly. Planning, design, and construction of the new multi-use pathways would result in an increased workload for park staff, and would likely lead to deferral of other high priority projects.

From the south boundary to North Jenny Lake Junction the effects to park operations from pathway construction outside the road corridor would be minor because the pathway in this area would be visible from the roadway in most instances making routine patrols relatively easy. The 3.3-mile (5.3-km) multi-use pathway outside the road corridor along a portion of the Moose-Wilson Road would be harder to patrol because of the forested vegetation in the area.

Other relevant concerns that have been identified associated with pathway development include impacts to wildlife, impacts to wildlife viewers, and wildlife safety hazards for pathway users. In order to provide mitigation and understand more precisely wildlife associated pathway impacts, the Park would implement a research and monitoring program designed to evaluate a variety of pathway effects, beginning with the first phase of construction. Attributes would be measured before, during, and after pathway construction. The estimated cost for the first 3 years of monitoring and research would be approximately \$700,000, and approximately \$100,000 annually for 3 to 5 years thereafter (see Chapter 2).

Operational activities associated with new facilities and programs would include additional ranger patrols, production of new informational and interpretive materials, control of invasive weeds along pathway corridors, and management and oversight of transit services. The addition of improved shoulders would result in a small incremental change in road maintenance activities; however, planning, design, and construction of the shoulders would result in a minor to moderate increase in workload and could result in the deferral of other priority projects.

Implementation of various management strategies for the Moose-Wilson Road would result in minor to

moderate workload increases for park staff involved in the planning and coordination of these actions, as well as communicating with local communities and park visitors.

Additional information about existing transit service would be provided to park visitors under this alternative and development and implementation of a pilot transit program pending the results of the TBP could result in a moderate increase in workload for park staff. Planning, coordinating, contracting, and other activities associated with introducing a new program into park operations would require the addition of new staff, and the time and attention of existing staff and managers.

Information kiosks and way-finding improvements would require periodic maintenance and would add to existing workloads. The enhanced use of information technology to communicate with visitors would also result in additional operating costs and staffing requirements. Beyond the capital costs of the equipment, operational costs would be incurred for such activities as updating the information content, developing and maintaining an improved website, and maintenance of the equipment.

In addition to the direct impacts on park operations, indirectly any increases in park staffing levels required to support new operations also require a corresponding increase in the need for housing, vehicles, office space, and administrative support. The resulting increase in park staff requirements associated with changes in operations implemented by this alternative would have long-term, localized, moderate, adverse impacts.

Cumulative Impacts

Cumulative impacts under Alternative 3 would be similar to those described under Alternatives 1 and 2, with additional staff and/or responsibilities for current staff from the additional maintenance, enforcement, administrative, and communications functions under Alternative 3. Overall, cumulative impacts to park operations would be long term, moderate, and adverse.

Conclusion

Alternative 3 would result in long-term, localized, moderate, adverse impacts on park operations due to the increased workload necessary to implement and manage the new programs. Increased staffing and funding would be necessary to ensure proper management and maintenance of multi-use pathways, efficient operation of a transit system (if implemented), and a well-coordinated implementation of management strategies for the Moose-Wilson Road that provides timely accurate information

to local communities and park visitors. In addition, the corresponding requirements in housing, vehicles, office space, and administrative support necessary to support additional staff would contribute to the long-term impacts. Short-term impacts on park operations would also be localized, moderate, and adverse due to the workload involved in planning, design, and construction. Cumulative impacts to park operations would be long term, moderate, and adverse.

Effects of Alternative 3a — Preferred Alternative

Under this alternative, a more extensive system of multi-use pathways would be constructed both within and outside of existing road corridors, as described in Chapter 2. The addition of approximately 41.3 miles (66.3 km) of multi-use pathways would result in an increased workload for park staff in order to perform routine and cyclic maintenance. Annual maintenance and operation costs for these pathways are estimated at \$558,000 (see Chapter 2). Routine patrols by park staff would be necessary for a variety of purposes related to managing visitor use, but also in order to identify any developing maintenance issues, especially those that could become safety concerns for bicyclists or other users if not addressed promptly. Planning, design, and construction of the new multi-use pathways would result in an increased workload for park staff, and would likely lead to deferral of other high priority projects.

From the south boundary to North Jenny Lake Junction, the effects to park operations from pathway construction outside the road corridor would be minor because the pathway in this area would be visible from the roadway in most instances making routine patrols relatively easy. The segments along the Moose-Wilson Road and from North Jenny Lake Junction to Colter Bay would also be relatively easy to patrol because of their proximity to the road. However, the labor and maintenance of these latter two segments would result in long-term, localized, moderate to major, adverse impacts to park operations.

Other relevant concerns that have been identified associated with pathway development include impacts to wildlife, impacts to wildlife viewers, and wildlife safety hazards for pathway users. In order to provide mitigation and understand more precisely wildlife associated pathway impacts, the Park would implement a research and monitoring program designed to evaluate a variety of pathway effects, beginning with the first phase of construction. Attributes may be measured before, during,



and after pathway construction. The estimated cost for the first 3 years of monitoring and research would be approximately \$700,000, and approximately \$100,000 annually for 3 to 5 years thereafter (see Chapter 2).

Operational activities associated with new facilities and programs would include additional ranger patrols, production of new informational and interpretive materials, control of invasive weeds along pathway corridors, and management and oversight of transit services.

Implementation of various management strategies for the Moose-Wilson Road would result in minor to moderate workload increases for park staff involved in the planning and coordination of these actions, as well as adequate communication with local communities and park visitors.

Additional information about existing transit service would be provided to park visitors under this alternative; development and implementation of a pilot transit program pending the results of the TBP could result in a moderate increase in workload for park staff. Planning, coordinating, contracting, and other activities associated with introducing a new program into park operations would require the addition of new staff, as well as the time and attention of existing staff and managers.

Information kiosks and way-finding improvements would require periodic maintenance and would add to existing workloads. The enhanced use of information technology to communicate with visitors would also result in additional operating costs and staffing requirements. Beyond the capital costs of the equipment, operational costs would be incurred for such activities as updating the information content, developing and maintaining an improved website, and maintenance of the equipment.

In addition to the direct impacts on park operations, indirectly any increases in park staffing levels required to support new operations also require a corresponding increase in the need for housing, vehicles, office space, and administrative support. The resulting increase in park staff requirements associated with changes in operations implemented by this alternative would have long-term, localized, moderate to major, adverse impacts.

Cumulative Impacts

Cumulative impacts under Alternative 3a would be similar to those described under the previous alternatives; however, the additional staff and/or responsibilities for current staff from the additional maintenance, enforcement, administrative, and communications

functions under Alternative 3a would add to adverse impacts. Overall, cumulative impacts to park operations would be long term, moderate to major, and adverse.

Conclusion

Alternative 3a would result in long-term, localized, moderate to major, adverse impacts on park operations due to the increased workload necessary to implement and manage the new programs. Increased staffing and funding would be necessary to ensure proper management and maintenance of multi-use pathways, efficient operation of a transit system (if implemented), and a well-coordinated implementation of management strategies for the Moose-Wilson Road that provides timely accurate information to local communities and park visitors. In addition, the corresponding requirements in housing, vehicles, office space, and administrative support necessary to support additional staff would contribute to the long-term impacts. Short-term impacts on park operations would be localized, moderate, and adverse due to the workload involved in planning, design, and construction. Cumulative impacts would be long term, moderate to major, and adverse.

Effects of Alternative 4 — Multi-Use Pathways

Under this alternative, a network of multi-use pathways outside the road corridor would be added along the high use roadways in the Park. The development of approximately 42.6 miles (68.4 km) of multi-use pathways would result in an increased workload for park staff in order to perform routine and cyclic maintenance. Annual maintenance and operation costs for these pathways is estimated at \$558,000 (see Chapter 2). Routine patrols by park staff would be necessary for a variety of purposes related to managing visitor use, but also in order to identify any developing maintenance issues, especially those that could become safety concerns for bicyclists or other users if not addressed promptly. Planning, design, and construction of the new multi-use pathways would result in an increased workload for park staff, and would likely lead to deferral of other high priority projects.

From the south boundary to North Jenny Lake Junction the effects to park operations from pathway construction would be minor because the pathway in this area would be visible from the roadway in most instances making routine patrols relatively easy. The segments along the Moose-Wilson Road and from North Jenny Lake Junction to Colter Bay would be more difficult to patrol because portions of the pathways would be less visible from the road because of intervening topography, trees, and other

vegetation. The labor to construct the segment from North Jenny Lake Junction to Colter Bay would be less intensive than construction proposed under Alternative 3a because construction would not occur within the road corridor.

Other relevant concerns that have been identified associated with pathway development include impacts to wildlife, impacts to wildlife viewers, and wildlife safety hazards for pathway users. In order to provide mitigation and understand more precisely wildlife associated pathway impacts, the Park would implement a research and monitoring program designed to evaluate a variety of pathway effects, beginning with the first phase of construction. Attributes may be measured before, during, and after pathway construction. The estimated cost for the first 3 years of monitoring and research would be approximately \$700,000, and approximately \$100,000 annually for 3 to 5 years thereafter (see Chapter 2).

Operational activities associated with new facilities and programs would include additional ranger patrols, production of new informational and interpretive materials, control of invasive weeds along pathway corridors, and management and oversight of transit services.

Implementation of various management strategies for the Moose-Wilson Road would result in minor to moderate workload increases for park staff involved in the planning and coordination of these actions, as well as adequate communication with local communities and park visitors.

Additional information about existing transit service would be provided to park visitors under this alternative; development and implementation of a pilot transit program pending the results of the TBP could result in a moderate increase in workload for park staff. Planning, coordinating, contracting, and other activities associated with introducing a new program into park operations would require the addition of new staff, as well as the time and attention of existing staff and managers.

Information kiosks and way-finding improvements would require periodic maintenance and would add to existing workloads. The enhanced use of information technology to communicate with visitors would also result in additional operating costs and staffing requirements. Beyond the capital costs of the equipment, operational costs would be incurred for such activities as updating the information content, developing and maintaining an improved website, and maintenance of the equipment.

In addition to the direct impacts on park operations, indirectly any increases in park staffing levels required to support new operations also require a corresponding increase in the need for housing, vehicles, office space, and administrative support. The resulting increase in park staff requirements associated with changes in operations implemented by this alternative would have long-term, localized, moderate to major, adverse impacts.

Cumulative Impacts

Cumulative impacts under Alternative 4 would be similar to those described under the previous alternatives; however, the additional staff and/or responsibilities for current staff from the additional maintenance, enforcement, administrative, and communications functions under Alternative 4 would add to adverse impacts. Overall, cumulative impacts to park operations would be long term, moderate to major, and adverse.

Conclusion

Alternative 4 would result in long-term, localized, moderate to major, adverse impacts on park operations due to the increased workload necessary to implement and manage the new programs. Increased staffing and funding would be necessary to ensure proper management and maintenance of multi-use pathways, efficient operation of a transit system (if implemented), and a well-coordinated implementation of management strategies for the Moose-Wilson Road that provides timely accurate information to local communities and park visitors. In addition, the corresponding requirements in housing, vehicles, office space, and administrative support necessary to support additional staff would contribute to the long-term impacts. Short-term impacts on park operations would also be moderate and adverse due to the workload involved in planning, design, and construction. Cumulative impacts would be long term, moderate to major, and adverse.

Unavoidable Adverse Impacts

The following discussion identifies impacts to resources associated with the implementation of each alternative. These impacts have been identified as being unavoidable, moderate or major, and adverse. The EIS used the best available information to estimate environmental impacts; conservative assumptions were made to estimate effects where information was unavailable. The Park would follow mitigation measures and conservation measures outlined in Appendix A of this Final Plan/EIS to minimize potential effects to resources.



Alternative 1 — No Action

Threatened and Endangered Species — Grizzly Bear and Gray Wolf

Alternative 1 is likely to adversely affect the grizzly bear and gray wolf because vehicle collisions may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. A moderate adverse impact results from the potential take of an individual bear or wolf due to vehicle collision or (for bears) acclimation to human presence.

Visitor and Employee Experience

Implementation of Alternative 1 would result in short- and long-term, localized, minor to moderate, adverse impacts on visitor and employee experience. Moderate adverse impacts would result from the inconveniences related to the construction and maintenance and the potential continued parking demand.

Alternative 2 — Improved Road Shoulders

Threatened and Endangered Species — Grizzly Bear and Gray Wolf

Alternative 2 is likely to adversely affect the grizzly bear and gray wolf because vehicle collisions may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. A moderate adverse impact results from the potential take of an individual bear or wolf due to vehicle collision or (for bears) acclimation to human presence.

Visual Quality

Short-term, localized, moderate, adverse impacts would result during construction of new road shoulders and facilities.

Visitor and Employee Experience

Implementation of Alternative 2 would result in short-term, localized, negligible to moderate, adverse impacts on visitor and employee experiences. Moderate adverse impacts would result from the inconveniences related to the construction of the road shoulders and the potential continued parking demand.

Alternative 3 — Improved Road Shoulders / Multi-Use Pathways

Threatened and Endangered Species — Grizzly Bear and Gray Wolf

Alternative 3 is likely to adversely affect the grizzly bear and gray wolf because vehicle collisions may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. A moderate adverse impact results from the potential take

of an individual bear or wolf due to vehicle collision or (for bears) acclimation to human presence.

Visual Quality

Alternative 3 would result in long-term, localized, minor to moderate, adverse impacts on visual quality, primarily because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. Short-term, localized, moderate, adverse impacts would result during realignment and construction of improved shoulders and pathways.

Soils

Alternative 3 would result in long-term, localized, minor to moderate, adverse impacts to soils, because of the construction of a multi-use pathway system and improved road shoulders.

Vegetation

Actions under Alternative 3 would result in long-term, localized, moderate, adverse impacts on vegetation chiefly because of the construction of the pathway system. Widening road shoulders would result in long-term, localized, minor to moderate, adverse impacts on plant communities, especially in wetland and heavily forested areas. In the short-term, localized, moderate, adverse impacts would occur where construction disturbs vegetation, including the realignment of two sections of the Moose-Wilson Road.

Transportation System and Traffic

Under Alternative 3, long-term, localized, minor, adverse impacts would continue to affect some parking areas due to crowding at certain times, and selected parking areas would experience long-term, localized, minor to moderate, adverse impacts because of new parking demand associated with use of the pathway system.

Visitor and Employee Experience

Implementation of Alternative 3 would result in short- and long-term, localized, negligible to moderate, adverse impacts on visitor and employee experience associated with the change to the landscape and inconveniences related to the construction of the road shoulders and pathways, and the potential increase in parking demand.

Park Operations

Alternative 3 would result in long-term, localized, moderate, adverse impacts on park operations due to the increased workload necessary to implement and manage the new programs. Increased staffing and funding would be necessary to ensure proper management and

maintenance of multi-use pathways, efficient operation of a transit system (if implemented), and a well-coordinated implementation of management strategies for the Moose-Wilson Road that provides timely accurate information to local communities and park visitors. In addition, the corresponding requirements in housing, vehicles, office space, and administrative support necessary to support additional staff would contribute to the long-term impacts. Short-term impacts on park operations would be localized, moderate, and adverse due to the workload involved in planning, design, and construction.

Alternative 3a — Preferred Alternative

Threatened and Endangered Species — Grizzly Bear and Gray Wolf

Alternative 3a is likely to adversely affect the grizzly bear and gray wolf because vehicle collisions may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. A moderate adverse impact results from the potential take of an individual bear or wolf due to vehicle collision or (for bears) acclimation to human presence.

Visual Quality

Alternative 3a would result in long-term, localized, moderate, adverse impacts on visual quality, largely because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. This would be particularly true in the Moose-Wilson corridor and from North Jenny Lake Junction to Colter Bay where pathways would be constructed within the road corridor. Short-term, localized, moderate, adverse impacts would result during construction including the realignment of two sections of the Moose-Wilson Road.

Soils

Alternative 3a would result in short- and long-term, localized, moderate, adverse impacts to soils primarily because of the construction of a multi-use pathway system.

Vegetation

Actions under Alternative 3a would result in long-term, localized, moderate, adverse impacts on vegetation chiefly because of the construction of the pathway system. Approximately 22.5 miles (36.0 km) of multi-use pathways would be located in relatively undisturbed areas outside the road corridor. Construction of 18.8 miles (30.3 km) of multi-use pathways within the road corridor would result in minor to moderate alteration of plant communities, especially in wetland areas and in heavily forested areas. In the short-term, moderate adverse impacts would occur

where construction disturbs vegetation, including the realignment of two sections of the Moose-Wilson Road.

Wetlands

Alternative 3a would result in long-term, localized, minor to moderate, adverse impacts to wetlands, mainly in the vicinity of Cottonwood Creek and the area from Jackson Lake Dam to Jackson Lake Junction. Approximately 3.85 acres (1.56 ha) of wetlands could be impacted under this alternative.

Wildlife

Although no adverse population level impacts are anticipated from Alternative 3a, effects to local species distributions and habitat use patterns are likely and would be long-term, localized, negligible to moderate, and adverse.

Although direct habitat impacts on mammals, reptiles, and amphibians would be relatively small, the increased disturbance (both spatially and in terms of recreation use levels) would further fragment habitats and erode habitat effectiveness. The addition of multi-use pathways, particularly along the Moose-Wilson corridor, but also between Jackson Lake Junction and Colter Bay, would affect some of the Park's most diverse and productive habitats. The potential for human-wildlife conflicts and associated management actions would be greater under this alternative than under Alternatives 1, 2, or 3 due to the larger area affected by the proposed pathways and the diverse habitats they traverse (i.e., greater number of species and individuals affected). Direct mortality levels are not expected to increase under this alternative; however, it is likely that vehicles using park roads would continue to strike and kill individual mammals. Although no adverse population level impacts are anticipated, effects to local species distributions and habitat use patterns are likely and would be long-term, localized, negligible to moderate, and adverse.

Transportation System and Traffic

Selected parking areas would experience long-term, localized, minor to moderate, adverse impacts because of new parking demand associated with use of the pathway system proposed under Alternative 3a.

Visitor and Employee Experience

Implementation of Alternative 3a would result in long-term, localized, minor to moderate, adverse impacts on visitor and employee experience. Moderate adverse impacts would result from the inconveniences related to the construction of the pathways and the potential increase in parking demand.



Park Operations

Alternative 3a would result in long-term, localized, moderate, adverse impacts on park operations due to the increased workload necessary to implement and manage the new programs. Increased staffing and funding would be necessary to ensure proper management and maintenance of multi-use pathways, efficient operation of a transit system (if implemented), and a well-coordinated implementation of management strategies for the Moose-Wilson Road that provides timely accurate information to local communities and park visitors. In addition, the corresponding requirements in housing, vehicles, office space, and administrative support necessary to support additional staff would contribute to the long-term impacts. Short-term impacts on park operations would be localized, moderate, and adverse due to the workload involved in planning, design, and construction.

Alternative 4 — Multi-Use Pathways

Threatened and Endangered Species — Grizzly Bear and Gray Wolf

Alternative 4 is likely to adversely affect the grizzly bear and gray wolf because vehicle collisions may occur that would adversely affect one or more individuals; however, the alternative would not threaten the survival of either species. A moderate adverse impact results from the potential take of an individual bear or wolf due to vehicle collision or (for bears) acclimation to human presence.

Visual Quality

Alternative 4 would result in long-term, localized, moderate, adverse impacts on visual quality, largely because of the introduction of multi-use pathways into the foreground views, as seen from the affected road corridors. Short-term, localized, minor, adverse impacts would result during construction.

Soils

Alternative 4 would result in long-term, localized, moderate, adverse impacts to soils primarily because of the construction of a multi-use pathways system.

Vegetation

Actions under Alternative 4 would result in long-term, localized, moderate, adverse impacts on vegetation chiefly because of the construction of the pathway system. New pathways would be located in relatively undisturbed areas outside the road corridor. In the short-term, localized, moderate, adverse impacts would occur where construction disturbs vegetation, including the realignment of two sections of the Moose-Wilson Road.

Hydrology and Water Quality

Alternative 4 would result in long-term, localized, minor to moderate, adverse impacts on water quality, principally due to the construction of separate bridges over Christian and Pilgrim Creeks; the increase in impervious surface associated with pathway facilities; and the potential for storm runoff from these facilities to carry pollutants (fuels, oil) into the groundwater.

Wetlands

Alternative 4 would result in long-term, localized, minor to moderate, adverse impacts to wetlands, mainly in the vicinity of Cottonwood Creek and the area from Jackson Lake Dam to Jackson Lake Junction. Approximately 4.26 acres (1.72 ha) of wetlands would be impacted under this alternative.

Wildlife

Alternative 4 would have the highest level of adverse impacts on wildlife of the alternatives considered. Although direct habitat impacts on mammals, reptiles, and amphibians would be relatively small, the increased disturbance (both spatially and in terms of recreation use levels) would further fragment habitats and erode habitat effectiveness. These impacts would be greater than any other alternative considered because of a greater area of impact caused by more linear feet of multi-use pathways outside of the roadway corridor. The addition of multi-use pathways outside of the roadway corridor, particularly along the Moose-Wilson corridor, but also between Jackson Lake Junction and Colter Bay, would affect some of the Park's most diverse and productive habitats. The potential for human-wildlife conflicts and associated management actions would be greatest under this alternative due to the larger area affected by the proposed pathways and the diverse habitats they traverse (i.e., greater number of species and individuals affected). Although no adverse population level impacts are anticipated, effects to local species distributions and habitat use patterns are likely and would be long-term, localized, negligible to moderate, and adverse.

Transportation System and Traffic

Selected parking areas would experience long-term, localized, minor to moderate, adverse impacts because of new parking demand associated with use of the pathway system proposed under Alternative 4.

Visitor and Employee Experience

Implementation of Alternative 4 would result in long-term, localized, minor to moderate, adverse impacts on visitor

and employee experience. Moderate adverse impacts would result from the inconveniences related to the construction of the pathways and the potential increase in parking demand. This impact would be expected to be less than under Alternative 3a.

Park Operations

Alternative 4 would result in long-term, localized, moderate to major, adverse impacts on park operations due to the increased workload necessary to implement and manage the new programs. Increased staffing and funding would be necessary to ensure proper management and maintenance of multi-use pathways, efficient operation of a transit system (if implemented), and a well-coordinated implementation of management strategies for the Moose-Wilson Road that provides timely accurate information to local communities and park visitors. In addition, the corresponding requirements in housing, vehicles, office space, and administrative support necessary to support additional staff would contribute to the long-term impacts. Short-term impacts on park operations would be localized, moderate, and adverse due to the workload involved in planning, design, and construction.

Irreversible or Irrecoverable Commitments of Resources

An irreversible commitment of resources is defined as the loss of future options. The term applies primarily to the effects of using nonrenewable resources, such as minerals or cultural resources, or to the loss of an experience as an indirect effect of a permanent change in the nature or character of the land.

An irrecoverable commitment of resources is defined as the loss of production, harvest, or use of natural resources. The amount of production foregone is irrecoverable, but the action is not irreversible. If the use changes, it is possible to resume production.

The irrecoverable and irreversible commitments of resources that are associated with each alternative are summarized below. Irreversible commitments are those that cannot be reversed, except perhaps in the extreme long term. Irrecoverable commitments are those that are lost for a period of time.

Alternative 1 — No Action

The irrecoverable and irreversible commitments of resources associated with Alternative 1 are mainly limited to the consumption of energy resources, because no specific actions would be taken to change any of the

natural or cultural resources, visitor experience, or park operations.

Alternatives 2, 3, 3a, and 4

Irretrievably and irreversibly committed resources are those that are consumed during the construction and implementation of a project and that cannot be reused. Because their reuse is impossible, they are considered irretrievably and irreversibly committed to the development of the proposed project. These resources would include expendable materials necessary for construction, as well as fuels and other forms of energy that are utilized during project implementation.

During construction, non-renewable resources would be consumed. Because the reuse of these resources may not be possible, they could be considered irreversibly and irretrievably committed should the proposed actions be implemented. The non-renewable resources would include materials such as materials and fuel used during construction.

Under these alternatives, no appreciable irreversible or irretrievable commitments of resources would be associated with water resources, air quality, visual and scenic resources, noise, visitor experience, transportation, social and economic environments, or park operations. If any wetlands, soils, or roadside vegetation were impacted during construction, this would be an irretrievable commitment of this resource for at least the duration of the alternative. However, it would be possible to rehabilitate impacted areas and return them to their preconstruction state at some point in the future.

The Relationship between Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity

This section considers the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

Alternative 1 — No Action

No measurable change from current conditions is expected. Visitation levels would continue to grow slightly. The existing relationship of short-term uses of the environment and the maintenance and enhancement of long-term productivity would be expected to continue with future potential issues addressed through the Park planning process.



Alternatives 2, 3, 3a, and 4

Both short- and long-term commitments of labor and capital, along with use of non-renewable materials, would result from the construction and use of the proposed pathways and/or improved shoulders. The construction activities associated with these alternatives are short term and temporary and adherence to the proposed mitigation measures (Appendix A) would minimize both short- and long-term effects. Long term monitoring would improve knowledge of the effects of use of the pathways system and would inform planning and design of future segments. The activities under each alternative affect the availability of land resources after the implementation phase, but no significant losses in long-term productivity have been identified as a result of the project alternatives.



CHAPTER 5

Consultation and Coordination

History of Public Involvement

This chapter describes the history of public involvement leading up to and during development of this Final Plan/EIS. Public participation in the planning process helps to ensure that the NPS fully understands and considers the public's interest. Through public involvement, the NPS shared information about the planning process, issues, and proposed actions. In turn, the planning teams were informed of the concerns and values of those groups and individuals that participated in the process. Government agencies and other public constituencies were also consulted as part of public involvement and in compliance with laws and regulations. With the help of public participation, the NPS is able to make better-informed decisions and improved plans.

