

**Environmental Assessment**  
Road Resurfacing, Restoration, and Rehabilitation  
October 2001



NPS Photo

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Canyon Junction to Fishing Bridge Junction  
Hayden Valley Road

**YELLOWSTONE**

National Park Wyoming / Montana / Idaho



# Environmental Assessment

October 2001

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Canyon to Fishing Bridge Road Improvement  
Hayden Valley Road

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United States Department of the Interior ! National Park Service ! Yellowstone National Park



## SUMMARY

The National Park Service proposes to resurface, restore, and rehabilitate the road and associated pullouts and parking areas between Canyon Junction and Fishing Bridge Junction, also known as the "Hayden Valley" road, within Yellowstone National Park. This is an interim measure until the road can be reconstructed in the future. The proposal (Alternative A) would be to recycle and overlay the entire 25.3 kilometers (15.7 miles) of road on the existing alignment to the same 7.4-meter (24-foot) width. Eleven pullouts would be formalized; seven informal pullouts would be obliterated due to safety and resource concerns, and three new pullouts constructed. Aggregate and borrow material would be obtained from the Sylvan Pass pit. Under Alternative B (No Action) no major repair work would be done until the road is scheduled for reconstruction, at least ten years into the future.

This segment of the Grand Loop Road is in an advanced state of deterioration, and work is needed now to maintain the road until it can be reconstructed in ten to fifteen years. The pavement is rutted from wear and cracking because of poor drainage, poor-quality base material, and increasingly heavy vehicle use. Wildlife viewing has increased in the central portion of the park, and there are insufficient pullouts and parking areas to support the use. As a result, the public is creating informal pullouts at the expense of resources, and the visitor experience is suffering. More and better-located pullouts and parking areas are needed. This environmental assessment has been prepared because some roadside areas previously graveled or dirt surfaced are proposed for formalization and paving.

About 0.3 to 0.5 hectare (0.75 to 1.25 acre) of soils and vegetation beyond the existing road prism (ditch to ditch) would be affected by the proposal. No impact to wetlands is anticipated. There would be no effect on any threatened, endangered, sensitive or candidate species. Cultural resources within the areas potentially affected by construction have been inventoried, and their eligibility for inclusion on the National Register of Historic Places (National Register) evaluated. The 1993 programmatic agreement (NPS 1993d) among the Wyoming and Montana State Historic Preservation Officers (SHPOs), the Advisory Council on Historic Preservation (ACHP), and the National Park Service (NPS) provides direction for the preservation and protection of these properties. Through project planning and design, impacts on these properties would be avoided. If there is an impact that is unanticipated and unavoidable once the project is underway, then appropriate mitigation strategies would be developed and mitigation plans prepared in consultation with the Wyoming State Historic Preservation Officer and Advisory Council on Historic Preservation. Some Yellowstone visitors would be inconvenienced by road construction delays. In the long term, road improvements would provide safer and more enjoyable driving experiences for visitors.

This environmental assessment will be on public review for 30 days.

## NOTE TO REVIEWERS AND RESPONDENTS

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. **If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment.** We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Comments are due November 16, 2001, and should be addressed to:

Superintendent  
Attn: Planning and Compliance  
Canyon Junction to Fishing Bridge Junction Road Project  
P.O. Box 168  
Yellowstone National Park, WY 82190

## TABLE OF CONTENTS

<b>INTRODUCTION</b> .....	<b>1</b>
<b>PURPOSE OF AND NEED FOR THE ACTION</b> .....	<b>3</b>
<b>Management Objectives</b> .....	<b>4</b>
<b>Relationship of the Proposed Action to Previous Planning Efforts</b> .....	<b>4</b>
<b>Impact Topics</b> .....	<b>4</b>
<b>Geology, Soils, and Vegetation</b> .....	<b>5</b>
Rare Plants.....	5
Hydrothermal Resources.....	5
<b>Wetlands and Other Waters of the United States</b> .....	<b>5</b>
<b>Air Quality</b> .....	<b>6</b>
<b>Wildlife</b> .....	<b>6</b>
Fisheries and Aquatic Resources .....	6
Threatened and Endangered Species .....	6
<b>Cultural Resources</b> .....	<b>6</b>
<b>Socioeconomic Environment</b> .....	<b>6</b>
<b>Impact Topics Considered then Dismissed</b> .....	<b>7</b>
<b>Environmental Justice</b> .....	<b>7</b>
<b>Prime and Unique Agricultural Lands</b> .....	<b>7</b>
<b>Floodplain Management (Executive Order 11988)</b> .....	<b>7</b>
<b>ALTERNATIVES CONSIDERED</b> .....	<b>9</b>
<b>Alternative A (Preferred): Recycle and Overlay the Existing 25.3 Kilometers (15.7 Miles) Hayden Valley Road from Canyon Junction to Fishing Bridge Junction, with Additional Pullouts Paved</b> ....	<b>9</b>
<b>Design Recommendations</b> .....	<b>11</b>
Areas of Roadway to be Excavated .....	11
Ditches .....	11
Culverts.....	11
Wall Repairs .....	11
Curbs.....	11
Signs.....	12
Eroding Slopes.....	12
<b>Pullouts and Parking Areas</b> .....	<b>12</b>
Mud Volcano Parking Area .....	12
Sulphur Caldron Parking Area.....	12
Grizzly Overlook.....	13
<b>Intersections</b> .....	<b>13</b>
Canyon Junction .....	13
Intersection Aprons .....	13
<b>Material Source</b> .....	<b>14</b>
<b>Staging, Stockpiling, and Disposal Sites</b> .....	<b>14</b>

<b>Reclamation/Revegetation.....</b>	<b>14</b>
<b>Geology/Thermal Features.....</b>	<b>14</b>
<b>Wetlands and Waters of the United States.....</b>	<b>15</b>
<b>Wildlife.....</b>	<b>15</b>
Threatened and Endangered Species .....	15
<b>Cultural Resources.....</b>	<b>15</b>
<b>Scheduling of Work Activities .....</b>	<b>16</b>
<b>Visitor Information .....</b>	<b>16</b>
<b>Construction Stipulations and Mitigation.....</b>	<b>16</b>
Other Stipulations.....	16
<b>Project Cost.....</b>	<b>17</b>
<b><i>ALTERNATIVE B: No Action .....</i></b>	<b><i>18</i></b>
<b>Design Recommendations.....</b>	<b>18</b>
Areas of Roadway to be Excavated .....	18
Ditches .....	18
Culverts.....	18
Wall Repairs .....	18
Curbs.....	18
Signs.....	18
Eroding Slopes.....	19
<b>Pullouts and Parking Areas .....</b>	<b>19</b>
Mud Volcano Parking Area .....	19
Sulphur Caldron Parking Area.....	19
Grizzly Overlook.....	19
<b>Intersections .....</b>	<b>19</b>
Canyon Junction .....	19
Intersection Aprons .....	19
<b>Material Source .....</b>	<b>19</b>
<b>Staging, Stockpiling, and Disposal Sites .....</b>	<b>19</b>
<b>Reclamation/Revegetation.....</b>	<b>19</b>
<b>Geology/Thermal Features.....</b>	<b>20</b>
<b>Wetlands and Waters of the United States.....</b>	<b>20</b>
<b>Wildlife.....</b>	<b>20</b>
Threatened and Endangered Species .....	20
<b>Cultural Resources.....</b>	<b>20</b>
<b>Scheduling of Work Activities .....</b>	<b>20</b>
<b>Visitor Information .....</b>	<b>20</b>
<b>Construction Stipulations and Mitigation.....</b>	<b>20</b>
Other Stipulations.....	20
<b>Project Cost.....</b>	<b>20</b>
<b><i>Alternatives Considered but Rejected.....</i></b>	<b><i>21</i></b>



Material Source Alternatives .....	21
<b><i>ENVIRONMENTALLY PREFERRED ALTERNATIVE</i></b> .....	<b>24</b>
<b><i>AFFECTED ENVIRONMENT</i></b> .....	<b>25</b>
<b><i>Regional Context</i></b> .....	<b>25</b>
<b><i>Road Use and Character</i></b> .....	<b>25</b>
Pullouts and Parking Areas .....	25
<b><i>Natural Resources</i></b> .....	<b>26</b>
Geology, Topography, And Soils .....	26
Hydrothermal Resources.....	26
Vegetation.....	26
Rare Plants.....	27
Wetlands and Other Waters of the United States .....	27
Air Quality.....	28
Wildlife.....	28
Overview.....	28
Birds.....	29
Fisheries and Aquatic Resources .....	30
Amphibians and Reptiles .....	31
Threatened and Endangered Species.....	32
Grizzly Bears .....	32
Lynx .....	32
Bald Eagle.....	33
Whooping Crane.....	33
Gray Wolf .....	33
Candidate or Proposed Species .....	33
<b><i>Cultural Resources</i></b> .....	<b>34</b>
Prehistory .....	34
History .....	34
Documentation of Cultural Resources.....	36
Description of Cultural Resources .....	37
Prehistoric Archeological Sites .....	38
Historic Archeological Sites .....	39
The Historic Road System .....	40
The Cultural Landscape .....	43
<b><i>Socioeconomic Environment</i></b> .....	<b>44</b>
General.....	44
Parkwide Road Conditions and Use .....	45
Canyon to Fishing Bridge Road Conditions and Use .....	47