Public and agency participation throughout the planning process allowed the planning team to:

- Analyze and incorporate comments from previous planning efforts.
- Collect scoping comments to help define the range of issues to be addressed.
- Provide opportunities for the public to obtain the knowledge necessary to make informed comments.
- Consult with other management agencies.
- Produce the best possible plan.

Public involvement has been extensive, beginning with the initial transportation study and continuing through review of the Draft Plan/EIS. A chronology of public and agency participation is provided below.

Grand Teton National Park Transportation Study

This initial study was completed between April 2000 and January 2001. Four meetings were held in the summer and fall of 2000 with a Technical Information Exchange Group. The group consisted of over 30 people representing a variety of public and private entities, ranging from local municipal and county governments to non-profit organizations and park concessioners. This group provided technical feedback on analysis and recommendations developed through the initial transportation study.

Three well-publicized community workshops (i.e., public meetings) were held in the summer and fall of 2000 to give the Jackson-area residents an opportunity to learn about and contribute to the study.

Initial Planning Workshops for Transportation Plan, September 17-19, 2001

An initial series of planning workshops were held on September 17-19, 2001, in Jackson, Wyoming. Separate meetings were conducted with approximately 30 park staff, representing a broad cross-section of functions (administrative, resource management, interpretation, and rangers); with the Technical Information Exchange Group; and with the public. The purpose of these meetings was to:

- Introduce the project.
- Reaffirm the Park's mission and significance.
- Assess existing conditions and identify desired future conditions.
- Identify actions that might help to bring about those desired future conditions.

Approximately 30 members of the public attended and participated in small breakout groups. Issues discussed are incorporated into the "Purpose of and Need for Action" section of Chapter 1.

To make the public aware of these meetings, an advertisement was placed in weekly papers (the Jackson Hole Guide and the Jackson Hole Daily) for the three Wednesdays prior to the public workshops. About 1 week prior to all public workshops, the Park issued a press release about the workshop, which usually resulted in an article about the upcoming meeting in both papers on the day of the meeting. There was a newspaper staff member at most of the public workshops, and an article was often written about the workshop in the week following the workshop. This process was repeated for each of the succeeding public workshops. Meeting notes were developed by the planning team and circulated to all attendees via email and hard copy.

Second Planning Workshops, December 11-13, 2001

A second round of planning workshops was held on December 11-13, 2001, in Jackson, Wyoming. Approximately 20 park staff, representing a range of



functions, were briefed on preliminary plan alternatives and their comments recorded. The same briefing was repeated for the Technical Information Exchange Group and members of the general public, with the public session organized as an “open house” format. Maps depicting plan alternatives were displayed, and members of the public had an opportunity to provide comments tied to specific geographic locations of proposals and on the range of proposed alternatives. Approximately 14 members of the public attended, as documented by sign-in sheets.

Publicity for these sessions was as for the initial round of planning workshops, which was discussed earlier in this section. Descriptions and maps of the alternatives were posted on the Park website for download. Meeting notes were developed by the planning team and circulated to all attendees via email and hard copy.

Initial Scoping Phase: December 13, 2001 — January 12, 2002

A press release, issued on December 6, 2001, initiated the first public scoping period for the Transportation Plan, which ran from December 13, 2001 through January 12, 2002. The press release was sent to all persons on a public contact list developed from Phase I and Transportation Plan public meeting sign in sheets, requests, public agencies, the Technical Information Exchange Group, and the Park list. This scoping was conducted pursuant to completing an Environmental Assessment of the Transportation Plan proposal. Approximately 20 discrete comments were received. Issues identified are summarized in the “Issues and Impact Topics” section of Chapter 1.

Alternatives Review Sessions, March 11-14, 2002

Alternatives were substantially revised following the December workshops. An interim review session was held in Jackson on the above dates to provide an opportunity for feedback from park staff and to engage members of the Technical Information Exchange Group in providing feedback on specific aspects of the implementation of plan proposals. Approximately 30 members of the group attended one of approximately 15 small group sessions held throughout the week and had an opportunity to provide specific feedback on plan proposals.

Third Planning Workshops, June 24-26, 2002

A third round of planning workshops was held on June 24-26, 2002, in Jackson, Wyoming. The purpose of these meetings was to review modifications to plan alternatives

based on feedback received in the December sessions, review preliminary impact analysis, and identify priorities for implementation.

Approximately 30 members of the public attended, as documented by sign-in sheets. Publicity for these sessions was as for the initial round of planning workshops. In addition, display boards depicting the alternatives were posted in the main Jackson Post Office approximately 1 week prior to the meeting so area residents would have an opportunity to become familiar with proposals. These maps and narrative descriptions were also made available on the Park website. Meeting notes were developed by the planning team and circulated to all attendees via email and hard copy.

Subsequent Scoping Phase: June 21, 2002 — July 20, 2002

The NPS conducted a second phase of public scoping (public meetings and solicitation of comments from state, county, and town agencies and organizations; park neighbors; SHPO; and associated American Indian tribes) for the Transportation Plan from June 21, 2002 to July 20, 2002. Because potential impacts of the Plan were deemed uncertain, the NPS proceeded with preparation of an EIS for the project and an additional scoping phase. Approximately 20 discrete comments were received during this scoping phase. Issues identified are summarized in the “Issues and Impact Topics” section of Chapter 1.

Interim Planning

Work continued on the Transportation Plan during 2002 and 2003. The initial approach of the Plan was to try to address comprehensively all of the Park’s transportation-related issues. An August 2003 internal review draft included several alternatives that were ambitious in terms of the level of transit service, development of an extensive pathway system, use of intelligent transportation systems, and other transit-related facilities. It became apparent that the scope of the initial alternatives was disproportionate to the types of transportation-related issues that exist in the Park, and would be financially and operationally infeasible to implement. In 2004, the NPS decided to scale back the plan to focus on actions that would be achievable within a 5- to 10-year period.

In September 2004, the NPS mailed the “Grand Teton National Park Transportation Plan Update” to interested parties announcing continuing work on the Plan with an expected release in spring 2005.



On January 20, 2005, a news release provided an update on the Grand Teton National Park Transportation Plan status.

Transportation Plan Draft Plan/EIS Release

The *Grand Teton National Park Transportation Plan/Draft Environmental Impact Statement* was released in May 2005 to the public. The public comment period for this Draft Plan/EIS originally extended from May 27 through August 1, 2005; however, on July 26, a press release and subsequent Federal Register Notice announced a further extension to August 25, 2005. This extension provided the public with additional time for submitting comments. The NPS solicited comments from state, county, and town agencies and organizations; park neighbors; SHPO; and associated American Indian tribes. The NPS also held a public meeting on June 28, 2005, in the town of Jackson, Wyoming.

Consultation with American Indian Tribes

On May 31, 2006, Grand Teton National Park sponsored an information exchange with representatives of American Indian tribes on various topics, including the Draft Plan/EIS. An additional consultation meeting to discuss pathway design locations and other tribal topics will take place in fall 2006.

Affiliated American Indian Tribes

- Crow Tribe.
- Northern Arapaho Tribe.
- Northern Cheyenne Tribe.
- Eastern Shoshone Tribe.
- Shoshone-Bannock Tribes.
- Blackfoot Tribe.
- Gros Ventre Tribe.
- Nez Perce Tribe.
- Confederated Salish and Kootenai Tribes.
- Coeur d'Alene Tribe.
- Confederated Tribes of the Colville Reservation.

Tribal Representatives

- Jo Ann White, Tribal Preservation Program, Fort Washakie, WY.
- George Reed, Cultural Affairs, Crow Tribe, Cabinet Head, Crow Agency, MT.

- Dean Don't Mix, Cultural Affairs, Crow Tribe, Crow Agency, MT.
- Conrad Fisher, Cultural Resources, Northern Cheyenne Tribal Council, Lame Deer, MT.
- Yvette Tuell, Natural Resources Coordinator, Shoshone-Bannock Tribes, Fort Hall, ID.
- Claude Broncho, Fish and Wildlife Representative, Shoshone-Bannock Tribes, Fort Hall, ID.
- Lori Edmo-Suppah, Sho-Ban News, Fort Hall, ID.
- Darrell "Curley" Youpee, Fort Peck Assiniboine and Sioux Tribes, Cultural Resource/InterTribal Bison Cooperative, Poplar, MT.
- Tim Mentz, Standing Rock Sioux Tribe, Tribal Historic Preservation Office, Fort Yates, ND.
- Elaine Quiver, Oglala Sioux Tribe, Pine Ridge, SD.
- Antoine Incashola, Director, Salish Cultural Committee, St. Ignatius, MT.
- Terry Gray, NAGPRA Representative, Rosebud Sioux Tribe C/O Sinte Gleska University, Mission, SD.
- Rodney Bordeaux, Chairman, Rosebud Sioux Tribe, Mission, SD.
- Andy Joseph, Jr., Confederated Tribes of Colville, Nespelem, WA.
- John Strombeck, Treasurer, Nez Perce Tribe, Lapwai, ID.
- Haman Wise, Eastern Shoshone Tribal Elder, Fort Washakie, WY.
- Delphine Clair, Eastern Shoshone Tribal Elder, Fort Washakie, WY.

Yellowstone National Park

- Frank Walker, Deputy Superintendent.
- Glenn Plumb, Chief, Natural Resources.
- Katie White, Anthropology Technician.
- Rosemary Sucec, Cultural Anthropologist.

Grand Teton National Park

- Jim Bellamy, Deputy Superintendent.
- Sue Consolo-Murphy, Chief, Science Resource and Management.
- Jacquelin St. Clair, Archeologist.
- Alice Hart, Curator.

- Suzy Schulman, Planner.
- Reuben Noah, Museum Technician.
- Brian Joseph, Archeological Technician.

List of Preparers/EIS Team

Table 26 lists the preparers of the Final Plan/EIS and the Draft Plan/EIS (released May 2005).

U.S. Fish and Wildlife Service

- Barry Reiswig, Manager, National Elk Refuge.
- Lewis Carroll, U.S. Fish and Wildlife Service, Washington, D.C.

TABLE 26 EIS LIST OF PREPARERS	
Name	Title/Role
Final Plan/EIS List of Preparers	
National Park Service	
Steve Cain	Senior Wildlife Biologist, Grand Teton National Park
Richard Easterbrook	GIS Specialist, Grand Teton National Park
Andy Fisher	Chief Ranger, Grand Teton National Park
Peter Lindstrom	Cartographic Technician, Grand Teton National Park
Gary Pollock	Management Assistant, Grand Teton National Park
Suzy Schulman	Park Planner, Grand Teton National Park
Mary Gibson Scott	Superintendent, Grand Teton National Park
John Stewart	Chief of Professional Services, Grand Teton National Park
Sena Wiley	Civil/Highways Engineer, Grand Teton National Park
Margaret Wilson	Outdoor Recreation Planner, Grand Teton National Park
A/E Consultants	
Lane Allgood	Public Involvement Specialist, North Wind, Inc.
Greg Bosen	Systems Analyst, North Wind, Inc.
Kris Burnham	Document Control Specialist, North Wind, Inc.
Carol Cole	Public Involvement Specialist, North Wind, Inc.
Jace Fahnestock	Principal Scientist, North Wind, Inc.
Kelly Green	NEPA Specialist, North Wind, Inc.
Russ McFarling	Consulting Biologist, North Wind, Inc.
Lori McNamara	Document Control Specialist, North Wind, Inc.
Travis Moedl	Technical Editor, North Wind, Inc.
Scott Webster	Biologist, North Wind, Inc.
Draft Plan/EIS List of Preparers	
National Park Service	
Kerri Cahill	Planner, NPS/Denver Service Center
Joe Evans	Chief Ranger, NPS/Rocky Mountain National Park
Cam Hugie	Former Chief of Professional Services, NPS/Grand Teton National Park
David Kreger	Natural Resource Specialist, NPS/Denver Service Center
Gary Pollock	Management Assistant, NPS/Grand Teton National Park



**TABLE 26
EIS LIST OF PREPARERS**

Name	Title/Role
Judith Rozel	Chief of Concessions Management, NPS/Zion National Park
Victoria Stinson	Landscape Architect, NPS/Denver Service Center
A/E Consultants	
Robin Anawalt	Editing and Production, RED, Inc.
Tom Campbell	Wildlife Biologist/Consultant, Biota Research and Consulting
James Charlier	Transportation Planner/Consultant, Charlier Associates, Inc.
Kristin Danford	Landscape Architect, Wenk Associates
Paula Daukas	Contributing Author/Technical Expert, URS Corporation
Ron Dutton	Socioeconomic Analyst, Hammer, Seiler, George
Jessica Green	Transportation Planner/Consultant, Charlier Associates, Inc.
Courtney E. Kelley	Wetland Consultant, Biota Research and Consulting
Jane Kulik	A/E Project Manager, Wenk Associates
Brenda Miller	Editing/Word Processing Assistance, URS Corporation
Jessica Mitchell	Biota Research and Consulting
Bob Mutaw	Contributing Author/Technical Expert of Cultural Resources, URS Corporation
Susan Pella	Editing/Word Processing Assistance, URS Corporation
Lisa Pine	Contributing Author, URS Corporation
Cynthia Riegel	Botanist/Consultant, Biota Research and Consulting
Aileen Torres	Editing/Word Processing Assistance, URS Corporation
Nancy VanDyke	Project Manager, URS Corporation
Russell Yawger	Landscape Architect, Wenk Associates
Other	
Renee Sigel	Transportation Planner, FHWA – CFCHD
Juan Aguirre	Senior Design Engineer, FHWA – Western Federal Lands Highway Division

Agencies/Organizations/Individuals Contacted

The following agencies, organizations, and individuals were contacted during the preparation of this document.

Federal Agencies

- U.S. Army Corps of Engineers, Omaha District.
- U.S. Department of the Interior, Fish and Wildlife Service, Ecological Services, Cheyenne Office.
- Federal Highway Administration.
- U.S. Department of the Agriculture, Forest Service, Bridger-Teton National Forest.
- U.S. Department of the Agriculture, Forest Service, Caribou-Targhee National Forest.

U.S. Department of the Interior, National Park Service

- Joan Anzelmo, Chief of Public Affairs and Partnerships.
- Jim Bellamy, Deputy Superintendent, Grand Teton National Park.
- Sue Consolo-Murphy, Chief of Science and Resource Management, Grand Teton National Park.
- Sarah Dewey, Wildlife Biologist, Grand Teton National Park.
- Chris Finlay, Chief of Facility Maintenance, Grand Teton National Park.
- Karen Frauson, South District Ranger, Grand Teton National Park.

- Patrick Hattaway, North District Ranger, Grand Teton National Park.
- Pam Holtman, Former Park Historian, Grand Teton National Park.
- Kip Knapp, Former South District Ranger, Grand Teton National Park.
- Steve P. Martin, Deputy Director, National Park Service, Washington, D.C.
- Dr. Kelly McCloskey, Plant Ecologist, Grand Teton National Park.
- Sue O’Ney, Hydrologist, Grand Teton National Park.
- Terry Roper, Fee and Revenue Business Manager, Grand Teton National Park.
- Jackie Skaggs, Public Affairs Specialist, Grand Teton National Park.
- Mallory Smith, Chief of Business Resources, Grand Teton National Park.
- Jacquelin St. Clair, Archeologist, Grand Teton National Park.
- Sue Wolff, Wildlife Biologist, Grand Teton National Park.

Intermountain Region, National Park Service

- Michael D. Snyder, National Park Service, Intermountain Regional Director.
- Christine L. Turk, Planning and Environmental Quality Coordinator, Intermountain Region.
- Lori Domler, NEPA/106 Specialist, Intermountain Region.
- Cheryl Eckhardt, NEPA/106 Specialist, Intermountain Region.

State and County Agencies and Local Governments

- Wyoming Department of Environmental Quality.
- Wyoming Game and Fish Department.
- Wyoming Office of Federal Land Policy.
- Wyoming Department of State Parks and Cultural Resources — State Historic Preservation Office.
- Wyoming Department of Transportation.
- Teton County Commissioners.
- Teton County Planning Office.

- Town of Jackson.
- Jackson Hole Chamber of Commerce.

Other Organizations

- AllTrans.
- American Alpine Club (Climber’s Ranch).
- Barker-Ewing Scenic Tours.
- Boy Scouts of America.
- Exum Mountain Guides.
- Flagg Ranch.
- Fort Jackson Float Trips.
- Friends of Pathways.
- Fund for Animals.
- Grand Teton National Park Foundation.
- Grand Teton Natural History Association.
- Greater Yellowstone Coalition.
- Gros Ventre River Ranch.
- Heart 6 Float Trips.
- Idaho National Laboratory.
- Jack Dennis Fishing Trips.
- Jackson Hole Airport.
- Jackson Hole Chamber of Commerce.
- Jackson Hole Conservation Alliance.
- Jackson Hole Mountain Guides.
- Jackson Hole Mountain Resort.
- Jackson Hole Trail Rides.
- Jorgenson Engineering.
- Lost Creek Ranch.
- Moose Enterprises, Inc.
- National Elk Wildlife Refuge.
- National Parks Conservation Association.
- Nelson Engineering.
- Northwestern University.
- O.A.R.S., Inc.



- R Lazy S Ranch (C-H Corporation).
- Rendezvous Engineering.
- Solitude Float Trips.
- Signal Mountain Lodge.
- START.
- Teton County.
- Teton County Pathways/Parks & Recreation.
- Teton Science School.
- Teton Valley Ranch.
- The Murie Center.
- Trail Creek Ranch.
- Vail Associates, Grand Teton Lodge.
- Wilderness Adventures.
- Northern Arapaho Business Council.
- Northern Cheyenne Tribal Council.
- Eastern Shoshone Business Council.
- Shoshone-Bannock Tribes.
- The Confederated Salish and Kootenai Tribes.
- Blackfeet Tribe.
- Nez Perce Tribe.
- Kootenai Tribe.
- Fort Belknap Tribe.
- Confederated Tribes of the Colville.

List of Recipients

The following agencies, organizations, and groups were sent copies of the Draft EIS:

Elected Officials

- U.S. Representative Barbara Cubin (Wyoming).
- U.S. Senator Michael Enzi (Wyoming).
- U.S. Senator Craig Thomas (Wyoming).

Federal Agencies

- Advisory Council on Historic Preservation.
- U.S. Army Corps of Engineers, Omaha District.
- U.S. Department of Agriculture, Bridger-Teton National Forest and Targhee National Forest.
- U.S. Department of the Interior, Fish and Wildlife Service, Cheyenne Office.
- U.S. Department of the Interior, Fish and Wildlife Service, National Elk Refuge.
- U.S. Department of the Interior, National Park Service, Yellowstone National Park.
- U.S. Environmental Protection Agency, Region 8.
- Greater Yellowstone Ecosystem Interagency Visitor Center.

Affiliated American Indian Tribes

- Crow Tribal Council.

State and Local Agencies

- Town of Jackson (Planning, Pathways).
- Jackson Hole Chamber of Commerce.
- START.
- Teton County Historic Preservation Board.
- Teton County Library.
- Teton County Commissioners.
- Teton County Planning Office.
- Wyoming Department of Environmental Quality.
- Wyoming Department of Transportation.
- Wyoming Game and Fish Department.
- Wyoming Office of Federal Land Policy.
- Wyoming Office of the Governor.
- Wyoming Department of State Parks and Cultural Resources — State Historic Preservation Office.

Other Agencies and Organizations

- Audubon Society.
- Citizens for Teton Valley.
- Defenders of the Rockies.
- Craighead Environmental Research Institute.
- Friends of Pathways.
- Grand Teton National Park Foundation.
- Grand Teton Natural History Association.
- Greater Yellowstone Coalition.

- Jackson Hole Bird Club.
- Jackson Hole Conservation Alliance.
- Jackson Hole Historical Society and Museum.
- Jackson Hole Land Trust.
- The Murie Center.
- The Nature Conservancy.
- National Parks Conservation Association.
- Teton Group of the Sierra Club.
- Teton Science School.
- The Wilderness Society.
- Wyoming Wildlife Federation.

Individuals

A list of individuals and additional organizations that received the project scoping materials and/or the Draft Plan/EIS and/or the Final Plan/EIS is kept in the Planning Office at Grand Teton National Park.



CHAPTER 6

Compliance with Federal or State Regulations

This chapter describes the key pieces of legislation that form the legal context for development of the Final Plan/EIS. These pieces of legislation have guided development of this document and would continue to guide its implementation.

National Park Service Enabling Legislation

Public Law 81-787, 1950

This Law established Grand Teton National Park as a 310,521-acre (125,663 ha) entity that includes portions of both the Teton Range and Jackson Hole. The legislation designated and opened rights of way over and across federal lands within the exterior boundary of the Park for the movement of persons and property to and from national forests and state and private lands adjacent to the Park. The rights of residents and others legally occupying and using lands within the Park in 1950 were also specified in the Law. The grazing rights protected by this Law have expired but are preserved by Public Law 105-81 (1997), the Open Space Study Act.

Organic Act, August 25, 1916 (National Park Service Organic Act), Public Law 64-235, 16 USC §1 et seq., as amended

On August 15, 1916, Congress created the NPS with the National Park Service Organic Act. This Act, as reaffirmed and amended in 1970 and 1978, establishes a broad framework of policy for the administration of national parks:

“...to promote and regulate the use of the...national parks...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.”

National Park Service Organic Act, 16 U.S.C. 1.

General Legislation and Regulations

Americans with Disabilities Act, Public Law 101-336, 104 Stat. 327, 42 USC §12101

This Act states that all new construction and programs will be accessible to individuals with disabilities. Additionally, NPS Special Directive 83-3 states that accessibility will be proportional to the degree of development (i.e., areas of

intense development, such as visitor centers, museums, drive-in campgrounds, etc., will be entirely accessible and areas of lesser development, such as backcountry trails and walk-in campgrounds, may have fewer accessibility features). All development proposed must be consistent with this Act.

Architectural Barriers Act of 1968, Public Law 90-480, 82 Stat. 718, 42 USC §4151 et seq.

This Act establishes standards for design/construction or alteration of buildings to ensure that physically disabled persons have ready access to and use of such buildings. The Act excludes historic structures from the standards until they are altered. All development proposed must be consistent with this Act.

Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508)

The Council on Environmental Quality (CEQ) regulations for implementing NEPA establish the process by which federal agencies fulfill their obligations under the NEPA process. The CEQ regulations contain the requirements for environmental assessments and EISs that document the NEPA process. These regulations also define such key terms as “cumulative impact,” “mitigation” and “significantly” to ensure consistent application of these terms in environmental documents. This EIS was prepared as directed in the CEQ regulations.

Freedom of Information Act of 1966, Public Law 89-487, 80 Stat. 250, 5 USC §552

The Freedom of Information Act (FOIA) grants United States citizens the right to access government information upon request. FOIA only applies to records of the Executive Branch of the Federal Government. It does not apply to the Legislative or Judicial Branch of the Federal Government or to state governments, local governments, or private groups. FOIA gives members of the public the right to access any federal record unless the information in those records is protected by one of the nine exemptions and there is a sound legal basis to withhold them. A member of the public obtains records through



FOIA by submitting a written request to the appropriate department.

National Environmental Policy Act of 1970, Public Law 91-190, 83 Stat. 852, 42 USC §4341 et seq.

The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences and take actions that protect, restore, and enhance the environment. Regulations implementing NEPA are set forth by the CEQ.

Wilderness Act of 1964, Public Law 88-577, 78 Stat. 890, 16 USC §§1131-1136

The Wilderness Act directed the Secretary of the Interior, within 10 years, to (1) review every roadless area of 5,000 acres (2,023 ha) or more and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and (2) to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas in the National Forest System. The Act provides criteria for determining suitability and establishes restrictions on activities that can be undertaken on a designated area.

Natural Resources Legislation

Bald Eagle Protection Act of 1940, 54 Stat. 250, 16 U.S.C. 668-668d

This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. The 1978 amendment authorizes the Secretary of the Interior to permit the taking of golden eagle nests that interfere with resource development or recovery operations. A 1994 Memorandum from President Clinton to the heads of Executive Agencies and Departments sets out the policy concerning collection and distribution of eagle feathers for Native American religious purposes.

Clean Air Act, as amended, Public Law Chapter 360, 69 Stat. 322, 42 USC §7401 et seq.

Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations.

Federal Water Pollution Control Act (commonly referred to as the Clean Water Act) of 1977, 33 USC 1251 et seq.

The Clean Water Act provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation's waters. Section 404 of the Act prohibits the discharge of fill material into navigable waters of the United States, including wetlands, except as permitted under separate regulations by the ACOE and EPA. The placement of fill material in wetlands should be avoided if there are practicable alternatives. Compliance with Section 401 and 404 of the Clean Water Act will be completed, as necessary, prior to any new construction proposed in this Final Plan/EIS.

Clean Water Act Amendments of 1987

The 1987 amendments to this Act required that the EPA establish regulations for the issuance of municipal and industrial stormwater discharge permits as part of the National Pollutant Discharge Elimination System. The final regulations were published in November 1990. These regulations apply to any construction activities that disturb more than 5 acres (2 ha) of land.

Endangered Species Act of 1973, as amended, Public Law 93-205, 87 Stat. 884, 16 USC §1531 et seq.

The Endangered Species Act (ESA) protects threatened and endangered species, as listed by the USFWS, from unauthorized take and directs federal agencies to ensure that their actions do not jeopardize the continued existence of such species. Section 7 of the Act defines federal agency responsibilities for consultation with the USFWS and requires preparation of a biological assessment to identify any threatened or endangered species that is likely to be affected by the proposed action. The NPS initiated and maintained formal consultation with the USFWS throughout the planning process.

Migratory Bird Treaty Act of 1918, 40 Stat. 755, 16 USC §§703-712

The original 1918 statute implemented the 1916 convention between the United States and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the United States and Mexico, Japan, and current day Russia, respectively. Specific provisions in the statute include an establishment of a



federal prohibition, unless permitted by regulations, to “pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this convention...for the protection of migratory birds... or any part, nest, or egg of any such bird” (16 U.S.C. 703). The statute also prohibits the interstate or international transport of a migratory bird, part of bird, nest of bird, or egg of bird that was taken or killed in violation of the law of the district where it was taken from or killed.