<b>ENVIRONMENTAL CONSEQUENCES .....</b>	<b>48</b>
<b>Overview .....</b>	<b>48</b>
<b>Impairment .....</b>	<b>49</b>
<b>Alternative A (Preferred): Recycle and Overlay the Existing 25.3 Kilometers (15.7 Miles) Hayden Valley Road from Canyon Junction to Fishing Bridge Junction, with Additional Pullouts Paved..</b>	<b>50</b>
<b>Natural Resources .....</b>	<b>50</b>
Geology, Topography and Soils.....	50
Hydrothermal Resources .....	50
Vegetation.....	50
Rare Plants.....	50
Wetlands and Other Waters of the United States .....	51
Air Quality .....	51
Wildlife .....	51
Overview.....	51
Birds.....	52
Fisheries and Aquatic Resources .....	53
Amphibians and Reptiles .....	53
Threatened and Endangered Species .....	53
<b>Cultural Resources .....</b>	<b>55</b>
Archeological and Ethnographic Resources .....	55
<b>Socioeconomic Environment.....</b>	<b>59</b>
General.....	59
Canyon to Fishing Bridge Road Conditions and Use.....	59
<b>Cumulative Effects .....</b>	<b>60</b>
Roadway Projects .....	61
Other Projects within the Park .....	62
Projects Outside the Park .....	63
Beneficial Development Effects .....	64
Analysis Results .....	65
<b>Impairment Determination .....</b>	<b>66</b>
<b>Alternative B: No Action .....</b>	<b>67</b>
<b>Natural Resources .....</b>	<b>67</b>
Geology, Topography and Soils.....	67
Hydrothermal Resources .....	67
Vegetation.....	67
Rare Plants.....	67
Wetlands and Other Waters of the United States .....	67
Air Quality .....	67
Wildlife .....	67
Overview.....	67
Birds.....	68
Fisheries and Aquatic Resources .....	68
Amphibians and Reptiles .....	68
Threatened and Endangered Species .....	68
<b>Cultural Resources .....</b>	<b>69</b>
Prehistoric and Historic Archeological Resources, Historic Roadway Resources, and Ethnographic Resources ..	69
Cultural Landscape.....	69
<b>Socioeconomic Environment.....</b>	<b>69</b>

General.....	69
Parkwide Roads.....	69
Canyon to Fishing Bridge Road Conditions and Use.....	70
<b>Cumulative Effects .....</b>	<b>70</b>
<b>Impairment Determination .....</b>	<b>70</b>
<b>Compliance Status.....</b>	<b>71</b>
<i>APPENDIX A: Vegetation Management for Construction in Yellowstone National Park .....</i>	<i>72</i>
<b>REFERENCES .....</b>	<b>74</b>
<b>CONSULTATION AND COORDINATION .....</b>	<b>79</b>
<b>PREPARERS and CONSULTANTS.....</b>	<b>79</b>
Yellowstone National Park .....	79
Federal Highway Administration, Western Federal Lands Division - Cooperating Agency.....	79
Persons, Organizations, and Agencies Contacted: .....	79
Agencies/Libraries That Will Receive This Environmental Assessment: .....	79
Agencies, Organizations, And Tribes That Will Be Notified Of This Environmental Assessment: .....	80

## MAPS

<b>Vicinity .....</b>	<b>2</b>
<b>Project Area .....</b>	<b>10</b>

## TABLES

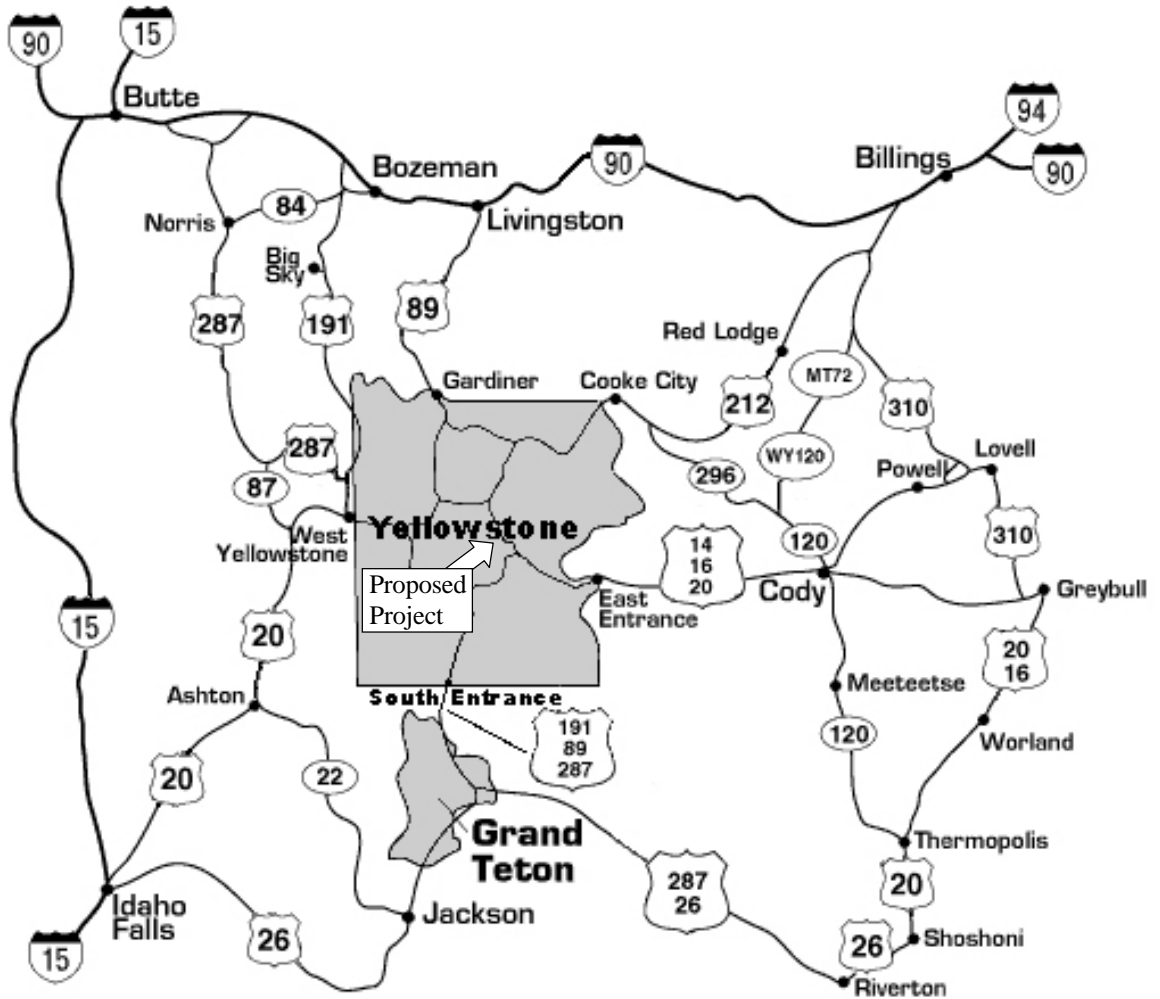
<b>Summary of Potential Impacts of Alternatives for Hayden Valley Road Improvement .....</b>	<b>22</b>
<b>Description of Cultural Resources- Site, Status, Effect, Mitigation and Further Compliance Needed ..</b>	<b>57</b>

## INTRODUCTION

Park roads, such as those in Yellowstone National Park (YNP), are intended to accommodate park visitors safely and efficiently while enhancing visitor experiences (NPS 1984). The National Park Service (NPS) is responsible for constructing, operating, and maintaining its roads in a safe and aesthetically pleasing condition to the greatest extent possible.

In keeping with this mandate, the National Park Service, in cooperation with the Federal Highway Administration (FHWA) is in the process of rehabilitating or reconstructing the principal park roads in Yellowstone. The Surface Transportation Assistance Act (PL 97-424), passed in 1982, established the Federal Lands Highways Program (FLHP). This program distributes funds from federal motor fuel tax revenues for work on roads in parks and on other federally administered lands. Recent examples of work performed under this program are: paving overlay work between Northeast Entrance and Tower Junction and between Norris and Canyon; reconstruction of the park road between West Thumb and Lake Junction; reconstruction of the Grand Loop Road between Madison Junction and Biscuit Basin; between Madison Junction and Norris Junction; and between the Fishing Bridge intersection and Sylvan Pass on the East Entrance road. Road improvements in Yellowstone generally take many years to complete because of limited funding, a relatively short construction season, and the park's desire to allow visitor traffic through construction zones.

The next road project for Yellowstone under FLHP is the resurfacing of the Grand Loop Road from Canyon Junction to Fishing Bridge Junction in the central portion of the park (see Vicinity map page 2). Work is proposed to begin in early 2002 and be completed within two to three years, subject to availability of funding. This *Environmental Assessment Canyon Junction to Fishing Bridge Junction Road Resurfacing, Restoration and Rehabilitation* describes the proposed project, the alternatives considered, and the associated environmental effects. The proposals in this document are based on standards and guidelines set forth in the *Parkwide Road Improvement Plan* (NPS 1992). That plan described the road improvement program that is expected to be carried out in Yellowstone over the next 20 or more years. It established standards for improvement of the park's principal roads (for example, width and design speed) and analyzed the cumulative effects of the long-term road improvement program. This route-specific environmental assessment (EA) evaluates the effects of resurfacing in the Canyon Junction to Fishing Bridge Junction project area, and it documents current compliance activities and material source information. The EA would be used in applying for project-specific permits and ensuring that appropriate mitigating measures are implemented.