Cultural Resources Legislation

Antiquities Act of 1906, Public Law 59-209, 34 Stat. 225, 16 USC §432, and 43 CFR 3

This Act provides for the protection of historic or prehistoric remains, “or any antiquity,” on federal lands. It protects historic monuments and ruins on public lands. It was superseded by the Archeological Resources Protection Act of 1979 as an alternative federal tool for prosecution of antiquities violations in the National Park System.

Archeological Resources Protection Act of 1979, Public Law 96-95, 93 Stat. 712, 16 USC §470aa et seq., 43 CFR 7 (subparts A and B) and 36 CFR

This Act secures the protection of archeological resources on public or Indian lands and fosters increased cooperation and exchange of information between private, government, and the professional community in order to facilitate the enforcement and education of present and future generations. It regulates excavation and collection on public and Indian lands. It requires notification of Indian tribes who may consider a site of religious or cultural importance prior to issuing a permit. The Act was amended in 1988 to require the development of plans for surveying public lands for archeological resources and systems for reporting incidents of suspected violations.

National Historic Preservation Act of 1966, as amended, Public Law 89-665, 80 Stat. 915, 16 USC§470 et seq., and 36 CFR 18, 60, 61, 63, 68, 79, 800

The National Historic Preservation Act (NHPA) requires agencies to take into account the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places (NRHP). The Advisory

Council on Historic Preservation (ACHP) has developed implementing regulations (36 CFR 800), which allow agencies to develop agreements for consideration of these historic properties.

American Indian Religious Freedom Act, Public Law 95-341, 92 Stat. 469, 42 USC §1996

This Act declares policy to protect and preserve the inherent and constitutional right of the American Indian, Eskimo, Aleut, and Native Hawaiian people to believe, express, and exercise their traditional religions. It provides that religious concerns should be accommodated or addressed under NEPA or other appropriate statutes.

Native American Grave Protection and Repatriation Act, Public Law 101-601, 104 Stat. 3049, 25 USC §3001-3013

This Act assigns ownership or control of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony that are excavated or discovered on federal lands or tribal lands to lineal descendants or culturally affiliated Native American groups.

Executive Orders

Executive Order 11593: Protection and Enhancement of the Cultural Environment

This EO instructs all federal agencies to support the preservation of cultural properties. It directs them to identify and nominate cultural properties under their jurisdiction to the NRHP and to “exercise caution...to assure that any federally owned property that might qualify for nomination is not inadvertently transferred, sold, demolished, or substantially altered.”

Executive Order 11988: Floodplain Management

This EO requires federal agencies to avoid, to the extent possible, adverse impacts associated with the occupancy and modification of floodplains, and to avoid development in floodplains whenever there is a practical alternative. If a proposed action is found to be in the applicable regulatory floodplain, the agency shall prepare a floodplain assessment, known as a Statement of Findings.

Executive Order 11990: Protection of Wetlands

This EO established the protection of wetlands and riparian systems as the official policy of the federal government. It requires all federal agencies to consider

wetland protection as an important part of their policies and take action to minimize the destruction, loss, or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands. Should adverse impacts on wetlands be identified, a Wetland Statement of Findings would be prepared.

Executive Order 12902: Energy Efficiency and Water Conservation

This EO directs each agency involved in the construction of a new facility to design and construct it to use energy efficiently, conserve water, and employ renewable energy technologies. The requirements of this EO would be met during the design phase for any new facilities proposed.

Executive Order 13112: Invasive Species

This EO directs federal agencies to not authorize, fund, or carry out actions they believe are likely to cause or promote the introduction or spread of invasive species. Actions proposed in this Final Plan/EIS include measures to prevent the introduction and spread of invasive species.

Executive Order 13149: Greening the Government through Federal Fleet and Transportation Efficiency

The purpose of this EO is to reduce petroleum consumption by the government through improvements in fleet fuel efficiency and the use of alternative fuel vehicles and alternative fuels. The NPS is continuously striving to reduce petroleum consumption. The NPS will complete a business plan for a transit program that will address anticipated use, intermodal transfers, and other factors (i.e., vehicle type and fuel use). Any vehicles the Park may purchase as a result of this Final Plan/EIS will strive to meet this EO.

Department of the Interior — Director’s Orders

Director’s Orders provide guidance for implementing certain aspects of NPS policy. Copies of those completed Orders may be obtained by contacting the NPS Office of Policy or by accessing the NPS web site at www.nps.gov/refdesk/DOrders/.

The following Director’s Orders may be relevant to the planning process:

- 1 The Directives System.
- 2 Park Planning.
- 9 Law Enforcement Program.

- 16A Reasonable Accommodation for Applicants and Employees with Disabilities.
- 17 National Park Service Tourism.
- 18 Wildland Fire Management.
- 20 Agreements.
- 21 Donations and Fundraising.
- 28 Cultural Resource Management.
- 32 Cooperating Associations.
- 41 Wilderness Preservation & Management.
- 50B Occupational Safety and Health.
- 77-1 Wetland Protection.
- 83 Public Health National Park Service Guidelines.
- NPS-12 National Environmental Policy Act Guidelines.
- NPS-77 Natural Resources Management Guidelines.

Future Surveys and Regulatory Compliance Necessary to Implement the Project

Since the Draft Plan/EIS was written, amphibian and sensitive bird surveys have been conducted and a black bear study in the Moose-Wilson corridor is ongoing. An archeological inventory of 97 acres (39 ha) between Dornan’s and South Jenny Lake has also been completed.

Per NEPA, all federal actions that have the potential to affect the environment must undergo some type of analysis through an established process before a decision is made. This Final Plan/EIS represents the most comprehensive type of analysis described by NEPA and as such, fully analyzes all the potential impacts for all the actions proposed. Consequently, if the preferred alternative is selected, NEPA compliance will be considered complete for all actions proposed in that alternative (unless otherwise stated in the document), as outlined in the ROD that will follow. During specific design and construction phases, the Park’s NEPA interdisciplinary team will continue to review and monitor all implementation components of this Final Plan/EIS in order to ensure that all regulatory compliance is completed. The following is a list of additional studies that will need to be completed to implement the project once an alternative has been selected and the preliminary design has been initiated:



- Archeological surveys of areas where improvements are proposed will be needed to determine whether sites are present and/or eligible for listing in the NRHP.
- Ethnographic studies may be necessary because many of the areas that would be affected by the Final Plan/EIS are unsurveyed. The NPS will continue to consult with the Park's associated American Indian tribes. If these or other tribes subsequently identify the presence of ethnographic resources, appropriate mitigation measures will be undertaken in consultation with the tribes as well as the Wyoming SHPO.
- Hydraulic analysis for all bridge locations will be necessary as part of preliminary design and to determine the need for further permitting.
- Wetland surveys will be performed to provide more accurate locations of wetlands and open water habitats within the project area. Wetlands would be delineated (by qualified NPS staff or certified wetland specialists) and marked prior to construction. It is the intent of the NPS to avoid wetlands during construction using cantilevered bridge crossings wherever possible in areas where bridges already exist. However, should potential adverse impacts to wetlands be identified, a Wetland Statement of Findings would be prepared.
- A rare plant survey will be conducted and will provide more accurate locations of rare plants within the project area. This survey would be completed by qualified NPS staff, or certified specialists, and marked prior to construction.
- A wildlife research and monitoring program, designed to evaluate a variety of pathway effects, will be implemented by the Park in order to understand more precisely wildlife associated pathway impacts. Relevant concerns that have been identified include impacts to wildlife, impacts to wildlife viewers, and wildlife safety hazards for pathway users. Some ongoing studies will help provide information for this program. For example, monitoring of elk movements will continue by increasing relocation frequency of currently collared elk between the south boundary and North Jenny Lake Junction, and bear monitoring in the Beaver Creek to North Jenny Lake Junction corridor will be expanded.
- Nesting bird surveys will be conducted (per the Migratory Bird Treaty Act) prior to construction disturbances in order to minimize impacts to migratory birds and birds of special concern. Breeding bird surveys will also be conducted along proposed pathways, and sage-grouse surveys will be conducted in sagebrush habitat potentially impacted by pathways. These surveys would be completed by qualified NPS staff, or certified specialists, and marked prior to construction.



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APPENDIX A

Construction Best Management Practices

Best Management Practices (BMPs) would be implemented (as appropriate) before, during, and/or after construction of proposed improvements to provide long-term protection of park resources. BMPs specific to the design cannot be proposed until the full design is complete and specifics of the proposed construction are known. Specific practices would include, but are not limited to, the following:

- Comply with National Environmental Policy Act, National Historic Preservation Act, Endangered Species Act, Clean Air Act, and Clean Water Act Section 404 permitting requirements and other applicable laws, regulations, and policies. The compliance-monitoring program at the Park will oversee these mitigation measures and include reporting protocols.
- Implement standard measures, such as construction scheduling, biological monitoring, erosion and sediment control, use of fencing or other means to protect sensitive resources adjacent to construction, removal of all food-related items or rubbish to bear-proof containers, topsoil salvage, and revegetation. The compliance-monitoring program would include specific construction monitoring by resource specialists, as well as treatment and reporting procedures.
- Implement standard measures, such as consideration of adaptive reuse, relocation, and salvage of historic building materials; archeological monitoring during ground disturbing activities; use of fencing or other means to protect sensitive resources adjacent to construction; and preparation of a discovery plan to handle unanticipated exposure of buried human remains. The compliance-monitoring program would include specific construction monitoring by resource specialists and culturally associated Native American people, as well as treatment and reporting procedures.
- Implement a traffic control plan, as warranted. Standard measures would include strategies to maintain safe and efficient traffic flow during and after the construction period.
- Implement a dust abatement program. Standard dust abatement measures would include the following elements, as appropriate:
 - Water or otherwise stabilize soils.
 - Cover haul trucks.
 - Employ speed limits on unpaved roads.
 - Minimize vegetation clearing.
 - Revegetate post construction.
- Implement standard noise abatement measures during construction. Standard noise abatement measures would include the following elements, as appropriate:
 - A schedule that minimizes impacts to adjacent noise sensitive uses.
 - Use of the best available noise control techniques (wherever feasible).
 - Use of hydraulically or electrically powered impact tools (when feasible).
 - Location of stationary noise sources as far from sensitive uses as possible.
- Implement a noxious weed abatement program. Standard measures would include the following elements, as appropriate:
 - Ensure construction-related equipment arrives on site free of mud or seed-bearing material.
 - Certify all seeds and straw material as weed free.
 - Identify areas of noxious weeds preconstruction.
 - Treat noxious weeds or noxious weed topsoil prior to construction (e.g., topsoil segregation, storage, or herbicide treatment).
 - Revegetate with appropriate native species. Noxious weed abatement would continue as an ongoing activity following construction.
- Implement a Spill Prevention and Pollution Control and Countermeasures program for hazardous materials. Standard measures would include, as appropriate:
 - Hazardous materials storage and handling procedures.
 - Spill containment, cleanup, and reporting procedures.



- Limitation of refueling and other hazardous activities to upland/nonsensitive sites.
- Use barriers, seasonal closures, and other measures to limit visitor access to areas under construction, minimizing safety impacts to visitors.
- Use silt fences, sedimentation basins, and other techniques to reduce erosion, surface scouring, and discharge to water bodies.
- Develop revegetation plans for the disturbed area and require the use of native species. Revegetation plans should specify seed/plant source, seed/plant mixes, soil preparation, etc. Use salvaged vegetation to the extent possible.
- Delineate wetlands and avoid wetlands wherever possible. Apply protection measures during construction in areas where wetlands cannot be avoided. Wetlands would be delineated by qualified National Park Service (NPS) staff or certified wetland specialists and clearly marked prior to construction work. Construction activities should be performed in a cautious manner to prevent damage caused by equipment, erosion, and siltation.
- Develop architectural character guidelines for new construction near historic districts. All new development would be designed to be compatible with historic resources in terms of scale, massing, materials, architectural elements, and orientation with designated historic sites, structures, or districts.

Resource-Specific Measures

Air Quality

The NPS would seek to perpetuate the best possible air quality by aggressively promoting and pursuing measures to preserve, protect, and enhance air resources. Moreover, actions are subject to the provisions of the Clean Air Act. Dust control measures would be implemented to help reduce surface and air movement of dust from disturbed soil surfaces. During construction, dust can be carried off-site, thereby increasing soil loss from the construction area. Land disturbance from clearing and excavation generates a large amount of soil disturbance and open space for wind to pick up dust particles. Mitigation measures would include the following, as appropriate:

- In the future, any transit within the Park (if determined to be feasible by the Transit Business Plan [TBP]) would apply best available clean fuel technology to minimize

air quality emissions, considering the need for reliable, cost-effective transit service with adequate vehicle capacity.

- Dispose of refuse at least weekly. Prohibit burning of refuse inside the Park.
- Employ dust abatement measures (i.e., watering, dust palliative application, etc.) to address environmental impacts from the presence of tractors, trailers, and other equipment involved in ground disturbance.

Soundscapes

The TBP will provide recommendations related to transit in the Park. If a pilot transit program were tested in the Park in the future based on the findings of the TBP, mitigation measures would include the following, as appropriate:

- Ensure that transit vehicles are equipped with best available technology for sound dampening muffler and exhaust systems.
- Design all transit waiting areas to minimize deflection of bus and passenger noise back to visitor waiting areas.

Visual and Scenic Resources

Mitigation measures would be designed to minimize visual intrusions. Many of the mitigation measures identified in the “Vegetation” section in this appendix would assist in mitigating potential scenic impacts. These measures would include the following, as appropriate:

- Minimize development footprints.
- Site facilities in locations outside primary or high value view corridors.
- Choose building materials that are visually compatible or do not compete with the landscape.
- Provide native vegetative screening where applicable.

Soils

Soil erosion and contamination result in impacts to air and water quality, as well as to habitats for plant and wildlife species. The Grand Teton National Park developed a protocol for topsoil management and revegetation; implementation of proposed actions would follow this protocol. Mitigation efforts would focus on minimizing or eliminating these impacts and would include a combination of the following, as appropriate:

- Remove and return topsoil to the same area once construction activities are complete. Live vegetation



less than 3 ft in height and limbs less than 2 inches in diameter may be incorporated as topsoil in the stockpiles. Care will be taken to assure that topsoil and fill material are not mixed and are stockpiled in separate areas (i.e., topsoil to the right of the trench and fill to the left).

- Stockpile topsoil materials (in an area determined by the landscape architect) away from excavations and future work without intermixing with subsoils. Then grade and shape stockpiles to allow unimpeded drainage of surface water. Stockpiles would be temporarily seeded and periodically treated to prevent wind from blowing topsoil and to prevent the introduction of exotics.
- Erect and maintain a temporary fence around the drip line of individual trees or around the perimeter drip line of groups of trees to remain within the construction limits. Do not store construction materials, debris, or excavated material within the drip line of remaining trees. Do not operate or park vehicles and construction equipment or allow foot traffic within the drip line of existing or planted trees. Do not excavate within the drip line of trees, unless otherwise indicated.
- To minimize the amount of ground disturbance, staging and stockpiling areas would be located in previously disturbed sites, away from visitor use areas to the extent possible. All staging and stockpiling areas would be returned to pre-construction conditions following construction.
- Use silt fences in construction areas to reduce erosion and surface scouring.
- Use sedimentation basins and silt fences in grading areas to capture soil erosion before discharge to rivers and other water channels.
- Use semi-permeable materials on temporary access routes to allow for water infiltration through the soil column and aeration of any compacted soils at the completion of construction.
- Use dust abatement measures to reduce airborne soil erosion (including setting speed limits for construction vehicles in unpaved areas) and cover dirt and debris to be hauled away in trucks.
- Employ dust abatement measures (i.e., watering, dust palliative application, etc.) to address environmental

impacts from the presence of tractors, trailers, and other equipment involved in ground disturbance.

- In appropriate locations, employ storm-drain inlet protection measures to help prevent soil and debris (from site erosion) from entering storm-drain drop inlets. Fabric barriers, straw bales, sandbags, block and gravel protection, etc. can be employed to create barriers. These should be used in combination with other measures, such as impoundments or sediment traps.
- Potentially use elevated boardwalk pathways or other feasible mitigation measures on pilings over wetland sections in the Cryaquolis-Cryofibrists Soils Complex.

Vegetation

Mitigation actions would occur prior to, during, and/or after construction to minimize immediate and long-term impacts to vegetation. These actions would vary by specific project, depending upon the extent of construction and the types of species and habitat affected. A rare plant species survey would be conducted within the project area covered by the selected alternative. Mitigation would include the following, as appropriate:

- Develop revegetation plans for the disturbed area, requiring the use of native species preferably from the same gene pool. Specify soil preparation, native seed/plant mixes, and mulching for all areas disturbed by construction activities.
- Develop and implement a monitoring plan to ensure successful revegetation, maintain plantings, and replace unsuccessful plant materials.
- Salvage and preserve vegetation to the extent possible for use in revegetating disturbed areas.
- Enforce construction specifications regarding soil salvage and reuse, trenching, plant protection, and finish grading.
- Site pathways to minimize impacts to vegetation, avoiding large trees where possible.
- Select base course and fill materials for compatibility with native soils to minimize risk of introducing nonnative plant seeds. Monitor areas where fill is imported from outside the Park and eradicate nonnative plants. Apply standard techniques to prevent nonnative plant encroachment.

- Develop monitoring and mitigation plans for managing nonnative plants within and immediately surrounding construction and developed areas. Implementation of the noxious weed abatement program would continue as an ongoing activity after construction is complete.
- Confine all construction operations to specified project work limits. Install temporary barriers to protect natural surroundings (i.e., trees, plants, and root zones) from damage. Repair or replace damaged trees and plants and avoid fastening ropes, cables, or fences to trees.
- Use native or seed-free mulch to minimize surface erosion and introduction of nonnative plants.
- Define pathways and boundaries of development to reduce radiating impacts.
- Protect meadows and other sensitive resource areas by defining parking areas.

Hydrology and Water Quality

Mitigation measures would be applied to protect water resources (see “Soils” section within this appendix). These measures would include the following, as appropriate:

- Take measures to control erosion, sedimentation, and compaction, thereby reducing water pollution.
- Immediately remove hazardous waste materials from project sites.
- Place construction debris in refuse containers at least daily.
- Dispose of refuse at least weekly. No burning or burying of refuse is allowed inside the Park.
- To the extent possible, schedule construction activities during periods of low precipitation and low surface water levels to reduce the risk of accidental hydrocarbon leaks or spills reaching surface and/or groundwater, and to reduce the potential for soil contamination and compaction.
- Dispose of volatile wastes and oils in approved containers for removal from construction sites to avoid contamination of soils, drainages, and watercourses.
- Inspect equipment for hydraulic and oil leaks prior to use on construction sites, and implement inspection schedules to prevent contamination of soil and water.
- Keep absorbent pads, booms, and other materials on site during projects that utilize heavy equipment to contain oil, hydraulic fluid, solvents, and hazardous material spills.
- Integrate storm water pollution controls into design, construction, and operation of new facilities, parking areas, and other paved surfaces that concentrate runoff.
- Employ dust abatement measures (i.e., watering, dust palliative application, etc.) to address environmental impacts from the presence of tractors, trailers, and other equipment involved in ground disturbance.
- In appropriate locations, employ storm-drain inlet protection measures to help prevent soil and debris (from site erosion) from entering storm-drain drop inlets. Fabric barriers, straw bales, sandbags, block and gravel protection, etc. can be employed to create barriers. These should be used in combination with other measures, such as impoundments or sediment traps.

Wetlands

For regulatory purposes under the Clean Water Act, the term wetlands means “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.” Executive Order (EO) 11990, Protection of Wetlands requires federal agencies to avoid, where possible, adversely impacting wetlands. Further, Section 404 of the Clean Water Act authorizes the Army Corps of Engineers (ACOE) to prohibit or regulate, through a permitting process, discharge or dredged or fill material or excavation within waters of the United States. The NPS policies for wetlands as stated in 2001 Management Policies and Director’s Order #77-1, Wetlands Protection, strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Once an alternative has been selected, a survey would be performed to certify wetlands within the project area and to identify locations of wetlands and open water habitat more accurately. Wetlands would be delineated by qualified NPS staff or certified wetland specialists and marked before any construction starts. All pathway construction facilities would be sited to avoid wetlands, or if that were not feasible, to otherwise comply with EO 11990, the Clean Water Act, and Director’s Order #77-1. In accordance with



Director's Order #77-1, proposed actions that have the potential to adversely impact wetlands must be addressed in a Statement of Findings for wetlands.

Mitigation measures would be applied to protect wetland resources. These measures would include the following, as appropriate:

- Employ standard avoidance, minimization, and mitigation strategies.
- Avoid wetlands during construction, using bridge crossings or retaining walls wherever possible. Increased caution would be exercised to protect these resources from damage caused by construction equipment, erosion, siltation, and other activities with the potential to affect wetlands. Measures would be taken to keep construction materials from escaping work areas, especially near streams or natural drainages.
- Use elevated pathways over wetland sections where it is not feasible to avoid the wetland or apply feasible mitigation measures (e.g., along portions of the Willow Flats area). This is of particular importance in the Cryaquolis-Cryofibristis Soils Complex (ACOE, Public Notice 3-18-2002, Regional Condition 6.F.); construction of a separated pathway on pilings would protect these unique wetland types.

Wildlife (including Threatened and Endangered and Special Status Species)

Mitigation actions would occur prior to, during, and after construction to minimize immediate and long-term impacts to wildlife. These actions would vary by specific project, depending on the extent of construction, its location, and the types of species and habitat affected. Many of the measures listed above (see "Vegetation" section) would also benefit wildlife by helping to preserve habitat. The NPS is already taking some actions to reduce wildlife-visitor conflicts within the Park. The Park has recently installed signs alerting motorists to migrating wildlife in important crossing areas and plans to install additional digital speed signs. The following actions have occurred within the last year and like actions will continue to be pursued in order to minimize impacts to wildlife:

- Notices appeared in the local weekly paper for 4 weeks, and regularly in the daily paper during the fall migration, alerting the public to drive safely due to the high incident of wildlife mortality (the actual number of fatalities was listed).
- Posters placed in the Moose Visitor Center alerted the public to drive safely due to the high incident of wildlife mortality. Actual numbers of each species wounded or killed per year were listed and updated as needed.
- Flyers were distributed to every vehicle passing through park entrance stations alerting visitors to drive safely due to the high incidence of wildlife mortality.
- New road signs were posted on the three access roads of the Park depicting a fatally wounded animal and serious vehicle damage.
- The Park is working closely with the Jackson Hole Wildlife Foundation to create radio spots and other public service announcements regarding driving more safely due to the wildlife on the roadway.
- The Grand Teton Lodge Company has created bumper stickers for all park vehicles, and possibly to sell to park visitors, encouraging safer driving due to the presence of wildlife.

Additional mitigation actions specific to wildlife would include the following, as appropriate:

- Prior to construction, evaluate habitat for species likely to occur and take steps to minimize impact on those species determined to be especially vulnerable.
- Minimize distance between existing road corridor(s) and any newly constructed pathways to reduce overall wildlife displacement.
- In site design, define pathways and boundaries of developed areas to confine human use and limit radiating impacts.
- During road shoulder and pathways design, several physical design features (e.g., retaining walls and guardrails) may be needed to construct pathways or widen road shoulders in certain topographically-challenging areas. These features would be designed in a manner that would not present a continuous barrier that would affect wildlife movement and migration. Long and continuous barriers to movement would pose unacceptable impacts to wildlife.
- Limit the effects of light and noise on adjacent habitat through control of sources during construction, and through site design of facilities, to limit long-term effects of resulting development.

- If a pilot transit program were tested in the Park in the future (based on the findings of the TBP), application of best available, low noise technologies and use of operating strategies would limit noise from transit vehicles.
- Install additional signs warning motorists and pathway users of the dangers of collisions with animals.
- Provide adequate education and enforcement to limit visitor activities that are destructive to wildlife and habitats.
- When possible, schedule disruptive construction activities to occur when effects on wildlife are less (e.g., after nesting season of birds and when mammals are neither hibernating nor have young).
- Where possible, preserve natural features with obvious high value to wildlife (e.g., tree snags).
- Maintain routes of escape from excavated pits and trenches for animals that might fall in. Cover post holes and other narrow pits with boards. During construction, maintain vigilance for animals caught in excavations and take appropriate actions to free them.
- To minimize the potential for “taking” a nest or egg of a migratory bird species, either (1) any activity that would destroy a nest or egg would occur after July 15 (a timeframe outside of the primary nesting season), or (2) a survey for any nests in the project area would be conducted prior to these activities.
- Take measures to reduce the potential for human-bear conflicts. Educate visitors on appropriate behavior when recreating in bear habitat. Provide bear-proof garbage containers in all developed areas. Require construction personnel to adhere to park regulations concerning food storage and refuse management.
 - “Bearwise” education would be conducted with all personnel involved in road and pathway construction and maintenance projects.
 - All food and other attractants would be properly stored at all times, and all food materials, garbage, and other attractants would be packed out on a daily basis if they cannot be stored in bear-resistant containers.
 - All road-killed wildlife carcasses found less than 100 yards from the roadside would be removed within 24 hours to a location away from roads and human activities.
- Project crews (other than law enforcement personnel) would not carry firearms.
- Project crews would carry bear pepper spray when conducting project activities and would be trained in bear safety.
- All project crews working in grizzly bear habitat would meet standards for sanitation, attractant storage, and access.
- All grizzly bear/human confrontations would be reported to Science and Resource Management personnel.
- Provide adequate cleaning of construction-related areas and garbage pick-up to limit wildlife access to human food.
- Enforce regulations that prohibit feeding of wildlife and that require proper food storage.

Cultural Resources

The NPS would preserve and protect, to the greatest extent possible, resources that reflect human occupation of the Grand Teton National Park. Specific mitigation measures would include the following, as appropriate:

- Conduct additional background research, resource inventory, and National Register evaluation where information about the location and significance of cultural resources is lacking. Incorporate the results of these efforts into site-specific planning and compliance documents.
- Incorporate mitigation measures into site-specific planning and design, including protecting archeological resources from disturbance, designing new construction in historic settings using compatible architectural style, and screening modern facilities from historic districts and ethnographic use areas.
- Develop specific design guidelines for all areas.
- Protect known human burials from disturbance and prepare emergency discovery plans to deal with any unanticipated discoveries.
- Mitigate unavoidable impacts to archeological resources through data recovery excavations and construction monitoring.
- Consult with tribes throughout site-specific design planning and project implementation to avoid or mitigate damage to ethnographic resources.



- Mitigate impacts to ethnographic resources through actions developed in consultation with culturally associated American Indian tribes. Mitigation measures could include designating alternative gathering areas, continuing to provide access to traditional and spiritual locations, and screening new development from traditional use areas.
- Design all new construction within historic districts, or adjacent to historic structures or sites, to be compatible in terms of architectural elements, scale, massing, materials, and orientation.
- Undertake all treatments to historic structures and cultural landscapes in keeping with the Secretary of Interior's standards.
- Coordinate with Southern Teton Area Rapid Transit and other transit-related organizations to understand demand, cost, and feasibility of connecting existing transit services to potential areas within the Park.

Transportation System and Traffic

The TBP will provide recommendations related to transit in the Park. If a pilot transit program were tested in the Park in the future based on the findings of the TBP, mitigation measures would be similar to, but not limited to, those listed below. Any future decision on transit would incorporate these elements.

- Limit noise from transit vehicles through application of best available, low noise technologies and use of operating strategies.
- Apply best available clean fuel technology to minimize air quality emissions.
- Consider the need for reliable, cost-effective transit service with adequate vehicle capacity.

Social and Economic Environments

During future planning and implementation, the NPS would work with local communities and county governments to identify further potential impacts and mitigation measures that would best serve the interests and concerns of both the NPS and the local communities, which may include the following:

- Pursue partnerships to improve the quality and diversity of community amenities and services.
- Coordinate with Teton County and the Town of Jackson such that pathway construction along U.S. Highway 26/89/191 within the Park from the south entrance to Moose Junction occurs at the same time a pathway from the town to the Park's south boundary is being constructed.



APPENDIX B Habitat Loss by Alternative

Table B-1 provides estimates of direct loss (in acres) by alternative and road segment.

TABLE B-1 ESTIMATES OF DIRECT HABITAT LOSS (ACRES) FROM ROAD AND PATHWAY FEATURES BY ALTERNATIVE AND ROAD SECTION											
		Alternatives									
		Road Feature					Separated Pathways				
Road Segment	Habitat Type	1	2	3	3a	4	1	2	3	3a	4
Jackson to Antelope Flats	Aspen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Barren	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.49
	Coniferous Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Cottonwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	0.33
	Meadow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.23	1.23	1.23
	Riparian	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.06
	Sagebrush	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.70	15.70	15.70
	Willow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.81	17.81	17.81
Moose to Signal Mountain	Aspen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05
	Barren	0.00	12.29	7.20	3.51	0.00	0.00	0.00	1.02	1.40	1.56
	Coniferous Forest	0.00	0.31	0.31	0.30	0.00	0.00	0.00	0.73	1.20	6.14
	Cottonwood	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.44	0.44	0.44
	Meadow	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.56	0.68	0.68
	Riparian	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.22	0.22	0.22
	Sagebrush	0.00	0.58	0.18	0.04	0.00	0.00	0.00	17.79	24.04	25.37
	Willow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.09
TOTAL		0.00	13.27	7.68	3.84	0.00	0.00	0.00	20.91	28.12	34.55



**TABLE B-1
ESTIMATES OF DIRECT HABITAT LOSS (ACRES) FROM ROAD AND PATHWAY FEATURES
BY ALTERNATIVE AND ROAD SECTION**

		Alternatives									
		Road Feature					Separated Pathways				
Road Segment	Habitat Type	1	2	3	3a	4	1	2	3	3a	4
Granite Canyon Entrance Station to Moose	Aspen	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.41	0.26	1.98
	Barren	0.00	0.00	0.04	0.04	0.04	0.00	0.00	0.13	3.64	0.28
	Coniferous Forest	0.00	0.00	0.33	0.33	0.33	0.00	0.00	2.28	1.10	3.56
	Cottonwood	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.07	0.10	0.07
	Meadow	0.00	0.00	0.07	0.07	0.07	0.00	0.00	0.29	0.90	0.64
	Riparian	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.02	0.07
	Sagebrush	0.00	0.00	3.49	3.49	3.49	0.00	0.00	2.89	2.10	7.26
Willow	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.06	
TOTAL		0.00	0.00	3.96	3.96	3.96	0.00	0.00	6.14	8.12	13.92
Jackson Lake Junc- tion to Colter Bay	Aspen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.21
	Barren	0.00	0.00	3.42	3.78	0.00	0.00	0.00	0.00	0.36	0.46
	Coniferous Forest	0.00	0.00	0.34	1.18	0.00	0.00	0.00	0.00	2.06	5.31
	Cottonwood	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.19
	Meadow	0.00	0.00	0.03	0.13	0.00	0.00	0.00	0.00	0.00	0.00
	Riparian	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.20
	Sagebrush	0.00	0.00	0.17	0.10	0.00	0.00	0.00	0.00	3.67	3.73
Willow	0.00	0.00	0.02	0.10	0.00	0.00	0.00	0.00	0.27	0.50	
TOTAL		0.00	0.00	3.99	5.37	0.00	0.00	0.00	0.00	6.59	10.61



**TABLE B-1
ESTIMATES OF DIRECT HABITAT LOSS (ACRES) FROM ROAD AND PATHWAY FEATURES
BY ALTERNATIVE AND ROAD SECTION**

		Alternatives									
		Road Feature					Separated Pathways				
Road Segment	Habitat Type	1	2	3	3a	4	1	2	3	3a	4
Signal Mountain to Jackson Lake Junction	Aspen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Barren	0.00	0.00	3.03	1.96	1.87	0.00	0.00	0.00	0.23	0.23
	Coniferous Forest	0.00	0.00	0.11	0.12	0.11	0.00	0.00	0.00	0.00	0.00
	Cottonwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Meadow	0.00	0.00	0.10	0.07	0.07	0.00	0.00	0.00	0.01	0.01
	Riparian	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	1.04	1.04
	Sagebrush	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Willow	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.92	0.92
TOTAL		0.00	0.00	3.31	2.18	2.07	0.00	0.00	0.00	2.21	2.21
Gros Ventre Junction to West Boundary	Aspen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Barren	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
	Coniferous Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Cottonwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
	Meadow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Riparian	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sagebrush	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69	0.00
	Willow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.85	0.00

**TABLE B-1
ESTIMATES OF DIRECT HABITAT LOSS (ACRES) FROM ROAD AND PATHWAY FEATURES
BY ALTERNATIVE AND ROAD SECTION**

		Alternatives									
		Road Feature					Separated Pathways				
Road Segment	Habitat Type	1	2	3	3a	4	1	2	3	3a	4
North Jenny Lake Junction to String Lake	Aspen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Barren	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00
	Coniferous Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.00
	Cottonwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Meadow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Riparian	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sagebrush	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67	0.00
Willow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
TOTAL		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.87	0.00
TOTAL FOR ALL ROAD SEGMENTS*		0.00	13.27	18.94	15.35	6.03	0.00	0.00	44.86	67.57	79.10
<i>*Total for acres lost for Alternative 1 0.00 Alternative 2 13.27 Alternative 3 63.80 Alternative 3a 82.92 Alternative 4 85.13</i>											



Table B-2 provides the net change in the 75-meter and 400-meter zone of influence by alternative and road segment

TABLE B-2 NET CHANGE IN 75-METER AND 400-METER ZONE OF INFLUENCE (ACRES) FROM ROAD FEATURES AND SEPARATED PATHWAY FEATURES BY ALTERNATIVE AND ROAD SECTION											
		Alternatives									
		75-m ZOI					400-m ZOI				
Road Segment	Habitat Type	1	2	3	3a	4	1	2	3	3a	4
Jackson to Antelope Flats	Aspen	0.00	0.00	0.20	0.20	0.20	0.00	0.00	0.41	0.41	0.41
	Barren	0.00	0.00	0.66	0.66	0.66	0.00	0.00	0.84	0.84	0.84
	Coniferous Forest	0.00	0.00	0.32	0.32	0.32	0.00	0.00	0.85	0.85	0.85
	Cottonwood	0.00	0.00	1.39	1.39	1.39	0.00	0.00	2.05	2.05	2.05
	Meadow	0.00	0.00	3.05	3.05	3.05	0.00	0.00	5.48	5.48	5.48
	Riparian	0.00	0.00	0.12	0.12	0.12	0.00	0.00	1.72	1.72	1.72
	Sagebrush	0.00	0.00	41.17	41.17	41.17	0.00	0.00	37.21	37.21	37.21
	Willow	0.00	0.00	0.21	0.21	0.21	0.00	0.00	0.00	0.00	0.00
TOTAL		0.00	0.00	47.11	47.11	47.11	0.00	0.00	48.56	48.56	48.56
Moose to Signal Mountain	Aspen	0.00	0.03	0.48	0.48	0.48	0.00	0.13	0.00	0.00	0.00
	Barren	0.00	0.28	0.73	0.99	1.80	0.00	3.40	3.83	4.07	4.80
	Coniferous Forest	0.00	3.91	11.48	14.63	25.54	0.00	29.55	28.73	40.32	55.15
	Cottonwood	0.00	0.16	2.19	2.19	2.19	0.00	3.00	6.13	6.13	6.13
	Meadow	0.00	0.10	1.27	1.37	1.56	0.00	1.34	1.92	2.02	2.09
	Riparian	0.00	0.08	0.77	0.77	0.77	0.00	1.37	2.88	3.03	3.00
	Sagebrush	0.00	8.76	47.49	60.91	63.88	0.00	33.48	19.44	20.55	23.03
	Willow	0.00	0.06	0.46	0.46	0.46	0.00	0.25	0.51	0.51	0.51
TOTAL		0.00	13.39	64.87	81.81	96.68	0.00	72.51	63.43	76.64	94.71

**TABLE B-2
NET CHANGE IN 75-METER AND 400-METER ZONE OF INFLUENCE (ACRES) FROM ROAD
FEATURES AND SEPARATED PATHWAY FEATURES BY ALTERNATIVE AND ROAD SECTION**

		Alternatives									
		75-m ZOI					400-m ZOI				
Road Segment	Habitat Type	1	2	3	3a	4	1	2	3	3a	4
Granite Canyon Entrance Station to Moose	Aspen	0.00	0.00	1.69	0.55	1.59	0.00	0.00	2.47	0.54	1.36
	Barren	0.00	0.00	0.46	0.19	1.75	0.00	0.00	0.19	0.07	0.29
	Coniferous Forest	0.00	0.00	8.94	2.24	14.86	0.00	0.00	10.64	2.88	18.40
	Cottonwood	0.00	0.00	0.33	0.23	0.33	0.00	0.00	0.05	0.85	0.59
	Meadow	0.00	0.00	0.44	0.21	1.02	0.00	0.00	1.29	0.62	1.72
	Riparian	0.00	0.00	0.95	0.19	0.95	0.00	0.00	0.27	0.21	0.11
	Sagebrush	0.00	0.00	6.87	2.63	21.40	0.00	0.00	5.15	1.16	9.55
	Willow	0.00	0.00	0.02	0.64	2.34	0.00	0.00	0.27	0.05	2.22
TOTAL		0.00	0.00	19.76	6.24	44.31	0.00	0.00	23.38	7.15	37.31
Jackson Lake Junction to Colter Bay	Aspen	0.00	0.00	0.07	0.34	0.34	0.00	0.00	0.03	0.14	0.03
	Barren	0.00	0.00	0.15	1.38	1.60	0.00	0.00	0.39	2.21	3.05
	Coniferous Forest	0.00	0.00	1.94	10.04	14.30	0.00	0.00	2.09	11.99	15.14
	Cottonwood	0.00	0.00	0.06	0.21	0.37	0.00	0.00	0.15	1.38	2.01
	Meadow	0.00	0.00	0.06	0.54	0.49	0.00	0.00	0.21	0.55	0.70
	Riparian	0.00	0.00	0.16	0.65	1.09	0.00	0.00	0.19	0.71	0.97
	Sagebrush	0.00	0.00	1.37	8.78	9.32	0.00	0.00	0.61	3.51	3.39
	Willow	0.00	0.00	0.25	2.47	2.41	0.00	0.00	0.69	4.81	4.85
TOTAL		0.00	0.00	4.06	24.41	29.92	0.00	0.00	4.38	25.28	30.14



**TABLE B-2
NET CHANGE IN 75-METER AND 400-METER ZONE OF INFLUENCE (ACRES) FROM ROAD
FEATURES AND SEPARATED PATHWAY FEATURES BY ALTERNATIVE AND ROAD SECTION**

		Alternatives									
		75-m ZOI					400-m ZOI				
Road Segment	Habitat Type	1	2	3	3a	4	1	2	3	3a	4
Jackson Lake Junction	Aspen	0.00	0.00	0.05	0.05	0.05	0.00	0.00	0.05	0.00	0.00
	Barren	0.00	0.00	0.64	0.77	0.83	0.00	0.00	1.18	2.58	2.65
	Coniferous Forest	0.00	0.00	1.09	1.12	1.06	0.00	0.00	0.93	0.83	0.78
	Cottonwood	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00
	Meadow	0.00	0.00	0.28	0.30	0.29	0.00	0.00	0.04	0.04	0.04
	Riparian	0.00	0.00	0.50	3.26	3.26	0.00	0.00	0.39	1.33	1.33
	Sagebrush	0.00	0.00	0.14	0.11	0.11	0.00	0.00	0.30	0.15	0.14
	Willow	0.00	0.00	0.60	2.92	2.92	0.00	0.00	0.39	3.33	3.33
TOTAL		0.00	0.00	3.32	8.55	8.53	0.00	0.00	3.28	8.26	8.27
Gros Ventre Junction to West Boundary	Aspen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Barren	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.00
	Coniferous Forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Cottonwood	0.00	0.00	0.00	0.63	0.00	0.00	0.00	0.00	1.47	0.00
	Meadow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Riparian	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00
	Sagebrush	0.00	0.00	0.00	4.02	0.00	0.00	0.00	0.00	0.63	0.00
	Willow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		0.00	0.00	0.00	4.65	0.00	0.00	0.00	0.00	2.66	0.00

**TABLE B-2
NET CHANGE IN 75-METER AND 400-METER ZONE OF INFLUENCE (ACRES) FROM ROAD
FEATURES AND SEPARATED PATHWAY FEATURES BY ALTERNATIVE AND ROAD SECTION**

		Alternatives									
		75-m ZOI					400-m ZOI				
		1	2	3	3a	4	1	2	3	3a	4
Road Segment	Habitat Type	1	2	3	3a	4	1	2	3	3a	4
North Jenny Lake Junction to String Lake	Aspen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Barren	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.62	0.00
	Coniferous Forest	0.00	0.00	0.00	2.52	0.00	0.00	0.00	0.00	1.08	0.00
	Cottonwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Meadow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Riparian	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
	Sagebrush	0.00	0.00	0.00	4.92	0.00	0.00	0.00	0.00	1.98	0.00
	Willow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		0.00	0.00	0.00	7.47	0.00	0.00	0.00	0.00	3.68	0.00
TOTAL FOR ALL ROAD SEGMENTS		0.00	13.39	139.12	180.24	226.55	0.00	72.51	143.03	172.23	218.99



TABLE B-3 AREAS WITHIN 75-METER AND 400-METER ZONE OF INFLUENCE (ACRES) FROM EXISTING ROAD FEATURES BY ROAD SECTION		
Road Segment	75-m ZOI	400-m ZOI
South Boundary to Antelope Flats	588.7	3,086.0
Moose to North Jenny Lake	675.7	3,380.5
North Jenny Lake to Signal Mountain	439.8	2,257.9
Granite Canyon Entrance Station to Moose	501.0	2,362.6
Jackson Lake Junction to Colter Bay	346.1	1,819.2
Signal Mountain to Jackson Lake Junction	189.3	968.6
Gros Ventre Junction to West Boundary	56.8	284.6
North Jenny Lake Junction to String Lake	88.8	417.8
Colter Bay to Yellowstone National Park	1,082.2	5,606.9
Other Primary Roads	1,487.2	7,642.9
TOTAL	5,455.6	27,827.0



APPENDIX C

Projects Examined for Cumulative Impacts

The following projects were considered in assessing cumulative impacts of the alternatives on the resources and values of the Park, as discussed in Chapter 4 of this document. These projects are those that would affect resources in the area of analysis (Grand Teton frontcountry), that would also be affected by the proposed plan, or that could cause changes to transportation patterns or needs in the area.

Grand Teton National Park

Moose Entrance Station

This project will relocate the existing entrance station within 1/8-mile of its existing location and add one entrance lane at the new location.

Moose Discovery Visitor Center and Area Plan

A new visitor center, approximately 22,000-ft² (2,044-m²) in size, will be constructed southeast of the old Moose Post Office within the sagebrush meadow on the edge of the mixed hardwood and spruce/fir forest. A value analysis has been completed for the existing administrative building and visitor center. The preferred option has not been selected. One option includes finishing the second floor of the current maintenance building to serve as the administrative office and removing the current administrative building. Another option includes finishing the second floor, keeping the current administrative office to use for storage, and removing a series of warehouses at the side of the maintenance yard. Other options combine similar work in different arrangements. Approximately 4.0 acres (1.6 ha) of parking will be provided. The existing store being used by the contractors during the construction work will be removed. In addition, the existing boat launch and boater parking areas will be reconfigured to provide for better circulation, visitor safety, parking efficiency, and expanded launching capability and boat parking.

Jenny Lake Lodge Upgrading Visitor Accommodation and Employee Housing Facilities

This project includes several elements, including: (1) relocating three existing guest cabins to the employee housing area to provide improved housing for managerial employees; (2) converting one existing employee cabin to an employee lounge, replacing a temporary employee lounge in the housekeeping facility, and constructing

five new guest cabins to improve the overall quality of guest accommodations while maintaining the maximum guest capacity of 114 people; (3) constructing a 2,000-ft² (186-m²) guest lounge to accommodate indoor programs and other special events and activities for guests; and (4) installing an additional 2,000-gal (7,570-L) tank for the septic system. Project construction will occur in five phases (three spring and two fall construction seasons).

North Park Road Projects

From 2006 to 2009, the following projects are scheduled on the North Park Road:

- Approximately 10.0 miles (16.1 km) of the North Park Road, from the Lizard Creek Campground north through the John D. Rockefeller, Jr. Memorial Parkway to the southern boundary of Yellowstone National Park, will be reconstructed following the standard roadway cross-section (two 11-ft paved travel lanes and two 5-ft paved shoulders).
- The Snake River Bridge near Flagg Ranch will be replaced.
- The road from Moran to the Jackson Lake Lodge will be chip sealed in 2007 (pending funding). In addition to the projects that are currently scheduled, a 5-ft widened shoulder may be considered for future roadwork between Colter Bay and Lizard Creek, but this action would require additional compliance.

Spread Creek

The National Park Service (NPS), in cooperation with the Federal Highway Administration and the U.S. Forest Service, prepared an environmental assessment evaluating the proposed rehabilitation of U.S. Highway 26/89/191/287 and the development of the Spread Creek material source and staging area. The Finding of No Significant Impact was signed in April 1997. Development of the Spread Creek material source and staging area provides sand, rock, and gravel for repairing and maintaining park and forest roads and facilities.

Laurance S. Rockefeller (LSR) Preserve

On May 26, 2001, Laurance S. Rockefeller announced his intent to donate 1,106 acres (448 ha) to the NPS. This parcel was the remaining privately held portion of the JY Ranch that the Rockefeller family had owned since the 1930s. The property surrounds the southern half of Phelps



Lake and offers some of the most spectacular mountain scenery in the Park. The transfer of ownership from the Rockefeller family to the Grand Teton National Park is scheduled to occur in 2007; after which, the JY Ranch will become a significant and nationally recognized park attraction known as the Laurance S. Rockefeller (LSR) Preserve. A system of trails and a visitor contact station are currently under development.

Western Center for Historic Preservation at White Grass Ranch

In 2003, the Department of the Interior and the National Trust for Historic Preservation formed a partnership creating the Western Center for Historic Preservation. Its primary purpose is to preserve rustic architecture through work on deferred maintenance projects in the Grand Teton National Park and the Intermountain Region. The secondary purpose will be to support cultural resource research projects dealing with historic structures, history, and cultural landscapes in the Park and the Greater Yellowstone Area. The first phase will involve rehabilitation of the White Grass Ranch, which will take approximately 5 years. Once rehabilitated, White Grass Ranch's primary function will be to provide seasonal housing and work space for NPS historic preservation crews and volunteers who will work with the center to decrease the historic structure maintenance backlog in the Park. White Grass Ranch will operate seasonally from late April to September. Use of the ranch will be limited to 30 people during the day and 15 people overnight. There will be parking for six vehicles at the ranch; car or van pools to the ranch would be required. A volunteer site manager will coordinate activities of overnight guests staying at the ranch.

Bison/Elk Management

The U.S. Fish and Wildlife Service and the NPS collaborated on an Environmental Impact Statement (EIS) that considers various management issues, including:

- Bison and elk ecology.
- Loss and degradation of elk winter range.
- Number of elk and bison inhabiting the refuge and park.
- Population control measures.
- Forage management.
- Winter feeding.
- Disease management.
- Restoration of habitats damaged by elk and bison.

- Restoration of previously agricultural lands to provide habitat.

A Record of Decision is expected in late 2006 or early 2007.

United States Department of Agriculture – Bridger Teton National Forest

Jackson Hole Mountain Resort Improvements

This project completes a number of improvements, including upgrading the hiking/biking trail network and providing approximately 23 miles (37 km) of additional trails. Trails must be sited and designed so as to avoid encroachment into the Grand Teton National Park.

Teton County/Town of Jackson

Teton Village Expansion

Snake River Associates (SRA) has recently had a development of approximately 200 acres (81 ha) of ranch land approved to be rezoned for resort development as a part of a Teton Village expansion. The SRA proposal includes construction of homes, a golf course, commercial space, skier parking, parks, paths, and other facilities.

Teton County/Town of Jackson Regional Transportation Plan

The Jackson Regional Transportation Plan was adopted by Teton County and the Town of Jackson in January 2000 and updated in December 2003. This comprehensive, regional, multi-modal plan is officially a part (Chapter 8) of the joint County/Town Regional Comprehensive Plan. Technical work and public process on the Transportation Plan began in 1996 and continued through to adoption. The Wyoming Department of Transportation (WYDOT) was actively involved in plan development.

A principal focus of the Plan is to reduce and manage the impacts of traffic growth occurring in the valley as a result of population growth and commercial development. Area residents have been concerned about the loss of rural character associated with traffic congestion and highway expansion in Jackson. The Plan sets policies and programs designed to intervene in traffic growth through a combination of mode shift and land use strategies.

Specifically, the Plan sets a goal of reducing single occupant vehicle travel to 42 percent of daily person trips, down from 55 percent in 1996. By 2020, "alternative



modes” (i.e., walking, bicycling, and transit) would account for 28 percent of daily person trips, up from 15 percent in 1996. The Plan also sets policies to focus future development in the existing town as part of a “town as heart” initiative. Other land use policies included in the Plan are the continued use of conservation easements to avoid traffic growth in certain corridors and the steering of development into “mixed use villages” suitable for development of improved transit service and pathway networks.

The Transportation Plan calls for a “systematic expansion of the public transit system in Teton County.” Both public and private transit providers are to play a role in this expansion. Transit services to be considered as part of this expansion include (among others):

- Transit service to popular Grand Teton National Park sites and provisions for integrating with future Grand Teton National Park transit systems.
- A regional transit center that includes additional parking opportunities in the Town of Jackson (Regional Transportation Plan, p. 8-30).

The regional Pathways Program (see below), providing routes for walking and bicycling, is another major emphasis of the Plan. The Plan states that:

- The town, county, and WYDOT street and roadway systems will be designed to safely accommodate and encourage pedestrian and bicycle use as important modes of travel. A system of separated pathways connecting major origins and destinations in Teton County will be incorporated into the transportation system.
- The town, county, and WYDOT will coordinate with public land management agencies to connect the pathway system and on-street pedestrian/bicycle facilities with pathway and trail systems on federal lands, including the Grand Teton National Park, the National Elk Refuge, and the Bridger-Teton and Targhee National Forests (Regional Transportation Plan, p. 8-33).

Finally, the Plan sets average daily traffic (summer) and level of service goals for regional arterial roadways, including roadways that provide access to the Grand Teton National Park.

Transit Development Plan — Southern Teton Area Rapid Transit (START)

The “Jackson/Teton County Transit Development Plan (TDP): 2000-2005 and Long Range” was adopted by Teton County and the Town of Jackson in June 2000 and updated in November 2003. The TDP was based on an evaluation of current operations of the START public bus system, including relationships between the START cost structure, routes, service levels, fleet requirements, and other factors.

Based on extensive public involvement and on policies articulated in the Jackson Regional Transportation Plan, the TDP provided service recommendations based on realization of the 2020 Transportation Plan goals (including a 2020 goal of 5 percent of daily person trips on transit) and also defined a phased implementation program with a detailed operations plan for the first 5 years (2000 to 2005). START is in support of providing public transit between Jackson and the Grand Teton National Park, assuming the Park will pay the capital and operating cost of this service.