Vicinity Map

## **PURPOSE OF AND NEED FOR THE ACTION**

The National Park Service is proposing to resurface, restore, and rehabilitate (3R) the 25.3 kilometers (15.7 miles) segment of the Grand Loop Road between Canyon Junction and Fishing Bridge Junction. The Canyon Junction to Fishing Bridge Junction road segment was identified in the NPS *Parkwide Road Improvement Plan* (NPS 1992) initially for a 3R project and eventually for reconstruction. Improvement of the road is needed in order to meet acceptable engineering safety standards, to provide safe and pleasant driving experiences, to facilitate park operations and emergency services, to improve resource protection, and to enable more efficient use of park funds.

The Canyon Junction to Fishing Bridge Junction road segment connects the Canyon developed area to the Fishing Bridge and Lake/Bridge Bay developed areas via Hayden Valley in the central portion of the park (see Vicinity Map page 2). This section, typically called the Hayden Valley road, closely follows the route of the Yellowstone River through Hayden Valley, one of the park's most extensive wildlife viewing areas. West of Hayden Valley, the road rises and crosses the Central Plateau, which separates Hayden Valley from the Firehole River Valley. The road ends at Fishing Bridge Junction with access to the Lake developed area and the East Entrance road. The road also acts as a connector between the northern part of the park and Yellowstone Lake. It provides a road corridor in Yellowstone National Park between communities such as Cody and Jackson, Wyoming, and Gardiner and Cooke City, Montana. This road provides a critical link in the Grand Loop Road system. There are numerous formal and informal pullouts that provide convenient access to the Yellowstone River, a favored fishing area, although the river is closed for fishing for 9.7 kilometers (six miles) in the heart of the valley. Abundant wildlife—especially bison—are easily visible from vehicles along the roadway. Grizzly bears also populate the valley in relatively large numbers, along with a large variety of birds. Four designated picnic areas and two paved parking areas for thermal features are along the route. The first is Sulphur Cauldron and the second is Mud Volcano thermal area. There is only one trailhead for the Mary Mountain Trail, and no campgrounds located along the Hayden Valley road. Because of the proximity of the roadway to the Yellowstone River, conflicts between vehicles and wildlife are common.

The Canyon Junction to Fishing Bridge Junction road segment was completed by 1892. Much of the road is typical of the older roads in Yellowstone that have not had complete reconstruction for more than 50 years. The top width and base material are not designed to accommodate the greater traffic volumes and wider and heavier vehicles of today. As with other older park roads, maintenance costs are escalating at an accelerating rate just to keep the road passable.

Visitors travel over this road to reach such features as the Grand Canyon of the Yellowstone and Yellowstone Lake. In 1999 the park received in excess of 3 million recreational visits, and visitation during the past five years has ranged from 2.84 million to 3.13 million. These visits represented more than one million vehicles entering the park and using the road system within the six-month period from May through October. The Canyon Junction to Fishing Bridge Junction road segment had an annual "Average Daily Traffic" (ADT) of 1,860 vehicles in 1992. More specifically, the peak season (summer) ADT was 6,210 vehicles per day (total in both directions) during the peak season in July and August 1992. This is third in the volume of the 14 road segments in the park. The traffic is about the same in the northbound and southbound directions (BRW, Inc 1997). The NPS *Park Road Standards* (NPS 1984) recommend minimum widths of 3.4 meters (11 feet) per lane and 1.2 meters (four feet) per shoulder for an ADT of

## Purpose and Need

4,000 to 8,000. However, these standards would not be met as part of this overlay project, but would be evaluated as criteria for a future road reconstruction project.

During this project, pullouts would be addressed in order to maximize visitor opportunities while reducing maintenance costs for inappropriate pullouts. Informal pullouts created by visitors often intrude on sensitive resource areas. During much of the summer season, there is insufficient space at pullouts. This project would create, formalize, and enlarge some pullouts. Other, discontinued formal and informal pullouts would be rehabilitated to protect soils and vegetation.

## Management Objectives

The objectives of this project are to provide a smooth and safe driving surface; to repair areas of failing road base structure that causes reoccurring problems such as potholes, frost heaves, and cracks in the pavement; and to provide additional pullout viewing areas that are formalized and would prevent resource damage and improve the flow of traffic. Road resurfacing would serve as an interim measure to keep this segment passable until funding for a more extensive reconstruction would be available.

## Relationship of the Proposed Action to Previous Planning Efforts

An *Alternative Transportation Modes Feasibility Study* (BRW, Inc 1994) was completed for Yellowstone National Park. One alternative discussed was a system for parkwide bus transportation, including this Hayden Valley road segment. Among other issues, the study recognized that the deteriorated condition of many park roads would need to be corrected before large-scale bus service would be practical. No alternative modes of transportation are being proposed at this time, and this project would only address the poor condition of the Hayden Valley road segment.