Jackson Hole Community Pathways Program

The Jackson Hole Community Pathways Program is a jointly funded independent department of the Town of Jackson under the direction of the Town Administrator. The Program has the following goals:

- *Improve Facilities* – Systematically complete the Pathways Improvement Program list of on-road and off-road improvements for bicycling, walking, horseback riding, and Nordic skiing.
- *Increase Use* – Double the percentage of transportation trips made by bicycling, walking, and other non-motorized modes by 2015.
- *Enhance Safety* – Decrease the number of bicycle and pedestrian accidents and multi-user trail conflicts by 10 percent.

The Pathways Program, through its task force, has adopted the following objectives:

- *Meet Needs of All Levels of Bicyclists* – Create a comprehensive network of on-road and off-road facilities that are integrated with the roadway and transit systems.

- *Meet Needs of Pedestrians, Including Persons with Disabilities* – Make all streets and intersections “pedestrian-friendly” and accessible.
- *Encourage and Promote Bicycling and Walking* – Shift 10 percent of transportation trips to bicycle and walking modes by 2015; conduct a promotion campaign for bicycling and walking transportation trips.

The Pathways Program has built a network of off-road multi-use “pathways” radiating out from the Town of Jackson and has worked with other agencies to build additional pathways. Past and future planned projects include:

- *Moose-Wilson Trail* – This project completes a trail of approximately 7 miles, from Wyoming Highway 22 to the south park boundary along Wyoming Highway 390.
- *Jackson-Moose Scenic Pathway* – This project completes a trail of approximately 3.5 miles, from the Multi-agency campus in Jackson to the Park boundary. Construction was scheduled to occur in 2004.
- *Regional Trails* – The following pathways are also scheduled for future construction: Teton Pass Millennium Trail; Hoback Junction Pathway, Hoback Junction Pathway to Wyoming Centennial Scenic Byway, Wyoming Highway 22 Pathway, and Snake River Bridge.

WYDOT Transportation Improvement Program

The WYDOT will undertake a number of highway projects in and around Teton County. Projects initiated in 2002 include the previously described Pathways Program projects that will directly connect Teton Village and the Granite Entrance Station of the Grand Teton National Park with the village of Wilson, and the extensive Teton County pathways network, including sections running west and south out of Jackson.

Two other projects, currently in the planning and design stages with WYDOT, will be of direct relevance to the Grand Teton National Park. These include:

- *Reconstruction of Wyoming Highway 22 and Wyoming Highway 390* – These projects will bring major changes to Wyoming Highway 22 from Jackson west over Teton Pass to the Idaho state line, and to Wyoming

Highway 390 from Wyoming Highway 22 north to Teton Village. The Regional Transportation Plan calls for Wyoming Highway 22 from Jackson to the Snake River to be widened to four lanes with an additional bridge over the river. Wyoming Highway 22 through Wilson would remain at two through-lanes. The Plan calls for delaying the widening of Wyoming Highway 390 beyond three lanes for as long as possible. Due to uncertainties in the planning process, WYDOT has not assigned these projects to specific program years.

- *Reconstruction of U.S. Highway 287 over Togwotee Pass* – This series of projects began in early 2006. Work will include bridge replacement projects as well as roadway reconstruction and widening. The preferred alternative calls for a 12-ft travel lane, 6-ft shoulders, and a 10-ft clear zone.

Finally, WYDOT has an ongoing statewide Intelligent Transportation Systems (ITS) program. The interstate highway system will be the location of the first specific improvements, including installation of dynamic message signs, radio stations, and other improvements along the western half of I-80. Ultimately, WYDOT will establish a statewide network of real time traffic data gathering, weather monitoring, and information dissemination on the state highway system, including variable message signs, information radio systems, dial-in services, and Internet web sites. An improved ITS on Wyoming Highway 22 over Teton Pass has already been funded.



APPENDIX D

Responses to Comments on the Draft Plan/EIS

This appendix summarizes all substantive comments received on the Draft Plan/EIS and provides responses to comments, as required by Council on Environmental Quality regulations. The appendix includes the following elements:

- Overview of the process for commenting on the Draft Plan/EIS.
- Analysis of comment types, numbers, and content, with summaries of substantive comments.
- Comment text from agency letters.
- Responses to substantive comments.

In accordance with 40 Code of Federal Regulations (CFR) 1503.4[5][b], summaries of all substantive comments received on the Draft Plan/EIS appear in this appendix. Comments in favor of or against the proposed action or alternatives, or comments that only agree or disagree with NPS policy, are not considered substantive. A substantive comment is one that does one or more of the following:

- Questions, with reasonable basis, the accuracy of information in the EIS.
- Questions, with reasonable basis, the adequacy of the environmental analysis.
- Presents reasonable alternatives other than those presented in the EIS.
- Causes changes or revisions in the proposal.

In preparing a Final EIS, an agency is required to assess and consider comments both individually and collectively. The agency is required to respond by one or more of the following means, while stating its response in the final statement (40 CFR 1503.4):

- Modify alternatives.
- Develop and evaluate alternatives not given serious consideration.
- Supplement, improve, or modify analyses.
- Make factual corrections.
- Explain why comments do not warrant further agency response.

Overview of the Public Comment Process

In April 2000, the National Park Service (NPS) undertook a transportation study to provide basic information regarding transportation issues in Grand Teton National Park. The study served as a foundation for the next step in the process, which was the development of a Transportation Plan, initiated in September 2001.

The Park conducted a series of public scoping meetings and workshops in Jackson, Wyoming, during late 2001 and early 2002, and work continued on the Plan during 2002 and 2003. In 2004, the NPS decided to scale back the Plan to focus on actions that could be achieved within a 5- to 10-year period.

The NPS developed the range of reasonable alternatives, involving a variety of strategies to address transportation within the Park. On May 27, 2005, the Draft Plan/EIS was released for public review and comment. The NPS subsequently extended the comment period, which ended on August 25, 2005, providing a 90-day comment period. A total of 2,638 documents were received through the NPS Planning, Environment, and Public Comment website, fax, and direct mail.

Some, but not all, commentors expressed a preference for or opposed one or more of the alternatives presented in the Draft Plan/EIS. Of those expressing an opinion, the most common was support for Alternative 4. Many of the comments received were form letters of various types.



Correspondence from Agencies and/or Tribes

Letter 130491—Teton County Board of Commissioners

Correspondence Text

The Teton County Board of County Commissioners commends the Park for undertaking the difficult but critical effort to re-envision the transportation system that serves Grand Teton National Park. We view this Plan as the first step toward creating a well-coordinated transportation system that meets the needs of Park visitors and employees and that protects the incalculable natural resources entrusted to the Park's care. We also view this Plan as a short-term planning document that will be further developed and refined in conjunction with the update of the General Management Plan. In that context, we offer the following comments on the Draft EIS:

Pathways Element

The Board supports the Park's efforts to implement a comprehensive system of separated pathways, extending from the Park's boundary north of Jackson to Colter Bay. The Board's preference would be for a pathway system most closely aligned with the system represented in Alternative 4. With regard to the design of the pathway system, the Board trusts that the Park will choose alignments that are safe and of minimal impact to natural resources and wildlife.

Transit Element

The Board recommends that the Park recast the EIS so that greater balance between the pathways and transit elements is achieved. The pilot transit system proposed in both Alternatives 3 and 4 lacks the same commitment to implementation and financial support proposed for the pathways element of the Plan. The success of the Plan will be measured not by the miles of pathway constructed, but by the degree to which the range of travel choices and needs are met, and the extent to which a seamless, environmentally sensitive transportation system is created. In order to achieve such a system, the EIS must include a transit element supported by realistic funding and a clear commitment to implementation on more than a start-up basis.

The County and Town of Jackson envision an opportunity to form a partnership with the Park to provide transit service to/from Jackson. Ideally the communities' local transit provider, START, would concentrate on a link between Jackson and the new visitor center in the Park, which would be coupled with Park-sponsored strategies for internal transit service. Again, the Plan does not include sufficient detail to anticipate the respective roles and responsibilities of START, the Park, or private concessionaires in this regard. Further detail can be found in the START comment memo, dated August 15, 2005.

Moose-Wilson Road

Members of the Board feel strongly that the Moose-Wilson Road and surrounding environment should not be allowed to suffer the ill effects of ever increasing travel and use. In that regard the Board opposes any change to the physical character of the road, as well as any proposal that would allow winter use of the road.

The Board does support the proposed pathway from Granite Canyon to the new JY Ranch Visitor Center, so long as it can be achieved with minimal environmental impacts. The Board also supports the proposed realignment of portions of the road, as detailed in the EIS, but only if the physical character of the realigned sections is consistent with the existing, adjacent roadway sections.

Planning for Developed Areas

The Draft EIS includes little detail with regard to proposed modifications in the Developed Areas of the Park. Successful integration of anticipated transit, pedestrian, cycling and vehicle modes will necessitate well-considered internal/external circulation routes, transit stops, adequate parking, wayfinding, services for the disabled, emergency access, and delivery and service needs. The current Plan provides little support for this critical component of the overall transportation system, either in terms of detail or commitment to funding.



In closing, the Board of County Commissioners supports the Park's efforts to create a safe, efficient, environmentally respectful, multi-modal transportation system for Grand Teton National Park. We look forward to partnering with you in support of our mutual goals and are confident that we can work together to achieve these goals.

Respectfully, Larry Jorgenson, Chairman

Response

See Response to Comments, numbers 13 and 16.

Letter 129654—USDA Forest Service, Bridger Teton National Forest

Correspondence Text

Thank you for the opportunity to comment on the GTNP Transportation Plan Environmental Impact Statement. We believe the Preferred Alternative presents a great improvement over the existing condition while allowing a moderate level of investment and impact to the environment. Implementation of this alternative will also help reduce environmental impacts to the adjacent National Forest system lands.

We have the following specific comments on the EIS:

1) We are concerned about the impact of the project on habitat and wildlife species including moose, elk, pronghorn antelope, and bears. For this reason, we support that pathways should be located adjacent to existing roads where possible. We further suggest that the project be phased in over time so that the impacts of the pathways on wildlife can be monitored and adjustments made, if needed.

2) The EIS states that transit service would begin from the MAC site. We suggest the wording be amended to include "or an alternative site within the Town of Jackson."

3) Adding some information on a proposed implementation schedule would be a good addition to the document. Does this project need to compete with other park maintenance needs for funding? How would implementation of this project be affected by other GTNP priorities?

Thank you again for the opportunity to comment. We look forward to the implementation of the Preferred Alternative and an improved transportation system in Grand Teton National Park. If we can be of any assistance in the implementation process, please do not hesitate to call.

Carole "Kniffy" Hamilton, Forest Supervisor

Response

See Response to Comments, numbers 17, 18, and 61.

Letter 129648—U.S. Fish and Wildlife Service

Correspondence Text

Thank you for the opportunity to comment on the Grand Teton National Park Transportation Plan/Draft EIS. These comments are based on my concern that the creation of bike paths away from existing highways in GTNP, particularly when these are in areas of visual cover in wildlife habitat, have the potential to increase bear-human surprise encounters and may also result in habitat loss or avoidance of such bike path areas by bears and other wildlife species.

The key issue is the creation of bike paths separated from the existing highways through habitat that has high potential to have grizzly and other wildlife presence. Such non-motorized pathways will be conflict generating developments as they will bring quiet fast moving people on bikes into close proximity with wildlife with little or no warning to the animals. Such bike paths also have high potential for dramatically increasing human use of wildlife habitat, especially in early morning and evening and even at night, times when wildlife are most active.

These pathways will increase the probability of bear-human encounters along with moose-human encounters and will effectively widen the human disturbance zone of the highway corridor into adjacent currently undisturbed habitats. The preferred alternative describes 23 miles of such pathways between 50 and 150 feet from the existing roadbed. I see major impacts related to:

- Increased surprise encounters with bears and other potentially aggressive wildlife and quiet, fast moving humans on bikes or running resulting in increased potential for injury and possibly death for both humans and bears.*
- Increased use of the presently undisturbed habitats where these pathways will be built. This use will occur during all times of the day and will be particularly detrimental during the hours of early morning and evening and even during darkness when wildlife is most likely to be present. This increased human use will displace wildlife and increase conflict encounter frequencies.*
- Increased habitat displacement in these areas by essentially widening the highway corridor and human presence zone from the existing highway to 50-150 feet of additional displacement distance. This will widen the roadway use zone and depart from the 1998 baseline in the Conservation Strategy. If such bike pathways are within 15-20 feet of the existing roadway, there will be little measurable impact.*

I am also very concerned about the impacts of alternative 4, since it proposes separated pathways all the way to Colter Bay, and traverses habitat with high grizzly bear density from North Jenny Lake Junction to Colter Bay. I am also particularly concerned about the Moose-Wilson road corridor, in the SW corner of the park, where excellent bear habitat exists, black bears occur at high density, but at this time grizzly bears are mostly absent or at low density. A separated pathway there will have impacts on black bears, moose, and other wildlife, and will eventually involve grizzly impacts in the near future as bears continue to colonize areas in the south end of the park.

My suggestion is that such pathways, if they are to be built, be immediately adjacent to (within 15-20 feet) of the existing highways. This is most important in areas where there is visual cover that can hide animals and people from each other along bike pathways. The adjacent distance is of less importance in open meadow or low sagebrush habitats where animals and people can see each other at some distance. Such adjacent pathway placement will minimize wildlife displacement and reduce the probability of surprise encounters as wildlife are less likely to be surprised along existing roads than along paved pathways in areas of high visual cover.

Thank you for this opportunity to comment. I appreciate the effort you are making to get people out of their cars on bike trails in the beauty of GTNP. However, I believe that such actions need to be done with careful consideration of the unintentional impacts of the placement of such bike trails on resident wildlife.

Christopher Servheen, Grizzly Bear Recovery Coordinator

Response

See Response to Comments, numbers 23, 30, 31, and 36.

Letter 129651—U.S. Fish and Wildlife Service-Ecological Service

Correspondence Text

*Thank you for your letter requesting comments on the Draft Environmental Impact Statement (DEIS) for Grand Teton National Park Transportation Plan (plan or Project), dated May 27, 2005 and received in our Cheyenne Fish and Wildlife Service (Service) Office on May 31. This letter addresses Alternative 3, the Preferred Alternative, and in particular the potential Project effects on the threatened grizzly bear (*Ursus arctos horribilis*) and gray wolf (*Canis lupus*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (50 CFR §402). In addition, the Service agrees with the Park's assessment that the Project will likely have negligible impacts to the threatened bald eagle (*Haliaeetus leucocephalus*) and Canada lynx (*Lynx canadensis*) and candidate yellow-billed cuckoo (*Coccyzus americanus*). In response to your request to review the proposed action, we are providing you with comments specific to threatened, endangered and candidate species. The Service provides recommendations for*



protective measures for threatened and endangered species in accordance with the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

Grand Teton National Park (GTNP or Park) is proposing to implement a new transportation plan that will include roadway shoulder improvements, separated multi-use pathways, traveler information systems, and a limited pilot transit program. In particular, pathway development and roadway shoulder improvements target cyclist and pedestrian use. Social trails in high-use developed areas will be improved and a pilot program for transit service from Jackson to Colter Bay and along the Moose-Wilson Road will also be evaluated. Approximately 20 miles of separated pathways will be provided between the south park boundary and Antelope Flats Road and from Moose Junction to North Jenny Lake Junction. An additional 13 miles of separated multi-use pathways will be provided along the Moose-Wilson Road between the Granite Canyon Entrance and the future location of the JY Visitor Center. Approximately 16 miles of improved roadway shoulders will be provided on Teton Park Road and North Park Road from North Jenny Lake to Colter Bay. The Moose-Wilson Road will be realigned in two areas.

Grizzly Bear.

Under the Preferred Alternative, the DEIS indicates that adverse impacts to listed wildlife species would be negligible to minor, although vehicle/wildlife collisions “may potentially result in adverse impacts to individual grizzly bears or gray wolves.” Although no grizzly bears have been hit and/or killed by vehicles in the Park, 2 grizzly bears and 8 black bears were road-killed in Yellowstone National Park from 1989 through 1998. The increasing Greater Yellowstone Area grizzly bear population has resulted in bears being relatively common throughout most of the Park. Therefore, as the DEIS indicates, it is reasonable to assume that it’s only a matter of time before a grizzly bear is hit and killed by a vehicle.

Two of the Park’s management objectives for grizzly bears include “(R)estore and maintain the natural integrity, distribution, and behavior of grizzly bears” and “(P)rovide for visitor safety by minimizing bear/human conflicts, by reducing . . . food sources. . . and by regulating visitor distribution (DEIS page 77).” To minimize Project impacts to grizzlies, the DEIS (page 38) includes mitigation actions that include “define pathways. . . of developed areas to confine human use and limit radiating impacts” and “. . . reduce the potential for human-bear conflicts. . . .” The Park’s analysis in the “Methods and Assumptions” section (DEIS pages 135-137) indicates the “. . . predictability [of activities and associated impacts to wildlife] along a linear corridor declines as human activities change. . . to people approaching wildlife from random points along a corridor.”

If Alternative 3 is selected, the Park is essentially providing a mechanism for improved and increased human access in the Park, in particular separated pathways for cyclists and pedestrians. Project actions will encourage unpredictable encounters and increase the likelihood for grizzly/human conflicts rather than minimize them. In some instances, human habituation and food conditioning may also result. These potential impacts are not only negative to grizzlies and human health and safety but run counter to the Park’s stated management objectives. Direct and indirect effects, such as ongoing road maintenance, permanent habitat loss within the zone of influence, and reduced habitat effectiveness (DEIS page 163, 166) further illustrate this point.

Gray Wolf.

The rationale for the “adverse affect” determination to gray wolf is similar to grizzlies by anticipating reduced habitat security and increased likelihood of a wolf being hit and killed by a vehicle. The DEIS (page 178) indicates that the Teton pack regularly crosses the road between U.S. 89/191 and between Moran and the Park’s east boundary. The pack’s alpha male was hit and killed by a vehicle on U.S. 287 in 1999. Other wolves with unknown pack affiliations have also been frequently observed crossing roads and one wolf was killed near Moran Junction in 2005. The potential impacts from this Project deviate from the Park’s management objectives and would likely lead to “Incidental Take” for both gray wolf and grizzly bear and therefore, formal consultation with the Service would be required.

Other comments.

The DEIS states that “(S)urveys would be done prior to construction to ensure that no listed species ... would be adversely affected” [at the population level] (Summary of Impacts, page vii). While the Service commends the Park on implementing surveys, this Project extends beyond the construction period and therefore, survey, by themselves do not address project impacts they merely inform the analysis of what species may be affected during the short term construction periods. Your complete analysis should address long-term Project impacts to wildlife in addition to the pre-construction period. The Service would also appreciate additional analysis and cumulative effects discussion on the potential expansion of Teton Village as it relates to future road use, especially given that grizzly bears have been reported in that area.

The Service appreciates the opportunity to comment on the Transportation Plan/Draft EIS. If you have any questions or comments regarding this letter or your responsibilities under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq., please contact Ann Belleman of our Cody office at (307) 578-5942.

Brian T. Kelly, Field Supervisor, USFWS

Response

See Response to Comments, numbers 23, 30, 31, 36, 39, and 44.

Letter 129652—U.S. EPA Region 8

Correspondence Text

The Environmental Protection Agency (EPA), Region 8, has reviewed the Draft Environmental Impact Statement (DEIS) for the Grand Teton National Park Transportation Plan. Our comments are provided in accordance with our authorities pursuant to the National Environmental Policy Act, 42 U.S.C. 4231; Section 309 of the Clean Air Act; and Section 404 of the Clean Water Act.

This DEIS analyzes three alternatives for transportation in the Park, and a no action alternative. The preferred alternative, alternative 3, proposes a system of multi-use pathways and shoulder improvements to provide safer experiences for bicyclists and pedestrians. It also initiates a pilot transit program, and enhances the visitor information system. The other two build alternatives are variations of this alternative, one providing much less construction, and one providing extended pathways.

Comments on the Draft EIS

Wetland Impacts: The impairment classification process used in the DEIS (explained on pages 106-107) results in the conclusion that the wetland impacts of all the alternatives are considered minor, and therefore do not need mitigation. The Clean Water Act Regulations (40 CFR 230.1(d)) indicate that “From a national perspective, the degradation or destruction of special aquatic sites, such as filling operations in wetlands, is considered to be among the most severe environmental impacts covered by these Guidelines. The guiding principle should be that degradation or destruction of special sites may represent an irreversible loss of valuable aquatic resources.” No net loss of wetlands is the nation’s wetland policy, and should be followed by the National Park Service. This policy should result in wetland mitigation for all unavoidable wetland impacts, whether deemed a minor or major impact.

The DEIS points out the sensitive wildlife and scenic values of the park in the purpose and need statement. These values include the park’s wetlands resources since they provide essential habitat for many of the park’s wildlife species. The DEIS also documents some of the cumulative wetland losses, which we presume are unmitigated, which occurred prior to preparation of the document. The DEIS then concludes that additional unmitigated losses are minor adverse impacts. We do not believe this conclusion is supportable. In addition, the DEIS does not document what the indirect impacts to wetlands from this project might be.



We also believe that the National Park Service should take this opportunity to create mitigation areas for past wetland impacts from highway projects in the park. This transportation plan could also be used to adopt a mitigation banking approach and provide additional restoration today to offset impacts that have yet to occur.

Water Quality Impacts: The preferred alternative results in 49 additional acres of impervious surface, resulting in long-term impacts from increased run-off to nearby surface drainage and groundwater. Again, the document classifies the impacts from the additional run-off as indirect, minor, and adverse (see page 128) or minor, long-term, adverse impacts on water quality (See page 51). Although the conclusion is that this does not result in impairment to the park's water resources, we still believe that best management practices (BMPs) are necessary to ensure that waters close to the trails and additional paving are not degraded. The BMPs described on page 37 are for the construction period. The storm water BMPs, which would provide the long-term protection of waters, are not described in any detail. Please provide more detail in the final EIS on what those BMPs will be where there are water resource close to the road.

Rating

Based on EPA's procedures for evaluating potential environmental impacts of proposed actions and the adequacy of information presented, EPA is rating the preferred alternative EC-2. The "EC" (environmental concerns) portion of the rating means that EPA's review has identified environmental impacts that should be avoided in order to fully protect the environment. In this case, wetlands and water quality impacts are of concern. The "2" portion of this rating means that the DEIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment. In this case, it is not clear to us whether long-term water quality will be impacted by this project. A summary of our rating definitions is enclosed.

We appreciate the opportunity to review this well-done Draft EIS. If you have any questions about our comments, please contact me at 303 312-6004 or Deborah Lebow of my staff at 303 312-6223.

Larry Svoboda, Director, NEPA program

Response

See Response to Comments, numbers 49, 50, 51, and 52.

Letter 129646—U.S Fish and Wildlife Service

Correspondence Text

The staff of the National Elk Refuge has reviewed the draft transportation plan/EIS and has the following comments.

While we generally support the concept of using alternative methods of transportation for a variety of reasons, we have several concerns about the preferred alternative as it relates to the proposed pathway system in Grand Teton National Park.

We are opposed to the development of any separated pathways in the park. We recommend that all pathway development be connected to existing roadways. We feel that transportation corridors should be kept as narrow as possible to facilitate the movement of wildlife including large ungulates and carnivores. The separation of a pathway in our view will simply enlarge overall transportation corridors making it more difficult for animals to cross. Given the fact most visitors see the park from vehicles of some sort, we feel greatly enlarging transportation corridors would deter from the visitor experience to need to look through another transportation corridor to view the park's vistas.

We are opposed to the development of any pathway along the Moose-Wilson Road. Because of its layout, traveling this road is currently an interesting and unique experience. We doubt any development could be accomplished without significant, visible impacts to the site immediately adjacent to the roadway that would deter from the current experience. We feel given the low speed limit already posted, the existing roadway should continue to be used for multi-type vehicle travel.

Given the increasing use of the northern end of the park by grizzly bears, we are also very concerned about the development of a pathway north of the Jenny Lake area. Given the nearly contiguous forest cover in this part of the park, we feel the development of a pathway, even one attached to the existing roadway, would be an invitation to increased conflict with bears. This has been demonstrated in other North American national parks where bicycle use has been allowed in grizzly country.

Even though Grand Teton National Park is considered by many to be one of the “big parks,” it is really not a very large natural area by North American standards. The natural values of the park have already been significantly compromised by the construction of the Jackson Lake Dam and the Jackson Hole Airport. We feel extreme caution needs to be exercised with a project that would further diminish any of the remaining existing natural values of this outstanding area. We believe future generations will judge us more favorably by our restraint in developing natural areas than by allowing a creeping development that slowly erodes the values the park was established for.

Barry Reiswig, Refuge Manager

Response

See Response to Comments, numbers 23, 30, 31, 36, 39, and 44.

Letter 129472—Wyoming House of Representatives

Correspondence Text

I appreciate the opportunity to respond to this Draft EIS. I consider Grand Teton National Park, and the values it is charged with preserving, to be the basis for the healthy, sustainable economy not only in the legislative district I represent but also throughout the Greater Yellowstone Ecosystem. I fully appreciate the challenge presented to you, and to the National Park Service, of dealing with, tolerating, or minimizing the impacts on GTNP resulting from ever increasing developments outside of the park.

An additional motivation to comment comes from my experiences in GTNP and Teton County with transportation issues since 1954. I was first exposed as an engineering technician and later as project engineer with the Bureau of Public Roads (predecessor of the Federal Highway Administration) from 1954 to 1965 in Grand Teton and Yellowstone National Parks. Later I was a private engineering consultant in Teton County, including serving as Teton County Engineer on a consulting basis for transportation studies. For a period of several years I served as the National Parks and Conservation Association “park watcher” for Grand Teton National Park.

GENERAL COMMENTS

The greatest deficiency in the document is the lack of a demonstrated need for any of the proposed improvements other than additional parking space. I realize that there has been a lot of suggestion for a more multi-modal transportation system in GTNP, but see no statistics or surveys to indicate the magnitude of that need.

The only relevant information I have come across is in a recent Bison-Elk study within table 3 11 on page 171. That table, presenting the results of a Loomis and Caughlin study in 2004 indicates that the relative importance of 16 various recreational activities to non local visitors coming to Jackson Hole varied dramatically from viewing wildlife and scenery (highest ranking) to biking/mountain biking (lowest ranking). This data suggests that further exploration should be done in a statistically based sampling of the need for both bicycle facilities and transit. It is obviously important in such surveys to segregate groups sampled by criteria such as Nonlocal Visitors & Local Visitors, further categorized as Road Bikers or Recreational Bikers.

This type of analysis I would expect to be completed prior to committing to any obligation of significant funding for such facilities. The analysis should also consider what other GTNP funding needs will be displaced or further deferred by such dedicated facilities funding.

TRANSIT SYSTEM

The initial step in consideration of a transit linkage should be a run from Jackson to Moose with a stop in both



directions at the Jackson Hole Airport. There is already significant traffic and service on the route from Teton Village to and from Jackson. With the possible exception of routes to Teton Valley and Star Valley, the airport run is probably the next logical route to serve. This service, combined with a significant overnight parking charge (like \$20 per night) at the airport, has the potential to obviate the need for a parking structure at the airport and the implications that would follow from that decision. If airport users did not find the transit service sufficient they could either arrange to be dropped off and picked up or use one of the many cabs currently available.

Any additional transit service within Grand Teton National Park may well be served by park concessionaires if a need is identified.

MOOSE-TETON VILLAGE ROAD

I would propose that you consider as your first strategy on the Moose-Teton Village Road a plan which contains the following elements:

- 1 From the south (Teton Village) make the existing road dead-end at the Granite Canyon trailhead. A larger parking area would be desirable for those desiring to hike, bike, or ride horseback beyond that point. For the purposes of this strategy, do not utilize the new entrance station to collect fees, but only to provide information and collect user data.*
- 2. From the north (Moose Village) make the existing road dead-end at the new Laurence Rockefeller Visitor Center in the area of the JY Ranch. Again a parking area should accommodate those desiring to hike, bike, or ride horseback beyond that point.*
- 3. The sector of the existing road between Granite Canyon and the new Laurence Rockefeller Visitor Center would be dedicated to non-motorized transportation. No additional work on the entire road would have to be committed to or performed except for paving a 10 or 12 foot wide strip where the current road is unpaved (approximately 1.4 miles) to accommodate the non-mountain bikes.*
- 4. This strategy would provide immediate multi-modal access to both Granite Canyon and the new Laurence Rockefeller Visitor Center. Further this strategy provides the only opportunity to truly limit the impacts of dramatically increased motorized vehicle usage in this sensitive area of the park and the subsequent significant upgrading necessary that would then be necessary on that entire road linkage from Teton Village to Moose Village. Even operations at the Jackson Hole Airport are subject to much more restrictive noise limits on lands west of the Snake River than lands east of the Snake River. In recognition and appreciation of the generosity of the Rockefeller family in gifting property for Grand Teton National Park, the focal point of the new Laurence Rockefeller Visitor Center, this strategy is the most appropriate, appreciative, and respectful treatment for that sector of Grand Teton National Park.*

PATHWAYS

The pathway proposals, even in Alternative 3, seem excessive without some indication of the needs. I recognize the safety concerns of bicyclists on traveled ways but this seems like an over-reaction. I would suggest an initial phase to contain the following elements:

- 1. A needs study as alluded to in my General Comments would be the first item. Classification of users as suggested would be important and a statistical sampling method should be utilized in carrying out the study.*
- 2. Depending upon the outcome of the needs study, a separate recreational pathway may be warranted from the Jenny Lake Parking Area up and along the main highway to the N. Jenny Lake Road which accesses String Lake, Jenny Lake Lodge and the one-way road/bike path along the lake back to the Jenny Lake Parking Area. This would only require a new separate pathway to connect with the one-way road/bike path section to provide a reasonable recreational user loop facility.*
- 3. On road projects as designed for future re-construction the inclusion of wider shoulders to serve as Class I pathways should be considered.*

4. *With the continuous pathway provided by the Wilson-Teton Village pathway in combination with the easily provided Teton Village to Moose pathway, as described under the Moose-Teton Village Road suggestion, you have a completed pathway from Wilson to Moose. When Wyoming Highway 22 is reconstructed the linkage from the Stilson Parking lot will be tied in with the Town of Jackson pathway system. In view of this it is difficult to rationalize construction of a separate pathway from Jackson to Moose along US Highway 26.*

I very much appreciate the opportunity to review the draft EIS and thank you and your staff for the effort which has gone into its preparation. I would like to be kept informed of your future efforts on this subject.

Peter M. Jorgensen, Wyoming House of Representatives

Response

See Response to Comments, numbers 9, 13, 19, 20, 41 and 42.

Letter 129638—Wyoming Department of Transportation

Correspondence Text

The Wyoming Department of Transportation (WYDOT) appreciates the opportunity to participate in and comment on the Grand Teton National Park, Draft Transportation Plan/EIS.

Highways US 26/89/191 and US 287 are on the National Highway System and are part of the TransAmerican bicycle route. WYDOT would encourage GTNP to consider improvements to US 26/89/191 from the South park boundary to Moran Junction and US 287 from Moran Junction to the east part boundary as part of the park's planning process. Recommended improvements include wider shoulders for emergency parking and bicycle accommodation and turn lanes at major intersections.

Included in WYDOT's State Transportation Improvement Program are construction projects on US 287 from Moran Junction to Dubois and US 26/89/191 from the north city limits of Jackson to the south park boundary. The section of US 287 from the East park boundary through Buffalo Valley is scheduled for reconstruction the summer of 2006. The section of US 26/89/191 from the north city limits of Jackson to the south park boundary is scheduled for widening and construction of a separated multi-use pathway within the next 7 years which is a good fit with the multi-use pathway as set forth in alternatives 3 and 4. The intent for both of the above noted sections is to include 8 foot shoulders as both a safety feature and bicycle accommodation.

We do have some concerns with respect to the strategies for handling motorized traffic on the Moose-Wilson road and what effects making the road one way will have on the peak summer traffic volumes on the state transportation system.

In summary, alternative number 3 provides a good balance between improvements to roadways, parking, transit services and facilities, and multi-use pathways.

WYDOT would like to continue to work with GTNP to provide an efficient, safe transportation system into and through the park. If WYDOT can provide information such as traffic volume information or future road improvement plans that would benefit GTNP in their planning process, please do not hesitate to contact John Eddins, District Engineer, Rock Springs at 307-352-3000.

John F. Cox, WYDOT Director

Response

See Response to Comments, numbers 1 and 41.



Letter 129635—Wyoming Department of Transportation

Correspondence Text

The Wyoming Department of Transportation (WYDOT) is keenly interested in the safety of the traveling public. Safely accommodating bicyclists and pedestrians within the Wyoming transportation system is part of our responsibility. WYDOT sees the need for a combination of pathways and roadway shoulders to safely accommodate bicyclists through Grand Teton National Park. A high priority for WYDOT is wider shoulders on US 26/89/191 and US 287. In order to improve operational safety WYDOT would like the Park to evaluate the need for additional turn lanes at key intersections on these highways.

The section of US 26/89/191 from Jackson to Moran Junction and the section of US 287 from Moran Junction to Lander are part of the popular TransAmerica bicycle route. This route is used by hundreds of bicyclists each year to ride across America. These highways have also been included by Congress on the National Highway System and have been functionally classified as principal arterials. According to WYDOT's Operating Policy 2-3 on bicycle accommodation, the shoulder width on these routes should be eight-feet or greater to adequately accommodate bicyclists. We believe this improvement should be included in whichever alternative is selected to provide for non-motorized transportation. Our concerns for adequate shoulders on these highways are magnified by the fact that 2 fatal crashes have occurred on these highways since 1999 involving bicyclists. Installation of intermittent rumble strips should be considered as a safety enhancement on these highways through the Park. However, installation of rumble strips on shoulders less than six-feet in width would render the shoulders unusable for bicyclists.

The construction of additional pathways in the park will provide a safe place for families and less experienced cyclists to enjoy the scenery and the outdoors. Construction of pathways and improved highway shoulders should be accomplished with a system concept in mind. WYDOT would like two-way motor vehicle traffic to be maintained on the Moose-Wilson Road. The pathways proposed in Alternative 4 would eventually provide an attractive loop from Jackson, to Wilson, Teton Village and Moose. Also, the pathway proposed from Moose to Signal Mountain and Jackson Lake Lodge proposed in Alternative 4 would provide a beneficial alternative to the high summer traffic volumes on US 26/89/191.

In conclusion, WYDOT supports shoulder widening on US 26/89/191 from the South Park Entrance to the North Park Entrance and on US 287 from Moran Junction east to the Park boundary. These routes are used by hundreds of experienced bicyclists every year. We also support the pathways included in Alternative 4 to provide safe facilities for less experienced cyclists and families with children.

Thank you for the opportunity to comment on the Draft Transportation Plan/EIS. Additional comments from WYDOT covering other issues and concerns may be forthcoming.

Robert Milburn, P.E., State Planning Engineer

Response

See Response to Comments, numbers 1 and 41.

Letter 129615—Wyoming Game and Fish Department

Correspondence Text

The staff of the Wyoming Game and Fish Department has reviewed the draft Environmental Impact Statement for Grand Teton National Park's Transportation Plan. We offer the following comments.

Terrestrial Considerations:

The draft document describes how a substantial portion of the Jackson elk herd migrates through Grand Teton National Park (GTNP), but fails to disclose how the various alternatives may influence elk migrations and management. Managing elk that originate in GTNP, or migrate through, is extremely important to our Department. During the expansion of GTNP in 1950, compromise provisions were included in the enabling legislation to address

concerns regarding the management of the Jackson Elk Herd. Section 6 (a) of Public Law 81-787 outlines these provisions. Regulated hunting occurs on lands east of the Snake River and in the northern portions of GTNP. Outside of the open hunting areas restrictions have been put in place, which close the remaining parklands to hunting. If pathways result in additional restrictions on hunting, the ability to adequately manage elk in GTNP will be impacted.

We recommend that the final draft include an evaluation of elk movements based on the radio collared elk data and track count data collected in this area so that pathway placement can avoid elk management issues. We also recommend that trails be located close to existing roads in sensitive wildlife areas where human disturbances are already occurring.

Aquatic Considerations:

We have no aquatic concerns pertaining to this transportation plan.

Bill Wichers, Deputy Director

Response

See Response to Comments, number 37.

Letter 129616—Wyoming Game and Fish Department

Correspondence Text

We previously provided comments on the Transportation Plan in a letter dated July 26, 2005. Please include also the following comments concerning grizzly bears.

We encourage agencies to attempt to concentrate travel corridors, in order to minimize negative impacts to wildlife. Expansion of the Park pathways will achieve the opposite effect and could reduce the amount of suitable habitat that is available to wildlife. Of particular concern is the potential to increase human/grizzly bear interactions.

Grizzly bear distribution has been expanding in the last ten years. Although grizzly bears are known to occupy primarily the northern half of GTNP, any travel system should assume grizzlies will be present now and in the near future. GTNP, the Bridger Teton National Forest, and the Shoshone National Forest have experienced several human injuries due to random encounters of people on foot and on bicycles with grizzly bears.

Moving the pathways away from the high use area next to the road system could increase the potential for these negative encounters. This is especially true in those areas of GTNP where the pathways will traverse forested habitats. Most of the human/bear encounters that result in human injuries take place in forested or shrub habitats where people have a higher probability of getting too close to grizzly bears before the bear knows people are present.

Alternative 2 would produce fewer negative impacts to wildlife and would help control the potential for human injuries due to conflicts with grizzly bears.

Bill Wichers, Deputy Director

Response

See Response to Comments, numbers 23, 30, and 31.

Letter 129614—Wyoming Game and Fish Department

Correspondence Text

We previously provided comments on the Transportation Plan in letters dated July 26 and August 1, 2005, regarding elk and grizzly bears, respectively. The extension of the comment period has allowed a more extensive review regarding nongame wildlife concerns, as follows.



The DEIS identifies impacts to wildlife and wildlife habitat resulting from construction or expansion of linear roadways and trails (e.g., habitat loss, habitat fragmentation, displacement of wildlife species, interference with life-history functions, spread of exotic plants, and increased mortality). A key mitigation measure to avoid disturbance effects of the corridor is “to minimize the number of corridors that are constructed.” The necessity of each and every disturbance corridor in a planned development should be reviewed as to its purpose, necessity, and redundancy (Jalkotzy et al. 1997). We encourage GTNP to develop a more thorough analysis of purpose and need for specific pathway segments, and develop additional mitigation measures for the benefit of wildlife species as part of this transportation planning effort.

Disturbance along linear trail corridors is directly related to number of users and temporal use patterns (daily and seasonally). It would be helpful if the DEIS specifically identified the different types and needs of trail users (i.e., family cyclists who drive into the park for short rides versus touring/commercial groups/long distance recreation riders/hikers) and included estimates of number of users for different proposed trail segments. The needs of advanced cyclists such as cross-country, long distance touring groups, and racing cyclists are very different than family groups/day visitors. How many cyclists will continue to use roadways even if pathways are built along certain segments, multiplying effects on wildlife?

A mitigation measure in the DEIS calls for minimizing the distance between existing road corridors and any newly constructed pathways to reduce overall wildlife displacement (page 38). Keeping pathways close to roadways decreases potential encounters with wildlife (page 141) and the Zone of Influence (ZOI; page 137). Based on the analysis given, we encourage pathways to be kept within 50 feet or closer to existing roads.

The DEIS identifies where proposed pathways would cross collision “hotspots” (page 85) or occur within 7.7 km buffers around known sage grouse leks (page 182). In areas identified as “sensitive” for wildlife habitat, specific mitigation measures should be developed, such as keeping pathways close to roadways, closing pathways during non-daylight hours, and/or restricting movements off pathways by users.

Road density calculations (page 135) in GTNP should be calculated on the area of the Park where road construction is possible and not on total Park acres, which includes steep alpine terrain. The density of roads in low gradient, sagebrush habitat where large numbers of wildlife occur is much greater than indicated.

The DEIS clearly identifies the value of the Moose-Wilson corridor for a high diversity of wildlife species, including those federally listed. Building three miles of pathway separated from the roadway before testing strategies for managing traffic over the next few years in this area of the Park (page 15) should be reconsidered. We encourage GTNP to delay pathway construction in the Moose-Wilson corridor until testing is completed and also coordinate pathway planning with the ongoing plan for development of the JY Ranch area.

The DEIS should explain in more detail what criteria were used to develop the 74 m and 400 m ZOI buffers to estimate ecological impacts to species; it appears to be a valuable approach, but may underestimate effects on large carnivores and other species most sensitive to human disturbance.

The plan should incorporate a monitoring plan (and identify how this effort will be funded) that can measure the long-term effects of new pathway construction on wildlife movement, habitat use, and mortality within the park.

Literature Cited

Jalkotzy, M. G., P. I. Ross, E. M. D. Nasserden. 1997. The effects of linear developments on wildlife: a review of selected scientific literature. Canadian Association of Petroleum Producers. Calgary, Alberta, Canada: 119 pp.

Thank you for the opportunity to comment.

Sincerely, Bill Wichers, Deputy Director

Response

See Response to Comments, numbers 19, 30, 31, 32, 33, 38, and 40.

Letter 129280—Jackson Hole Chamber of Commerce

Correspondence Text

Thank you for this opportunity to comment on the referenced DEIS. I write on behalf of the Board of Directors of the Jackson Hole Chamber of Commerce representing over 800 businesses in the Jackson Hole region. We have long appreciated our partnership with Grand Teton National Park, in particular the terrific representation on our board and other community service by Joan Anzelmo.

Our Board of Directors considered the DEIS at our regularly scheduled meeting on August 24, 2005. We write to inform you that we support improvements to Alternatives #3 and #4.

We do not believe that Preferred Alternative #3 goes far enough to implement concepts we have previously discussed with you – concepts that are in the mutual long-term interests of Grand Teton, local government, region businesses and the public. The concepts we favor are as follows:

- 1. Public/Private Partnerships: We strongly support a strategic transportation plan arrived at through consistent collaboration among the elected officials and staff of Teton County, the Town of Jackson, Teton Village, START, the Chamber of Commerce, significant resorts and business leaders adjacent to or operating within GTNP, and the Clean Cities Initiative Group, that appropriately shares transportation equipment and related maintenance facilities and that jointly plans to utilize transit centers in Town, the Village or Grand Teton. Consistent with a letter many of these organizations signed jointly and provided to you more than a year ago, we strongly encourage you to reach out and help build strong public/private partnerships to meet transportation challenges.*
- 2. Expanded and Frequent Transit System: The collaborative strategic plan we promote above would help accomplish “clean energy” transit service between Jackson, Moose, Jenny Lake, Signal Mountain, Jackson Lake Lodge, Colter Bay and Teton Village, cooperatively utilizing equipment and maintenance facilities year round and cooperatively planning and funding visitor transit centers. Also, we urge cooperative planning to provide appropriate public transit on the Moose-Wilson road.*
- 3. Complete and Safe Pathways: We support a continuous pathway system of approximately 50 miles, with safety and public access a priority including use by the disabled, families and elderly. This pathway system should have “appropriate” separation from roads and wildlife areas based on “best practices” to protect people, wildlife and wildlife habitat. These pathways should connect Jackson and Teton Village with the main park activity centers mentioned above.*
- 4. Better Pedestrian Activity Area Enhancements: We support improvements to pedestrian walkways and visitor information in GTNP to improve the ability for short trips to be made by walking, and to better integrate campgrounds and lodging with the transit and pathway system.*

In sum, we support improvements on the concepts discussed in Alternatives #3 and #4. We look forward to ongoing cooperating planning meetings with you and your staff.

Sean Love, President, Jackson Hole Chamber of Commerce

Response

See Response to Comments, numbers 9 and 13.

Letter 130457—Pathways and Trails Coordinator

Correspondence Text

This is a letter of comment for the Grand Teton National Park Transportation Plan Draft EIS. Note that substantive comments regarding transportation elements relating to the various alternatives have been submitted by the Teton County Board of Commissioners, and the Town of Jackson – Town Council. This letter is only to correct an inaccuracy in how the Jackson Hole Community Pathways Division is referred to within the document.



In several places within the document, specifically on page 102, the document incorrectly states that the Jackson Hole Community Pathways Program is a division within the Teton County Park & Recreation Department. The Jackson Hole Community Pathways Program is actually a jointly-funded independent Department of the Town of Jackson, under the direction of the Town Administrator. The only formal affiliation with the Teton County Park & Recreation Department is agreement where certain staff perform maintenance functions for the Pathways Program. Please make this correction in all places where this error occurs.

Thanks for the opportunity to comment, and as previously stated, the Pathways Program staff are ready and willing to assist in design, alignment, and construction specifications for any pathways ultimately included in future transportation improvements within Grand Teton National Park.

Jim Chandler, Pathways & Trails Coordinator

Response

Noted and corrected.

Letter 129246—Jackson Hole Airport Board

Correspondence Text

The Jackson Hole Airport Board appreciates the opportunity to review and provide comments on the Grand Teton Park Draft Transportation Plan / Environmental Impact Statement. As a tenant of the Park, being the only commercial airport operating in a National Park, we fully appreciate the goals of enhancing visitor experience and protecting the Park's resources. Realizing, as a Joint Powers Board appointed by the Town and County, that you have received comments on the full plan from both groups, we will confine our comments to the public transit needs.

We believe that an effective public transit system, running on a regular schedule, from the Town of Jackson to the Moose Visitor Center, on to Jenny Lake and to Coulter Bay is of extreme importance. The Airport would be a logical stop on this route. However, to be effective, the frequency should be at least hourly, and preferably every half hour. The pilot project described in Alternative 3 and 4 will not provide any adequate test of the viability of a transit system. In fact, if this approach is used, it might only prove that public transit will not work.

In conclusion, we feel that public transit can create a better experience for all visitors to the Park, and the Jackson Hole Airport Board will cooperate in any way possible to make transit a viable option to the public.

George Erb, President, Jackson Hole Airport Board

Response

See Response to Comments, numbers 9 and 13.

Letter 129497—Town of Jackson

Correspondence Text

The Town of Jackson appreciates the opportunity to review and provide comments on the Grand Teton National Park Draft Transportation Plan/EIS. As a gateway community to one of the jewels of this nation's national park system, we take our partnership with the National Park Service seriously. We also appreciate the dual goals of enhancing visitor experience and protecting the Park's resources and hope our comments can help create a long-term sustainable future. As Mayor and Town Council, our letter provides the combined official comments of the Town of Jackson.

As you know, the Town of Jackson is the only incorporated municipality in Teton County. Ours is a community with a deep commitment to the environment. Our residents also believe that public access to the natural resources afforded by the surrounding federal lands is important for locals and visitors. For these reasons how we plan for the future and our interrelationship with Grand Teton National Park is particularly important. Successful planning

means that we anticipate the movement of people and direct their behavior in environmentally progressive ways. We need a comprehensive, valley wide multi-modal transportation plan.

Our principal request is that you revise your DEIS to commit to such a well-planned and coordinated multi-modal and intermodal transportation vision. We strongly believe that the transit component of every alternative in the DEIS falls short of successful planning. The Town of Jackson supports Alternative 4 with comprehensive revisions to the transit component so that it is designed fully and with vision to succeed both in the short and long terms. The details of how to do that follow below.

Enhanced Partnership Opportunities with the Town of Jackson and Grand Teton National Park

As the Mayor and Town Council of Jackson, we believe there is great potential for mutually beneficial partnerships between Grand Teton National Park, the National Park Service, the State of Wyoming, Teton County; and the Town of Jackson. Specifically addressing future transit services, we recommend the transportation relationship between Grand Teton National Park and the Town be more explicitly developed in the final EIS, and the potential for collaboration on transportation projects be better developed.

The discussion of transportation partnerships is limiting in the DEIS. For instance, WYDOT is not identified in the document as a partner. We believe working closely with WYDOT is imperative from funding to planning to implementation. Another missing element is the consideration of incorporating park concessionaires Grand Teton Lodge Company and Signal Mountain Lodge into future transit partnerships. Finally, collaboration with the Greater Yellowstone-Teton Clean Cities Coalition should also be further developed in the DEIS. The Coalition is already working on regional transit connectivity. Additionally, they could be helpful in supporting future funding needs for transit systems.

The topic of transportation partnerships is mentioned in the purpose (page 2), but the DEIS provides limited analysis of how the park will collaborate specifically in what ways, on what projects, and to what mutual benefit.

START is mentioned as a key option to provide Transit in the park, and the Town and START are briefly mentioned, (DEIS Alt. 3 page 26, Alt. 4 page 31, and Appendix C). But a transit partnership is not adequately developed to address the Town's concerns and needs.

The Town of Jackson wishes to express its willingness to be an active partner in helping provide operations and management services for Park transit vehicles and systems. Investments that might be shared include a convenient park and ride space, bus maintenance and fueling facilities, and the fleet vehicles. The dual use of facilities by both systems saves Grand Teton from using NPS land for the industrial facilities needed for fueling and maintenance.

In summary, the final National Park Service EIS decision needs to better outline a long-term transportation partnership strategy between the Town of Jackson, Teton County, the State of Wyoming/WYDOT, Teton Village entities, Park concessions, GYT Clean Cities, and Grand Teton National Park/National Park Service. Such collaboration will be the most cost effective, and can provide the highest level of service for the community and visitors.

Purpose and Need for Plan, Plan Scope

The Purpose and Need section does not adequately describe the increasing pressure on the existing transportation system in the park and region. Population in this region is increasing and pressure on transportation systems has also increased dramatically. This increase in population, traffic, and visitation is likely to affect Grand Teton, and should be considered in the final EIS. The Transportation Plan Scope of 5-10 years should be extended longer to perhaps 20 years. Systems such as transit and pathways take years to plan, fund, and implement, and the final EIS should frame a larger and longer vision for transportation solutions. The resulting Plan can and should be flexible to future conditions, and easily modified by a future Grand Teton General Management Plan as needed.

Impact Topics Dismissed from Further Analysis

The Town believes protecting clean air is an important issue, and is surprised air quality was dismissed and not analyzed in the DEIS. The beneficial impacts of clean fuel transit and pathways would help protect the Class I Air



shed of the national park, which Grand Teton is required to protect. Air quality is mentioned briefly in Mitigation Measures, and the DEIS briefly states that clean fuel vehicles would be used. The Town recommends that air quality be discussed in the final EIS.

Alternatives and the Park Preferred Alternative 3.

The DEIS alternatives do not go far enough identifying the opportunities that exist for a regional transit system and intermodal enhancements from which we believe Grand Teton could benefit. The Town recommends a significantly enhanced and expanded transit system from what is currently presented. Both Alternative 3 and Alternative 4 contain the same limited Transit Service and Facilities program, which states, “START, the Lodge Company, or other private Concessionaire would provide transit service on routes between Jackson, Moose, Jenny Lake, Colter Bay and along Moose-Wilson Road. The transit service would originate at the Jackson Visitors Center on the MAC, where a 300 space park & ride would be located.”

The Town concurs the route from Jackson to Colter and Teton Village to Moose is the correct basic starting route for a transit system in Grand Teton National Park; however the DEIS alternatives have only one run in the morning and one in the evening, “...pilot transit system to determine...potential to expand to Jackson Lake Lodge or Colter Bay.” This implies a significantly limited system for Alternatives 3 and 4 Transit, as shown in the Estimated Costs of only \$70,000 in total capital costs. A viable transit system cannot be implemented for that level of investment.

A transit system must be frequent, accessible, and provide convenient access from visitor and employee origins and destinations. This will require transit stops in all park-developed areas, and at appropriate trailheads and points of interest. Interconnections with the proposed pathways are also very important.