The Canyon Junction to Tower Junction road segment (Dunraven Road) is currently proposed for reconstruction to a 7.2-meter (24-foot) width, with a proposed start date of spring 2002. If the Dunraven Road project moves forward, the proposal would have the first phase of construction concurrent with this overlay project.

A separate project is a proposed contractor's RV camp at Canyon. If approved, the contractor camp would help provide housing for workers on road projects. This project is being evaluated through a separate environmental assessment and is proposed for construction in 2001/2002.

## Impact Topics

Issues and concerns affecting the proposed project were identified by specialists in the National Park Service, as well as from the input of other federal, state, and local agencies. Impact topics are the resources of concern that could be affected by the range of alternatives. Specific impact topics were developed for discussion focus to ensure that alternatives were compared on the basis of the most relevant topics. The following impact topics were identified on the basis of federal laws, regulations, orders, and National Park Service *Management Policies* (NPS 2001a). A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

## **Geology, Soils, and Vegetation**

The National Environmental Policy Act (1969) calls for an examination of the impacts on all components of affected ecosystems. National Park Service policy is to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2001a). Therefore, geology, soils, and vegetation will be addressed as an impact topic.

### **Rare Plants**

The Endangered Species Act (1973) requires an examination of impacts on all federally listed threatened or endangered species. National Park Service policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. Therefore, threatened, endangered, candidate species and species of special concern will be addressed as an impact topic.

### **Hydrothermal Resources**

The National Environmental Policy Act (1969) calls for an examination of the impacts on all components of affected ecosystems. National Park Service policy is to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2001a). Therefore, hydrothermal resources will be addressed as an impact topic.

## **Wetlands and Other Waters of the United States**

National Park Service policies require protection of water quality consistent with the Clean Water Act. Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers to prohibit or regulate, through a permitting process, discharge of dredged or fill material into U.S. waters.

The Storm Water Rule (40 CFR, Parts 122, 123, 124) requires an Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Notice of Intent be submitted to the EPA, with a copy sent to the Wyoming Department of Environmental Quality, on construction activities, including clearing and grading, that occur on land in excess of five acres (less than five acres if construction occurs in 2003 or after) or if the proposed action is part of an overall common plan of development. A NPDES notice of intent would be submitted to both the EPA and the Wyoming Department of Environmental Quality, prior to any ground disturbing activities. When construction is complete, a notice of termination would be sent to the EPA and Wyoming Department of Environmental Quality.

In addition, the EPA NPDES process requires preparation of a Storm Water Pollution Prevention Plan. The plan would be the guiding tool for the prevention, minimization, and mitigation of soil erosion and water pollution during construction activities. Should the proposed action be implemented, the contractor would be responsible for developing a park-approved plan. The plan would be available for public and agency inspection at the construction site. Therefore, water quality will be addressed as an impact topic.



## **Air Quality**

Section 118 of the 1963 Clean Air Act (42 U.S.C. 7401 et seq.) requires a park to meet all federal, state, and local air pollution standards. Yellowstone National Park is designated a Class I air quality area under the Clean Air Act, as amended. A Class I area is subject to the most stringent regulations of any designation. Class I areas must not exceed the maximum allowable increment over baseline concentrations of sulfur dioxide and particulate matter as specified in Section 163 of the Clean Air Act. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect the park's air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts. Thus, air quality will be addressed as an impact topic in this document.

## **Wildlife**

The National Environmental Policy Act (1969) calls for an examination of the impacts on all components of affected ecosystems. National Park Service policy is to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2001a). Therefore, wildlife will be addressed as an impact topic.

## **Fisheries and Aquatic Resources**

The National Environmental Policy Act (1969) calls for an examination of the impacts on all components of affected ecosystems. National Park Service policy is to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2001a). Therefore, fisheries and aquatic resources will be addressed as an impact topic.

## **Threatened and Endangered Species**

The Endangered Species Act (1973) requires an examination of impacts on all federally listed threatened or endangered species. National Park Service policy also requires examination of the impacts on federal candidate species, as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. Therefore, threatened, endangered and candidate species will be addressed as an impact topic.

## **Cultural Resources**

The National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.), and the National Environmental Policy Act, as well as the National Park Service's Director's Order #28, Cultural Resource Management Guideline (NPS 1997), Management Policies (NPS 2001a), and Director's Order #12, Conservation Planning, Environmental Impact Analysis and Decision-Making (NPS 2001c), require the consideration of impacts on cultural resources listed on or eligible for listing on the National Register of Historic Places.