The Town supports the use of clean fuels (page 26). However, the final EIS should do more than “encourage” use; clean fuels should be required to the greatest degree practical.

Recommendations for a Grand Teton Transit System

The Town recommends Grand Teton National Park approve, design and implement a new transit system designed to provide a high quality service to meet the travel needs of a significant portion of park visitors and employees. A 5-10% transit mode share is recommended as a desirable 10 to 20 year goal. Park Transit should become a viable alternative to private vehicles over time. Transit should provide access to the primary destinations in the park, and interconnect with the local START system and other transit providers. Frequent service, with a goal in the range of half hour to hour headways on the main route should be considered. The decision in the EIS should allow the park to implement a more complete system as funding and facilities can be secured.

Often overlooked, a transit system can also provide high quality visitor education and interpretation. Buses can be equipped with interactive technology, an educational experience not available in private vehicles, hence enhancing transits’ viability. Bus drivers can provide interpretive information and answer questions for visitors improving the quality of the visitor experience.

Grand Teton should be a leader in the development of transit to coordinate the park’s needs and support research and implementation of a new fleet of clean-fuel vehicles designed to be comfortable and inviting, with bus size and service frequency levels geared to meet visitor needs. The Final Plan/EIS must also include a realistic program addressing service and maintenance of the fleet.

Summary of Recommendations for Grand Teton Transit Service

The Town supports creating a frequent and viable Transit System connecting the Town with key Park destinations in Moose, Jenny Lake, Signal Mountain Lodge, Jackson Lake Lodge, and Colter Bay, with stops at major trailheads, in doing so providing a viable transportation alternative for both visitors, residents, and employees.

Grand Teton should partner with the Town, County and State in mutually beneficial relationships for planning, implementing, and funding a new park transit system. Transit serving the Park would operate in concert with existing START public transit services in Jackson Hole.

Use clean fuels and best available technology for vehicles to ensure air quality of the park.

Additional key Town of Jackson Recommendations:

- 1. A contractual relationship with the NPS must be negotiated that is acceptable to the Town of Jackson, Teton County, and START. While the Town is not in a position to subsidize the cost of service to Grand Teton National Park, we are open to a mutually beneficial arrangement that creates new Park Transit Service.*
- 2. The Town supports providing the Park transit maintenance services at an in town location. This would reduce impacts to the park, and overall maintenance costs for both entities. Contractual agreements amenable to both parties would be forthcoming. The Plan should contain discussion on the need for future federal cost-share expenditures for the combined maintenance and operations facility.*
- 3. The Jackson Visitor Center (MAC), now in the final planning stage, should be designated as the key inter-modal hub serving Grand Teton National Park.*
- 4. The Moose Visitor Center should be identified as an important transit center. Provisions should be made to accommodate a minimum of three public buses and provide convenient access to the Visitor Center.*
- 5. Earlier Park draft plans requested the Jackson Visitors Center provide 80 park & ride spaces to serve the Park. The Draft EIS calls for just 65. The Draft EIS goes on to estimate park & ride spaces at \$3,300 per space, total estimate in the DEIS is only \$214,500. According to the Town's existing regulations, the facility would be grossly underfunded, as we currently collect \$17,000 per parking space in our fee-in-lieu program. The Town recommends the Grand Teton National Park's park & ride spaces at the Jackson Visitors Center be revised upward to 100. We feel this is more accurate reflection of the future demand.*
- 6. The Jackson to Grand Teton transit service will need improved frequency to be successful. Pilot runs in morning and evening, as is proposed in the Draft EIS, will not be successful. Headways of between 30 and 60 minutes is necessary in order to encourage transit use.*
- 7. The Plan Decision should leave the option open to provide a higher speed fixed route from Jackson to primary north park destinations, Jackson Lake Lodge and Colter Bay, should demand in the future warrant.*
- 8. A transit-marketing plan should be identified as a goal in the final EIS decision.*
- 9. Grand Teton National Park will remain a partner with the Town of Jackson and Teton County in the transit hub at the Jackson Visitors Center.*

Pathways System:

The Town supports a comprehensive pathway system from Jackson to Colter Bay. We recognize and appreciate the system should be constructed in a phased manner.

Pathways should be designed to accommodate and encourage park visits by bicycling and walking, and must interconnect with the proposed transit system in all key locations. A pathway system and transit system, combined with developed area enhancements, will work together synergistically and encourage greater use of alternative transportation. Long term, the benefits of this coordinated effort are profound.

Recommended Pathway System:

- 1. The Town supports an Improved Alternative 4 Park Pathway System to fully interconnect the Town/County Pathway System with the key front-country destinations in the park. This will enhance use, and over the long-term best help reduce congestion and traffic impacts. A fully connected system has greatest value to community, the park, and visitors.*
- 2. The Town supports continuous Pathways from Town to Moose, Jenny Lake, Signal Mountain, Jackson Lake Lodge, and to Colter Bay, including the Signal to Jackson Lake Dam section. Spur pathways should also be included from Gros Ventre Junction to the Jackson Hole Golf and Tennis Resort, and from North Jenny Junction to the String Lake intersection.*



The paved pathways should be designed to quality standards, separated an appropriate distance from the roadways when feasible, provide visitors with interpretive information along the way, and made more functional with frequent intermodal connections. The pathway network should be designed to provide a quality alternative to private motor vehicle use as trail segments are implemented over time, encouraging increased use of these non-polluting quiet modes of park access. The health benefits of selecting human-powered transportation modes to visit and enjoy the national park are significant and should be better recognized in the benefits analysis of the EIS, and promoted in the future by Grand Teton and the National Park Service. The Park pathway system should also provide cross-country skiing, snowshoe and walking opportunities in appropriate segments during winter.

Activity Centers:

The park has limited information on what the Alternatives would provide in the Developed Areas. Funding levels in the Estimate Costs in Alternative 3 and 4 are \$224,000 – a level that implies limited improvements can be expected, and does not appear to include funding for transit stops. It is critical that transit stops are developed as an integral component. Major developed areas at Moose, Jenny, Signal, Jackson Lake Lodge, and Colter Bay will require additional care and quality in the transit stops if the system is to serve volumes of visitors. The need to improve Developed Areas is important to support the success of Transit and Pathways. The walkway networks in all the primary park activity areas should be evaluated and improved to provide enhanced internal walking access and new intermodal connections between park lodging, commercial and campground destinations and the transit and pathway systems.

Moose-Wilson Road:

Concerning the Moose-Wilson Road, the Town Council and I feel it is important that the roadway stay in tact into the future, at least to the extent that it is today. We believe the connection to Moose, and it's myriad of visitor services, as well as access to the southern park entrance is vital. Additionally we know closing that stretch would be closing a critical piece in a redundant-roadway system for our valley, and we feel strongly this is not a feasible option. We do not object to the relocations proposed to remove the road from sensitive environmental areas.

Alternative 4 shows a separated pathway extending from Teton Village to Moose. While we support pathways and use of walking, bicycling and cross-country skiing in this area, as well as improved safety, we trust your planning efforts to decide on the details of that pathway.

Summary:

Grand Teton National Park has the opportunity to create a new standard for quality visitor access to the park that is light on the land. Great opportunities to partner also exist. The Town of Jackson encourages Grand Teton National Park and the National Park Service to approve a visionary plan that will address transportation needs well into the future.

Thank you for the opportunity to comment. If you have questions on these recommendations please contact Town Administrator Bob McLaurin at 307-733-3932.

Mark Barron, Mayor

Response

See Response to Comments, numbers 9, 10, 13, 18, 41, 58.

Responses to Substantive Comments

Roadways and Parking

1. **Comment:** The NPS should make a variety of improvements and changes in the design of park roads, including U.S. Highway 26/89/191 between the south park boundary and Moran Junction and U.S. Highway 287 between Moran Junction and the east park boundary. Suggested improvements include widened shoulders, turn lanes, roundabouts, etc.

Response: This Final Plan/EIS is intended to address a 5-10 year period during which certain projects can be accomplished and for which funding may reasonably be anticipated to be available. The Final Plan/EIS is not intended to comprehensively address all aspects of the Park's road system and transportation infrastructure, such as road design, maintenance and construction that is not likely to occur within 5-10 years. During planning for future projects, the NPS will consider what improvements may be necessary and appropriate and provide opportunities for public involvement through the National Environmental Policy Act (NEPA) processes associated with those projects.

2. **Comment:** The NPS should close the Teton Park Road between Moose and Signal Mountain.

Response: This alternative was considered but dismissed from further consideration, as described in Chapter 2.

3. **Comment:** The road between Colter Bay and the South Entrance of Yellowstone should be reconstructed with 11-ft travel lanes and 5-ft shoulders.

Response: The NPS completed an Environmental Assessment and Finding of No Significant Impact in 2002 for reconstruction of the North Park Road between Lizard Creek Campground and the South Entrance of Yellowstone, specifying 11-ft travel lanes and 5-ft shoulders. Phase 1 of the project, between Snake River Pit and the South Entrance has already been completed; Phase 2, between Lizard Creek and the Snake River Pit is scheduled for 2008. The section of road between Colter Bay and Lizard Creek has not yet been scheduled or funded for rehabilitation or reconstruction, and only routine maintenance is anticipated within the next 5-10 years. The design of the road prism will be considered in future planning for that segment.

4. **Comment:** A north crossing of the Snake River should be constructed between Wyoming Highway 390 and U.S. Highway 26/89/191 to provide a more direct route between Teton Village and Jackson.

Response: Construction of such a road is not within the jurisdiction of the NPS and is beyond the scope of this plan.

5. **Comment:** The NPS should keep the size of parking lots small in order to limit the number of visitors to areas facing increased use.

Response: The NPS recognizes that the capacity of parking lots tends to regulate the amount of visitor use in certain areas of the Park, although carrying capacities have not been established nor have parking lots been specifically designed for that purpose. The NPS also recognizes that some parking lots may receive increased use from visitors that use them as a starting or ending point for a trip on the new pathways. None of the alternatives in the Final Plan/EIS provide for the expansion of parking lots, although modifications may be made to some parking lots to better utilize the area within existing footprints.

6. **Comment:** Bicycle lanes, marked with striping and a painted bike symbol could be used instead of widened shoulders.

Response: According to standards of the American Association of State Highway and Transportation Officials (AASHTO), designated bicycle lanes are established in corridors where there is significant demand for bicycle use, and once established, such lanes are dedicated to bicycle use and may not be used for parking, stopping, or standing except for emergencies. The demand for bicycle use is not sufficient and is unlikely to become sufficient to warrant the establishment of dedicated bicycle lanes, especially since doing so would render the shoulder unusable for other purposes or require the construction of new shoulders, creating additional pavement and disturbance.

7. **Comment:** The preferred alternative fails to meet the Purpose and Need for the Plan because it would not substantially reduce road and parking congestion.

Response: As generally described in Chapter 1 of the Final Plan/EIS, traffic and parking congestion are not widespread but rather limited to a few key areas and at peak times. The parking lot at South Jenny Lake



generally fills to capacity by late morning during the peak of the summer, and the Moose-Wilson Road is sometimes congested, often as a result of visitors that have stopped in the roadway to observe wildlife. On most park roads, traffic flows at or above the speed limit, and in fact excessive speeds are believed to contribute to the number of wildlife-vehicle collisions. The NPS preferred alternative provides for the introduction of a transit system following the development of a Transit Business Plan (TBP) to identify routes, frequency of service, types of equipment, etc. It is expected that such a system will be attractive to a variety of users, particularly those that have only one or two destinations within the Park, such as visitors accessing a trailhead. A transit system is expected to reduce the demand for parking at South Jenny Lake and other key areas by providing a good alternative for visitors that do not need the flexibility of their own vehicle during most of the day. In addition, the NPS will test several management strategies on the Moose-Wilson Road that are intended to alleviate congestion by limiting or reducing the amount of traffic, while ensuring that the character of the road is maintained and that a high quality visitor experience is provided.

8. **Comment:** The Final Plan/EIS should more clearly describe the roadway system and anticipated improvements, along with the impacts associated with these improvements.

Response: The Final Plan/EIS includes a description of known or reasonably anticipated projects along with their associated cumulative impacts.

Transportation Systems and Traffic

9. **Comment:** Additional analysis should be provided regarding the integration of transit, pedestrian, bicycle, and vehicle modes of transportation.

Response: Prior to implementation of a transit system, the NPS will prepare a TBP that will address the potential “market” for transit service and identify strategies for integrating various modes of travel. The TBP will identify specific routes, frequency of service, types of equipment, anticipated levels of ridership, capital and operating costs, fare structures, potential partnership opportunities, and other information that is essential to implementation.

10. **Comment:** Commentors provided a variety of suggestions for specific transit routes, frequency of

service, location of transit stops, types of equipment, and other specific elements of transit infrastructure and operations.

Response: In the Draft Plan/EIS, the NPS proposed a pilot transit system in several of the alternatives. After further consideration, in the Final Plan/EIS, the NPS has determined that prior to implementing a transit system, a TBP will be prepared to determine the feasibility of implementing a system. Therefore, specific decisions regarding the transit system have been deferred to the TBP. The TBP will identify specific routes, frequency of service, types of equipment, anticipated levels of ridership, capital and operating costs, fare structures, potential partnership opportunities, and other information that is essential to implementation.

11. **Comment:** Periods of time should be scheduled when various park roads are open only to non-motorized use.

Response: The Park includes many roads that have low traffic volumes and for which there is no demonstrated need to schedule periods for non-motorized use only. For roads with higher traffic volumes, periods restricted to non-motorized use would be operationally impractical and unwarranted based on demand.

12. **Comment:** The cost estimates in Alternatives 3 and 4 of the Draft Plan/EIS are not sufficient to permit implementation of a viable transit system.

Response: Prior to implementation of a transit system, the NPS will prepare a TBP that will address the potential “market” for transit service and identify strategies for integrating various modes of travel. The TBP will identify specific routes, frequency of service, types of equipment, anticipated levels of ridership, capital and operating costs, fare structures, and other information that is essential to implementation.

13. **Comment:** The NPS should develop partnerships with state and local governments, including Southern Teton Area Rapid Transit (START), concessioners, and other entities in order to develop collaborative strategies for meeting transportation needs and transit services.

Response: Prior to implementation of a transit system, the NPS will prepare a TBP that will address the potential “market” for transit service and identify strategies for integrating various modes of travel. The

TBP will identify specific routes, frequency of service, types of equipment, anticipated levels of ridership, capital and operating costs, fare structures, potential partnership opportunities, and other information that is essential to implementation.

14. **Comment:** The Draft Plan/EIS incorrectly states that Teton County/START has not contemplated transit service between Teton Village and Moose.

Response: The statement has been corrected in the Final Plan/EIS.

15. **Comment:** The NPS should consider developing definable, measurable goals for mode-share outcomes to decrease single occupancy vehicle trips.

Response: The NPS recognizes that many communities have developed such goals as part of efforts to decrease congestion, pollution, and other transportation-related impacts, and to encourage the use of mass transit, carpools, bicycles, etc. Since a large percentage of vehicle use in some communities consists of utilitarian trips made by one person (i.e. commuting to work, school, shopping, etc.), a decrease in the number of such trips may help to reduce the level of transportation-related impacts within those communities. On the other hand, the vast majority of automobile use in Grand Teton National Park is recreational in nature, rather than utilitarian. Auto touring and sightseeing are among the most popular activities for park visitors. Given the differences between the primarily utilitarian type of transportation that is characteristic of communities and the recreational nature of touring the Park for enjoyment, methods such as focusing on single occupancy trips may not produce comparable results. Nevertheless, park employees and some visitors may have an interest in using transit or other methods for certain trips in the Park. The TBP will assist the NPS in determining the market for alternative means of transportation and provide opportunities for decreasing the number of trips.

16. **Comment:** The Draft Plan/EIS does not provide sufficient detail regarding improvements within developed areas to support the successful integration of transit, pedestrian, bicycling, and motor vehicle modes of travel. More detail should be provided for circulation routes, transit stops, parking, wayfinding, services for the disabled, and delivery and service needs.

Response: The NPS recognizes that many of the developed areas within the Park could be improved as suggested by the commentor. While the actions considered in this Final Plan/EIS include only a limited range of improvements within developed areas, the NPS may consider undertaking additional site-specific development plans to address individual areas. The TBP will help the NPS to identify specific improvements that may be appropriate within developed areas to support transit and the integration of various modes of travel.

17. **Comment:** The Final Plan/EIS should indicate that transit service would begin at the multi-agency campus site or an alternative location within the Town of Jackson.

Response: The NPS intends to prepare a TBP to determine the feasibility of implementing a transit system in the Park. The NPS will coordinate with the Town of Jackson and other entities to determine the best location in town for a transit hub.

Multi-Use Pathways

18. **Comment:** The NPS should construct pathways on several segments not included in the draft preferred alternative, including spurs to Jackson Hole Golf and Tennis, String Lake, and between North Jenny Lake Junction and Colter Bay.

Response: In the Final Plan/EIS, the NPS has included a new alternative, Alternative 3a, and selected it as the preferred alternative. This change from the Draft Plan/EIS, in which Alternative 3 was identified as the preferred alternative, provides the NPS with the flexibility to construct a more extensive system of pathways than would Alternative 3, but at the same time ensures that no unacceptable impacts will be allowed to occur. An adaptive management approach will be used to ensure that data and analysis associated with the early phases of pathway development and use are utilized in the design and implementation of later phases.

19. **Comment:** The NPS has not provided sufficient information on the demand or expected amount of pathway usage to determine whether the costs and environmental impacts are warranted. The NPS should provide specific estimates of the types and numbers of pathway users expected to use different segments of the pathway system.



Response: The NPS does not have specific, detailed estimates of the types and numbers of pathway users expected to use the pathways. Chapter 3 provides information on visitor activities within the Park, including data regarding bicycling. Interest in commercially provided bicycling tours appears to be increasing based on the number of tour companies that have contacted the Park in recent years. The NPS intends to use a phased approach and adaptive management strategy for the construction and operation of pathways. Following the construction of an initial phase, the NPS will monitor the amount of use and the environmental impacts of pathway use, particularly regarding effects on wildlife.

20. **Comment:** The NPS has not demonstrated in the analysis that there is a significant safety issue that warrants the construction of pathways nor that pathways are necessarily safer for bicyclists and other users.

Response: Since 1999, there have been two fatal accidents in Grand Teton National Park involving bicycles and motor vehicles. While these two incidents alone do not constitute a statistically meaningful analysis of accident trends or the safety of bicycling, the NPS believes that separated pathways may reduce the potential for conflicts between motor vehicles and bicyclists. Pathways, however, will not entirely eliminate the inherent risks associated with bicycling, and may increase the potential for surprise encounters with wildlife or have the potential for conflicts between different types of pathway users.

21. **Comment:** Development of a pathway system will create additional demand for parking at key locations and increase the average length of stay in parking lots at the Moose Visitor Center, Taggart Lake Trailhead Parking, South Jenny Lake, and other areas, thereby increasing parking congestion.

Response: The NPS recognizes that the capacity of parking lots tends to regulate the amount of visitor use in certain areas of the Park, although carrying capacities have not been established nor have parking lots been specifically designed for that purpose. The NPS also recognizes that some parking lots may receive increased use from visitors that use them as a starting or ending point for a trip on the new pathways. None of the alternatives in the Final Plan/EIS provide for the expansion of parking lots. The NPS preferred alternative provides for the introduction of a transit

system following the development of a TBP to identify routes, frequency of service, types of equipment, etc. It is expected that such a system will be attractive to a variety of users, particularly those that have only one or two destinations within the Park, such as visitors accessing a trailhead. A transit system is expected to reduce the demand for parking at South Jenny Lake and other key areas by providing a good alternative for visitors that do not need the flexibility of their own vehicle during most of the day. The NPS intends that any transit system would be “bike-friendly” in that the vehicles would accommodate the transport of bicycles. In addition, the NPS will test several management strategies on the Moose-Wilson Road that are intended to alleviate congestion by limiting or reducing the amount of traffic, while ensuring that the character of the road is maintained and that a high quality visitor experience is provided.

22. **Comment:** The NPS should limit the hours of operation and/or establish seasonal periods when the pathways are unavailable for public use in order to minimize impacts on wildlife and potential conflicts between visitors and wildlife. In addition, the NPS should consider visual screening, wildlife crossing structures, secure cover arrangements, and other design features intended to minimize impacts on wildlife.

Response: The NPS implements public closures or restrictions on visitor use to protect wildlife and/or enhance human safety when considered necessary by the superintendent. Examples of such closures include wintering wildlife areas, high bear use areas, bald eagle nesting sites, etc. The design and alignment of pathways will be accomplished in such a way as to minimize impacts on wildlife; however, use restrictions or closures could be implemented (if needed) to protect wildlife or reduce the potential for conflicts between humans and wildlife. Pathways will be placed within or as near road corridors as practicable and natural vegetation and terrain will be used to provide screening when possible. In some areas, however, it will be important to maintain adequate sight distances to minimize the probability of undesirably close or surprise encounters with wildlife. Pathways will be closed from dusk to dawn for public safety and protection of park resources. Wildlife crossing structures would likely be ineffective since wildlife crossings are not concentrated in certain areas, but are generally dispersed.

23. **Comment:** The development and use of pathways in areas frequented by grizzlies and other wildlife will result in an increased risk of surprise encounters between bears and pathway users, with the potential for serious injury or loss of life.

Response: The NPS acknowledges this concern. There is an inherent risk of surprise encounters between humans and wildlife associated with many outdoor activities in which park visitors participate. The use of pathways may increase the potential for surprise encounters due to the relatively high speeds of bicycles as compared to pedestrians and the limited sight lines that will exist in some areas. Restricting the use of pathways between dusk and dawn may somewhat mitigate the increased risk of surprise encounters; however, as with many other activities, the potential for serious injury or loss of life will exist. Public education, signing, and placing pathways in areas that maximize visibility (such as in existing road corridors) may help to mitigate, but not eliminate the inherent risks.

24. **Comment:** Pets should be prohibited from pathways in order to avoid impacts and/or conflicts with wildlife.

Response: NPS regulations currently require dogs, cats, and other pets to be leashed, crated, or otherwise under physical restraint. In Grand Teton National Park, pets are allowed only on maintained roads or parking areas, and within established campgrounds and picnic areas. Pets are prohibited in the backcountry and on trails. Park regulations will be revised through a revision to the superintendent's compendium to clarify that pets are not allowed on pathways. Guide dogs, however, used for the sole purpose of aiding persons with disabilities will be allowed.

25. **Comment:** Pathways should be open only to bicyclists in order to avoid conflicts between bicyclists and pedestrians.

Response: Multi-use pathways are by their nature open to a variety of uses and restricting their use to bicycles only would be inconsistent with the purpose and need for the Final Plan/EIS. It is anticipated that the pathways will be open to pedestrians, bicyclists, and persons using in-line skates, although such rules and regulations as may be necessary to minimize conflicts between users may be implemented, including restrictions on some uses.

26. **Comment:** Bicyclists should be required to use pathways where they are provided in lieu of riding on park roads.

Response: NPS regulations permit the use of bicycles on park roads that are open to motor vehicle use, as well as on other routes designated for bicycle use. NPS regulations provide superintendents with the authority to close roads or other designated routes to bicycle use, if necessary, and the NPS may consider whether any such restrictions are necessary once pathways have been constructed and are available for public use.

27. **Comment:** The RKO Road (also known as the River Road) should be converted into a pathway for walkers, joggers, skaters, and fat-tire bicyclists.

Response: The RKO Road is located in potential wilderness and is a nonconforming use that currently accommodates a low volume of motor vehicle use, as well as use by pedestrians and bicyclists. As potential wilderness, the area could be recommended for wilderness designation if the nonconforming use was eliminated. Improving the RKO Road would be inconsistent with NPS Management Policies regarding wilderness, and is therefore not being considered.

28. **Comment:** Pathways should be groomed for cross-country skiing in the winter.

Response: Management of winter recreational use is beyond the scope of this Final Plan/EIS.

29. **Comment:** Pathways constructed by the NPS should be integrated with the Jackson Hole Community Pathways system.

Response: Pathways linking to points outside of the Park would be constructed in coordination with local and/or state governments.

Impacts to Wildlife

30. **Comment:** The development of a pathway system may increase the potential for conflicts between visitors and wildlife, and therefore the NPS should seek other solutions, such as expanded shoulders in lieu of pathways, as well as lower speed limits on park roads.

Response: The NPS acknowledges in the analysis that the potential for surprise wildlife encounters would be lower if expanded road shoulders were constructed in lieu of separated pathways. At the same time, the NPS believes that the use of pathways may also reduce the potential for conflicts between motor vehicles and



bicyclists. Lower speed limits on park roads, or at least on certain segments, may be a useful tool in reducing the number of wildlife-vehicle collisions, and the NPS will continue to seek ways to reduce such conflicts by a variety of methods, including the consideration of reduced speed limits in certain areas, as well as improved signage and education.

31. **Comment:** The development of separate pathways between North Jenny Lake Junction and Colter Bay and along the Moose-Wilson Road would traverse important habitat occupied by grizzly and black bears, as well as moose and other wildlife. The development and use of these pathways will have deleterious effects on black bears and moose and could result in increased habituation to human foods and conflicts between grizzly bears and humans, and increased levels of bear mortality.

Response: The NPS acknowledges these concerns. In the preferred alternative, pathway segments between North Jenny Lake Junction and Colter Bay and along the Moose-Wilson Road would be constructed primarily within the road corridor, meaning the engineered corridor in which the roadway exists. It includes the paved road surface, shoulders, cut and fill areas, and clear zones. Placement of the pathways in close proximity to the road will minimize impacts on vegetation and wildlife habitat and reduce the chances of surprise encounters with wildlife. Other mitigation measures (as described in the Final Plan/EIS), such as restrictions on use between dusk and dawn, public education, and signing, will also be used to reduce adverse effects on wildlife. The NPS will ensure that no unacceptable impacts are allowed to occur. There is, however, an inherent risk of surprise encounters between humans and wildlife associated with many outdoor activities in which park visitors participate. The use of pathways may increase the potential for surprise encounters due to the relatively high speeds of bicycles, as compared to pedestrians, and the limited sight lines that will exist in some areas.