## **Socioeconomic Environment**

The National Environmental Policy Act (1969) calls for an examination of the impacts on all components of affected ecosystems. National Park Service policy is to maintain all the

## Purpose and Need

components and processes of naturally evolving park ecosystems, including creating and maintaining conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans. Therefore, socioeconomic issues will be addressed as an impact topic.

## **Impact Topics Considered then Dismissed**

### **Environmental Justice**

According to the Environmental Protection Agency, environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Presidential Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

The proposed action would not have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Draft Environmental Justice Guidance (July 1996). Therefore, environmental justice was dismissed as an impact topic.

### **Prime and Unique Agricultural Lands**

The Canyon Junction to Fishing Bridge Junction road improvement project is within the boundaries of Yellowstone National Park. No park lands are classified as agricultural, and no unique agricultural values or prime farmlands are included in this project. Therefore, agricultural lands were dismissed as an impact topic.

### **Floodplain Management (Executive Order 11988)**

Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

Before taking an action, each agency shall determine whether the proposed actions will occur in a floodplain— for major Federal actions significantly affecting the quality of the human environment, an evaluation is require to be prepared under Section 102 (2) (C) of the National Environmental Policy Act.

Park roads are excepted from compliance with Executive Order 11988, "Floodplain Management," under NPS final implementation procedures as outlined in Special Directive

## Purpose and Need

93-4, "Floodplain Management Guideline," July 1, 1993. The project area would not affect any floodplains. Therefore floodplains were dismissed as an impact topic.

## **ALTERNATIVES CONSIDERED**

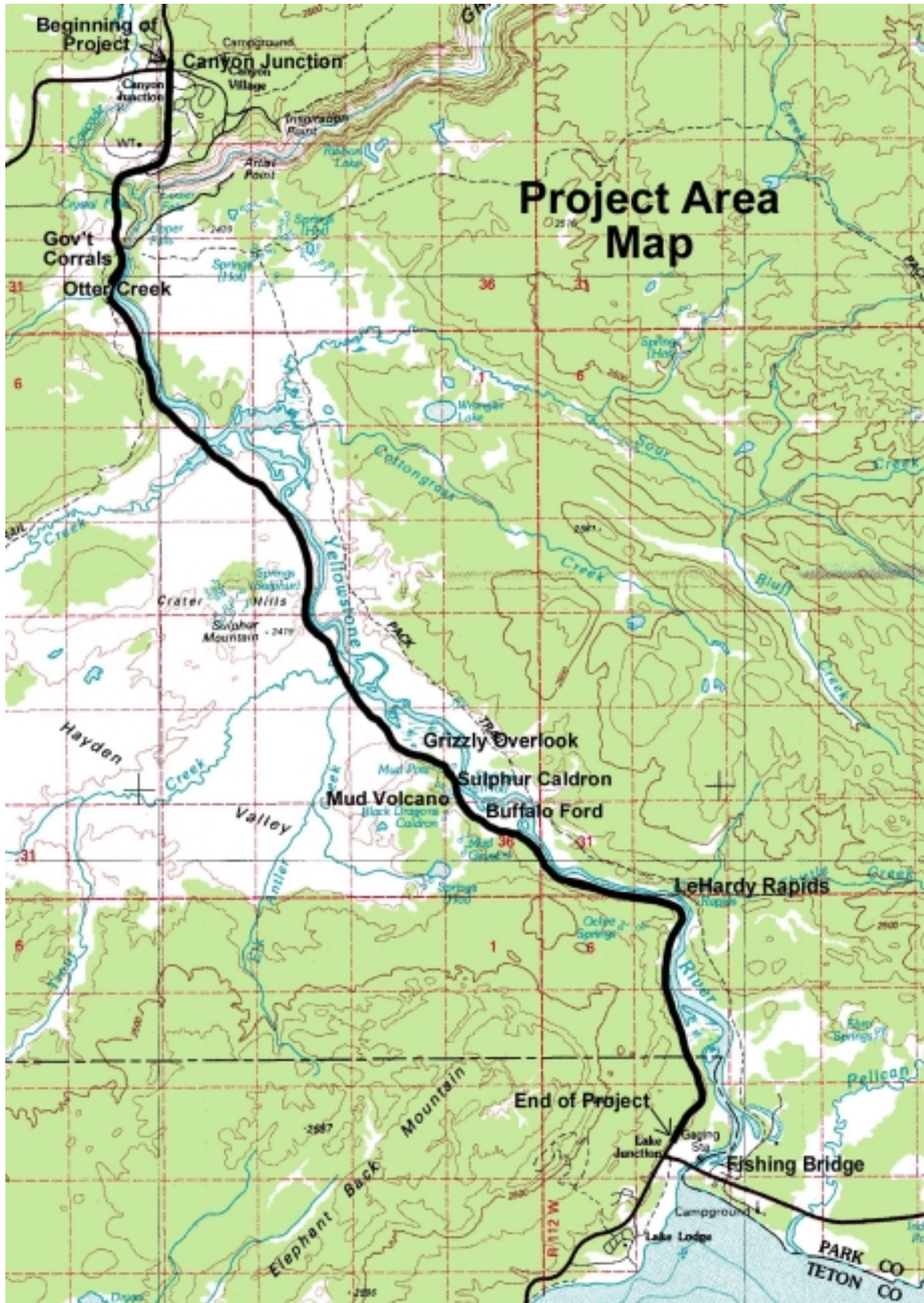
### **Alternative A (Preferred): Recycle and Overlay the Existing 25.3 Kilometers (15.7 Miles) Hayden Valley Road from Canyon Junction to Fishing Bridge Junction, with Additional Pullouts Paved**