32. **Comment:** The Plan has not adequately addressed the visitor safety and resource protection issues associated with wildlife-vehicle collisions.

Response: Wildlife-vehicle collisions were extensively discussed in Chapters 3 and 4 of the Draft Plan/EIS. These discussions are also included in the Final Plan/EIS. The Jackson Hole Roadway and Wildlife Crossing Study (Biota 2003) and park roadkill data were

consulted during preparation of the Draft Plan/EIS. The Park has recently installed signs alerting motorists to migrating wildlife in important crossing areas and plans to install additional variable message and digital speed signs. Other mitigation recommendations were either deemed inappropriate in a national park or unlikely to be effective because wildlife cross park roads across broad areas. The NPS will continue to seek methods to reduce the number of wildlife-vehicle collisions.

33. **Comment:** Road density calculations in the EIS should be recalculated based on the Park area where road construction is possible rather than on total park acreage, which includes steep alpine terrain. The density of roads in low gradient, sagebrush habitat where large numbers of wildlife occur is much greater than indicated.

Response: The number of miles of roads in the Park and the parkwide road density estimate were provided to establish a broad context for linear transportation features in the Park rather than to describe site-specific road densities or highlight developed/undeveloped areas of the Park. All action alternatives would result in an increase in the width of linear corridors, as opposed to increasing their density. Consequently, the effects analysis focused on direct and indirect habitat impacts resulting from this increased width.

34. **Comment:** Available science contradicts the information provided in the Draft Plan/EIS that bicycle use on trails or pathways increases the likelihood of encounters between wildlife and humans.

Response: Responses of wildlife to disturbance are variable and related to a number of factors (i.e., disturbance type, intensity and duration, terrain, disturbance history, group size, age/sex, reproductive status, wind direction, loudness, distance between animals and disturbance, distance to secure cover, relative elevation, season, etc.). A recent study by Wisdom, et al. (2004) found that elk exposed to four off-road activities had higher movement rates and probabilities of flight compared to periods where no human activity occurred. Of the four activities evaluated, ATV and mountain bike riding resulted in more pronounced elk reactions than horseback riding and hiking. Because many cyclists travel quickly and quietly, they may have a greater potential for surprise encounters with wildlife, especially in habitats with high cover or nearby terrain features that reduce visibility.

35. **Comment:** The Draft Plan/EIS overstates the risk that use of the pathways by cyclists and pedestrians will increase the availability of human foods to which bears may become conditioned.

Response: Wherever bears and humans share the landscape, the possibility of bears becoming habituated to humans and conditioned to seeking their foods exists. This is particularly true where easy access puts large numbers of people who are naive about the effects of human foods on bears into high quality, occupied bear habitat. Despite NPS efforts to educate visitors about proper behavior in bear country, some visitors do not take the basic precautions and some are known to intentionally provide food to bears when they are encountered.

36. **Comment:** The development of pathways represents a widening of the roadway use zone and departs from the 1998 baseline that the NPS agreed to in the Conservation Strategy for Grizzly Bears in the Yellowstone Ecosystem.

Response: The primary conservation area (PCA) borders the east side of U.S. Highway 191/89/287 from Jackson Lake Junction to Colter Bay, where pathways have been proposed. Separated pathways constructed in this area would be located within the road corridor on the west side of the road, thus not affecting the 1998 baseline agreed to by the NPS in the Conservation Strategy. However, recognizing that a pathway placed as such may reduce habitat effectiveness for grizzly bears in this area outside of the PCA, the Park will evaluate potential measures nearby to mitigate this impact.

37. **Comment:** Commentor (Wyoming Game and Fish Department) expressed concern that the development of pathways could result in additional restrictions on elk hunting and could impact the ability to adequately manage elk in the Park. Suggested that additional information be provided on elk movements (based on radio collar data) so that pathway placement can avoid elk management issues.

Response: Between the south park boundary and Moose, pathways will generally be located within 50 ft of the roadway, and not more than 150 ft from the road, and therefore are not expected to result in the need for any additional restrictions on hunting

between Gros Ventre Junction and Moose, since hunting is not allowed within a quarter mile of the road. The Final Plan/EIS discloses that the addition of the separated pathway to the road corridor is likely to increase the zone of influence (ZOI) of the corridor. For elk, this would result in reduced habitat effectiveness near the path/roadway corridor. The extent to which this will affect habitat connectivity and the ability to use traditional migration routes is uncertain, but is expected to be minor because the proposal does not involve improvements that would increase motor vehicle speeds or traffic volumes, both of which are factors that can reduce habitat connectivity. The NPS does not intend to plow the pathways or groom them for skiing. Therefore, it is expected that pathway use will diminish or disappear by the time peak elk migration occurs. Track count data were used to define the broad area in which elk migrate and travel throughout the project area. In contrast, the existing radio-collar data is not fine enough in scale to delineate specific travel routes.

38. **Comment:** The NPS should provide more detailed information on the criteria that were used to develop the 74-meter and 400-meter ZOI buffers to estimate ecological impacts to species. Commentor (Wyoming Game and Fish Department) is concerned that the method may underestimate the effects on large carnivores and other species sensitive to human disturbance.

Response: The NPS agrees that the ZOI buffers may underestimate impacts for certain species, including some large carnivores and those most sensitive to human disturbance. The size of a linear features ZOI depends on a number of factors, such as topography, vegetation and the individual species sensitivity. Thus an absolute figure, even for individual species, is difficult to derive. The range of distances where wildlife appears to show an avoidance response was highlighted in the Methods and Assumptions section of Chapter 4. The 75-meter and 400-meter buffers were selected to represent the range in ZOIs for various species and to generalize the scope of impacts at two levels: one that addressed the likely impacts for smaller species like birds and the other that addressed larger mammals. For some species (i.e., grizzly bears), the 400-meter buffer may represent a minimum ZOI.

39. **Comment:** The potential impacts from this project deviate from the Park's management objectives and



would likely lead to an “Incidental Take” for both gray wolf and grizzly bear, and therefore require formal consultation with the U.S. Fish and Wildlife Service (USFWS).

Response: The NPS will engage in formal consultation with the USFWS upon release of the Final Plan/EIS.

40. **Comment:** The Plan/EIS should incorporate a monitoring plan (and identify how this effort will be funded) that can measure the long-term effects of new pathway construction on wildlife movement, habitat use, and mortality within the Park.

Response: The NPS is developing a wildlife research and monitoring program to address the impacts of pathways and pathway use on wildlife. The program is discussed in detail in Chapter 2.

Moose-Wilson Road

41. **Comment:** Commentors suggested a variety of strategies for addressing management of the Moose Wilson Road, including the establishment of a cap on the number of vehicles.

Response: The NPS believes that traffic volumes on the Moose-Wilson Road are approaching a level beyond which further growth is unsustainable without unacceptably degrading the condition of the road or the quality of the visitor experience. While a cap could be one way of limiting the number of vehicles on the road, from an operational perspective it would be undesirable and difficult to implement. The NPS intends to implement an adaptive management plan (AMP) for the Moose-Wilson Road with the goal of obtaining information on the best strategy for managing traffic volumes along the road that are sustainable and which provide a safe, high-quality visitor experience for motorists, bicyclists, and pedestrians. Under the AMP, the NPS would test strategies such as direction of traffic flow and other techniques to manage vehicle use of the road.

42. **Comment:** The Moose-Wilson Road should be closed to motor vehicles between the Granite Canyon Trailhead and the Laurance S. Rockefeller Preserve, with the closed segment being open only to non-motorized uses such as pedestrians, bicyclists, and horseback riders. Such a strategy would limit traffic growth on the Moose-Wilson Road and improve opportunities for non-motorized users.

Response: As noted above, the NPS intends to implement an AMP to address traffic volumes on the Moose-Wilson Road.

43. **Comment:** Wildlife viewing areas should be provided along the Moose-Wilson Road in order to provide safe viewing opportunities and reduce wildlife disturbance.

Response: Wildlife viewing areas may be considered in conjunction with realignment of the two segments of road.

44. **Comment:** The NPS should provide additional analysis and discussion of cumulative impacts on the expansion of Teton Village as it relates to future use of the Moose-Wilson Road, especially since grizzly bears have been reported in that area.

Response: Additional analysis and discussion of the cumulative impacts on the Moose-Wilson Road corridor and nearby areas associated with development outside the Park, including any impacts on grizzly bears, has been included in the Final Plan/EIS.

45. **Comment:** The analysis in the Draft Plan/EIS did not adequately address the impacts on visual quality of relocating two segments of the Moose-Wilson Road.

Response: The analysis in the Final Plan/EIS has been revised to address the concern.

46. **Comment:** The analysis in the Draft Plan/EIS did not adequately describe the restoration actions for the segments of Moose-Wilson Road that would be removed.

Response: The analysis in the Final Plan/EIS has been revised to address the concern.

47. **Comment:** The Transportation Draft Plan/EIS fails to consider the economic impacts of relocating portions of the Moose-Wilson Road on persons owning land within the vicinity of the proposed relocations.

Response: Grand Teton National Park includes numerous inholdings – privately owned lands that pre-date the Park’s establishment. Two of these inholdings are located in proximity to portions of the Moose-Wilson Road that are proposed to be relocated in several of the alternatives. In determining the final alignment of the Moose-Wilson Road, the NPS will consider the location of any nearby inholdings.

48. **Comment:** The information provided in the Draft Plan/EIS did not adequately explain the rationale for the proposal to relocate two sections of the Moose-Wilson Road nor did the analysis adequately address the environmental impacts of such an action.

Response: The Final Plan/EIS has been revised to better address the issues raised in this comment. In general, the purpose of relocating sections of the Moose-Wilson Road would be to restore the value of wildlife habitat that is currently impacted by the presence of roadway. In addition, moving the junction of the Moose-Wilson Road with the Teton Park Road to a point past the Moose Entrance Station will eliminate the need for northbound Moose-Wilson traffic to pass through a second entrance station, thus reducing the queue at Moose.

Wetlands

49. **Comment:** The Draft Plan/EIS analysis underestimates the amount of wetland impacts because it does not take into account habitat degradation and loss of effectiveness due to disturbance. The Draft Plan/EIS does not document what the indirect impacts to wetlands from this project might be.

Response: Indirect impacts to wetlands are related to habitat loss and are discussed in Chapter 4 under the heading “Threatened and Endangered Species, Species of Special Concern, and General Wildlife.” The more sensitive wetland dependent species (i.e., sandhill crane) may experience indirect impacts within the 400-meter buffer, while the less sensitive wetland dependent species may be affected within the 75-meter buffer. Estimated acreages are presented in Appendix B.

50. **Comment:** The NPS should ensure that all unavoidable wetland losses are mitigated regardless of whether they are deemed minor or major impacts (Environmental Protection Agency [EPA] comment).

Response: The NPS intends to provide mitigation for all unavoidable wetland losses resulting from this project.

51. **Comment:** The NPS should take this opportunity to create mitigation areas for past wetland impacts from highway projects in the Park (EPA comments).

Response: The Draft Plan/EIS listed historical wetland impacts in order to show cumulative impacts over time; however, not all of these impacts and losses were

unmitigated. It is the Park’s intent to manage for no net loss of wetlands whenever possible; therefore, any unavoidable wetland impacts will result in wetland mitigation, whether they are deemed minor or otherwise.

The Park is also currently planning several projects that may create mitigation areas. Several locations, such as the Snake River Pit, Lower Flagg Ranch development area, and along the Moose-Wilson Road, will likely have the potential to restore more than 10 acres combined. The Moose-Wilson Road realignment, which is part of the Final Plan/EIS, is anticipated to restore approximately 2 acres of wetlands.

52. **Comment:** The NPS should provide detailed information on storm water best management practices (BMPs) that will be used for the long-term protection of waters close to the pathways and additional paving.

Response: The NPS will address storm water management as part of the planning and design for each phase of construction.

Other

53. **Comment:** An entrance lane should be provided specifically for visitors holding annual or other passes and technology improvements should be used to reduce waiting time at the entrance station.

Response: The NPS intends to provide an additional entrance lane specifically for employees and other administrative traffic that will reduce the length of the queue for park visitors. The NPS will consider whether it is operationally feasible to use the same lane for visitors with annual or other passes.

54. **Comment:** The NPS should change the entrance fee structure for the Park.

Response: Changes to the fee structure are beyond the scope of this planning effort.

55. **Comment:** The NPS did not adequately describe the impacts of relocating portions of the Moose-Wilson Road in Alternatives 3 and 4, and therefore cannot state that Alternative 3 is the environmentally preferred alternative. In addition, commentors assert that Alternative 3 does not provide the level of environmental protection required by the National Environmental Policy Act (NEPA).

Response: The analysis in the Final Plan/EIS has been revised to describe the impacts of relocating



segments of the Moose-Wilson Road. The NPS continues to believe that Alternative 3 best meets the six criteria identified in NEPA and is, therefore, the environmentally preferred alternative. NEPA is a procedural law and does not prescribe a particular level of environmental protection; protection of park resources is governed by the NPS Organic Act, as well as other laws, policies, and regulations described in Chapter 1 of the Final Plan/EIS.

56. **Comment:** The NPS should open certain dirt roads and trails to mountain bikes.

Response: The Park includes approximately 70 miles of unpaved roads, most of which are open to both motor vehicles and bicycles. Opening of new areas outside of existing road corridors is beyond the scope of this plan.

57. **Comment:** The NPS should implement a reservation system to control the number of visitors during peak periods.

Response: There is no demonstrated need for such a requirement.

58. **Comment:** The NPS should analyze and consider the impacts to air quality.

Response: Air quality was considered but dismissed from further analysis because all potential impacts would be minor, as described in Chapter 2 of the Final Plan/EIS.

59. **Comment:** In Chapter 2, under “Alternatives Eliminated from Analysis,” a correction should be made to indicate that the old road between South Jenny Lake and the River/RKO Road is not within the potential wilderness shown in the August 1972 Wilderness Recommendation.

Response: The abandoned two-track road is located just south of the potential wilderness. It is, however, in a backcountry area, closed to all public and administrative vehicle use, and in an area that may be suitable for wilderness.

60. **Comment:** Park facilities, including those developed in connection with the Transportation Plan, should comply with the American with Disabilities Act (ADA).

Response: The NPS will continue to make all reasonable efforts to, ensure that facilities, programs, and services are accessible and usable by all persons,

including those with disabilities.

61. **Comment:** The Final Plan/EIS should include information on an implementation schedule.

Response: The Final Plan/EIS includes this information in Chapter 2; however, the specific years in which phases will be implemented depend on the availability of funds as well as other factors.



Glossary of Terms

3R: Road work in this category includes resurfacing, restoration, and rehabilitation. Funds in this category may only be used for work undertaken to extend the service life of an existing road and enhance safety. Work includes the placement of additional surface materials and/or other actions necessary to return an existing roadway, including shoulders, the roadside, and appurtenances, to a condition of structural adequacy. Most 3R work occurs on the existing road bench and generally cannot involve widening beyond the existing road bench or require the construction of new retaining walls, or cuts and fills.

4R: Road work in this category includes road reconstruction or realignment, which consists of altering the geometry of the roadway through widening or modifying the current horizontal and/or vertical alignment. These types of projects are typically much more complex and costly than 3R projects and result in more impacts to resources along the road. The numbers of roads selected for 4R types of work is limited to only the most critical, high priority segments. Work that will not qualify as 3R work includes paving previously unpaved roads or parking areas, constructing new parking areas or pullouts, widening off the present road bench, realigning and relocating roads (vertical or horizontal realignments), and constructing new bicycle paths.

Action alternative: An alternative that proposes a change to existing conditions or current management direction. The environmental consequences of an action alternative are analyzed in relation to the No Action Alternative. Also see No Action Alternative.

Activity area: Developed area or trailhead in the park.

Affected environment: The existing biological, physical, cultural, social, and economic conditions that are subject to both direct and indirect changes as a result of actions described within alternatives under consideration.

Alluvial: Pertaining to sediment deposited by flowing water, as in a riverbed.

Alternatives: A reasonable range of options that can accomplish an agency's objectives.

Aquifer: An underground bed or layer that yields ground water.

Backcountry: Backcountry is defined as 50 feet from the roadway.

Braided stream: A stream in which flow is divided at normal stage by small islands. This type of stream has the aspect of a single large channel within which there are subordinate channels.

CEQ: The President's Council on Environmental Quality (CEQ) was established by the National Environmental Policy Act (NEPA). The council's mission is to oversee and develop national environmental policy.

Choosing by Advantages: A decision-making process used as part of developing the Transportation Plan/EIS to analyze and refine the alternatives.

Class I Airshed: A Class I Airshed is the most restrictive air quality category, and was created by Congress to prevent further deterioration of air quality in national parks and wilderness areas of a given size which were in existence prior to 1977, or those additional areas which have since been designated Class I under federal regulations (40 CFR 52.21). The Clean Air Act established stringent requirements for "Class I" areas, national parks over 6,000 acres and national wilderness areas over 5,000 acres. Forty-eight National Park Service (NPS) units are Class I areas and the Clean Air Act (CAA) affords the greatest air quality protection to these areas.

Cub-of-the-year: A cub born in the current year.

Cultural landscape: A geographic area, including both cultural and natural elements, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values.

Cultural resources: Properties such as landscapes or districts, sites, buildings, structures, objects, or cultural practices that are usually greater than 50 years of age and possess architectural, historic, scientific, or other technical value. By their nature, cultural resources are non-renewable.

Cumulative effects: Effects on the environment that result from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or non federal) or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

Cygnets: A young swan.



Degradation (natural resources): Refers to negative impact(s) to natural resources or natural processes. The impact may be singular or cumulative; the extent may be local or ecosystem-wide. The term degradation is used broadly and may refer to: reduction in habitat size, reduction in extent of plant populations, declining species vigor exhibited as reduced population numbers, reduced reproductive success, increased mortality rates, and/or decreased percent of available habitat utilized.

Environmental consequences: A section of an environmental impact statement that is the scientific and analytic basis for comparing alternatives. This discussion includes the environmental effects of the alternatives, any adverse effects that cannot be avoided, and short-term, long-term and cumulative effects. These environmental effects include ecological, aesthetic, historical, cultural, economic, and social issues.

Environmental Impact Statement (EIS): A detailed statement required by NEPA when an agency proposes a major action that significantly affects the quality of the human environment. This document describes and analyzes the activities that might affect the human environment.

Environmental justice: Ensuring the rights of low-income people and communities of color to experience and enjoy clean and healthy environments. Executive Order 12898 requires that the NPS ensures that its programs, policies, and activities do not exclude, discriminate, or deny persons because of their race, color, or national origin.

Extirpated: Totally destroyed or exterminated.

Facilities: Refers to buildings, houses, campgrounds, picnic areas, visitor-use areas, operational areas, and associated supporting infrastructure such as roads, trails, and utilities.

Fixed route: Scheduled route for bus transit.

Frontcountry: Frontcountry means an area in a park or recreation area that is generally accessible by vehicle and offer designated campsites, facilities and recreational opportunities.

Graminoid: Grasslike plant or of the grass family.

Habitat fragmentation: The partitioning of larger habitats into smaller more isolated parcels, usually as a result of development. Fragmentation of habitat can negatively affect the abundance and diversity of plants and animals in an area.

Hibernacula: The shelter of a hibernating animal.

Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER): An architectural and engineering documentation program that produces a thorough archival record of buildings, engineered structures, and cultural landscapes significant in American history and the growth and development of the built environment.

Historic character: The sum of all visual aspects, features, materials, and spaces associated with the historic nature of a site, structure, or landscape.

Historic district: A geographically definable urban or rural area, possessing a significant concentration, linkage, or continuity of sites, landscapes, structures, or objects united by past events or aesthetically by plan or physical developments. A district may also be composed of individual elements separated geographically but linked by association or history.

Hydric soils: Soils that are characterized by an abundance of moisture, periodically producing anaerobic conditions.

Hydrology: The science dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Impacts: Effects, both beneficial and adverse, of an action on the human environment. Direct effects are those occurring at the same time and place as the action itself. Indirect effects occur later in time or are farther removed in distance from the action, yet are reasonably foreseeable.

Interpretation: Programs that support the mission of the NPS by assisting people in understanding, enjoying, and contributing to the protection of the park's natural, cultural, and scenic resources and dynamic processes. Interpretive programs include walks and evening programs, guided tours, formal education programs for school groups, exhibits, audiovisual productions, and publications.

Lek: Established sage-grouse breeding area.

Lithic: Of or relating to stone or stone tools.



Loam: Soil composed of a mixture of sand, silt, clay, and organic material.

Mission 66 style (architecture): Refers to buildings developed in national parks between 1956 and 1966, during a period of experimentation with new structural forms, modern materials, and machine-driven methods of construction. The intent was to provide low maintenance, economical, permanent structures.

Mitigation: An activity designed to avoid, minimize, rectify, eliminate, or compensate for impacts of a proposed project. A mitigation measure should be a solution to an identified environmental problem.

Moraine: An accumulation of boulders, stones, or other debris carried or deposited by a glacier.

Multi-use trails: Pathways that serve several types of users including bicyclists and hikers.

Museum collection: Objects, works of art, historic documents, and natural history specimens collected according to a rational scheme and maintained so they can be preserved, studied, and interpreted for public benefit.

National Environmental Policy Act (NEPA): The federal act that requires the development of an EIS for federal actions that might have substantial environmental, social, or other impacts.

National Historic Landmark: A district, site, building, structure, landscape, or object of national historical significance designated by the Secretary of the Interior under authority of the Historic Sites Act of 1935 and entered in the National Register of Historic Places.

National Register of Historic Places: The comprehensive list of districts, sites, buildings, structures, and objects of national, regional, state, and local significance in American history, architecture, archeology, engineering, and culture. This list is maintained by the NPS under authority of the National Historic Preservation Act of 1966.

Natural resources: Features and values that include plants and animals, water, air, soils, topographic features, geologic features, paleontologic resources, natural quiet, and clear night skies.

Neotropical: The biogeographic region of the New World that stretches southward from the Tropic of Cancer and includes southern Mexico, Central and South America, and the West Indies.

No Action alternative: An alternative in an EIS that continues current management direction. A No Action alternative is a benchmark against which action alternatives are compared.

Non-native species: Species of plants or animals that do not naturally occur in a particular area and often interfere with natural biological systems. Also known as alien, introduced, or exotic species.

Non-point sources: Pollutants that enter the environment from general noncontained locations. Examples of non-point sources are roadways, parking lots, and landscaped areas. Pollutants from these locations can include petrochemicals, heavy metals, and fertilizers.

Noxious weeds: Weeds that are exotic and that have become pests; see non-native species.

Overstory: The portion of the trees forming the upper or uppermost canopy in a forest stand. This stratum of trees has outgrown the other vegetation in a forest and have their uppermost crown foliage largely or fully in direct sunlight, usually as a relatively continuous layer (excluding gaps).

Oxbow: A bend in a meandering river channel that is abandoned as the river shifts its course over time. Oxbows can remain saturated with surface water or groundwater for some time, providing diverse wetland habitats for vegetation and wildlife.

Restoration (cultural): The act or process of accurately depicting the form, features, and character of an existing historic structure, landscape, or object as it appeared at a particular period of time, by removing modern additions and replacing lost portions of historic fabric, paint, or other elements.

Restoration (natural): Work conducted to remove impacts to natural resources and restore natural processes, and to return a site to natural conditions.

Revegetation: Replacement or augmentation of native plants in an area largely or entirely denuded of vegetation.

Ridership: The number of transit boardings, trips taken, or people using a transit system.

Riparian areas: Areas that are on or adjacent to rivers and streams; these areas are typically rich in biological diversity (flora and fauna).

Road corridor: The graded, disturbed area on each side of the road approximately tree line to tree line.

Social trails: A social trail is an informal, nondesignated trail between two locations. Social trails often result in trampling stresses to sensitive vegetation types.

Stewardship: The responsibility of caring for the park. This often grows from an understanding of and respect for the principles of the National Park System and the needs of the park's natural, social, and cultural environment.

Substantive comment: A comment that does one or more of the following: questions, with reasonable basis, the accuracy of information in the EIS; questions, with reasonable basis, the adequacy of the environmental analysis; presents reasonable alternatives other than those presented in the EIS; or causes changes or revisions in the proposal.

Surface water: Water that naturally flows or settles on top of natural landforms and vegetation, often as rivers, streams, lakes, ponds, and other bodies of water.

Telemetry: Telemetry is the wireless transmission and reception of measured quantities for the purpose of remotely monitoring environmental conditions or equipment parameters in real-time.

Threatened and endangered species: Species of plants and animals that receive special protection under state and federal laws. Also referred to as listed or protected species.

Transportation System Management: A variety of information systems and strategies for managing transportation issues.

Transit: Bus system operated by park or concessioners.

Understory: The trees and other woody species growing under a relatively continuous cover of branches and foliage formed by the overstory trees; also loosely applied to all woody strata below the overstory.

Ungulates: Hoofed herbivores, e.g., mule deer.

Variable messaging signs: Mobile electronic sign that provides timely information on road conditions, accidents, parking capacity etc. as an aid in trip planning/management.

Visitor experience: The perceptions, feelings, and interaction a park visitor has in relationship with the environment. Within the context of the proposed alternatives, visitor experience includes general access, facilities, visitor services, interpretation and orientation, and recreational opportunities. Other elements also contribute to the quality of the visitor experience, such as the condition of natural and cultural resources, air quality, transportation, and noise.

Wetland: Areas that are inundated by surface or groundwater with a frequency sufficient to support, under normal circumstances, vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wilderness: Areas protected by provisions of the Wilderness Act of 1964. These areas are characterized by a lack of human interference in natural processes; generally, there are no roads, structures, installations, and the use of motorized equipment is not allowed.



As the nation's conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environment and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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