The preferred alternative is to recycle and overlay the existing 7.4-meter (24-foot) road on the same alignment and width. The existing pavement would be milled and placed back on the roadway as base material. A new 75-mm (three-inch) layer of asphaltic concrete would then be laid down. Where the base material is saturated and/or inferior, it would be dug out and replaced with suitable material. If needed, drains would be installed to keep the new base rock dry. Ditches would be cleaned, as needed, to reestablish the original grade for proper and efficient ditch function. Culverts would be cleaned as needed, and one would be replaced. Most disturbance would be in the existing roadway (ditch to ditch). Existing pullout areas would be obliterated, paved, overlaid, or reconstructed. Three new pullouts would be constructed. Where pullouts are obliterated or modified, the area would be rehabilitated to natural conditions.

This project would not meet the NPS *Park Road Standards* (NPS 1984) recommended minimum widths of 3.4 meters (11 feet) per lane and 1.2 meters (four feet) per shoulder for an ADT of 4,000 to 8,000. That road standard is a goal for future reconstruction of this same road segment. However, as an interim solution, a safer unbroken road surface with additional paved pullouts would be accomplished by this action.

A map of the project area is located on the following page.

Alternatives Considered



## **Design Recommendations**

### **Areas of Roadway to be Excavated**

The base structure would be repaired in 38 specific locations by excavation of poor-quality material and replacement with better draining aggregate. The excavation would be only as wide as the existing road prism, and about one-meter (three feet) deep. A total of about 17,000 cubic meters would be removed, most of which would be disposed of at the Canyon ballfield disposal site or Lake transfer station disposal site. In some locations perforated drainage pipes would be installed with an outlet ditch to keep the base material as dry as possible.

One of the longest dig-outs would be in the vicinity of the Buffalo Ford/Nez Perce Ford Picnic area intersection would be 175 meters (575 feet) long. Work in this area would include the installation of perforated pipe, directly on the west side of the road, in the present ditch. The road grade in this section would be raised approximately 0.3 meters (one-foot) to allow for placement of the increased base material necessary to cross this saturated area, and prevent frost heaving. Additionally, the road design requires a shift of approximately 0.6 to 0.9 meters (two to three feet) to the east to accommodate these construction parameters. The shift in roadway surface would be accomplished without subsurface excavation of the new road surface area. Road base material would be placed on top of the existing surface of the road edge.

### **Ditches**

Nine locations totaling about 660 linear meters (2,165 feet) of ditch would be cleaned and reshaped throughout the project. Care would be taken to identify and avoid areas where this work would disturb wetlands, rare plants, historic and prehistoric archaeologically significant resource areas. Ditches would be reshaped and grades would be reestablished to allow proper drainage functions.

### **Culverts**

Cleaning of 31 culverts would occur. This work would include clearing the inside of the pipe, the inlet, and the outlet of all debris to restore the free flow of water. No headwalls would be replaced. One masonry headwall would be reconstructed using the existing stone where a culvert is being replaced 700 meters (0.43 miles) north of the Mary Mountain trailhead.

### **Wall Repairs**

Just south of the LeHardy Rapids, a portion of an historic dry-laid retaining wall on the fill-side of the road, between the road and the Yellowstone River, would be reconstructed. A portion of the wall is beginning to bulge and stones are dislodging. The road surface in this location is beginning to slowly tilt towards the river, with cracks appearing in the pavement. The wall would be dismantled, and then soil within the road prism would be excavated. New soil would be placed using geo-textile fabric wraps to hold the fill material in place and to provide reinforcement. The dry-laid wall would then be rebuilt using the same stone materials and the same pattern of the original wall.

### **Curbs**

Asphalt curbing would be replaced in kind where it performs a drainage function, controls erosion of fill slopes, and protects adjacent resources. Asphalt curbing in limited pullouts and parking areas would be replaced with log barriers where needed to control traffic. Grizzly Overlook is one area

## Alternatives Considered

that would have half-buried 12-inch diameter logs installed to separate vehicles from pedestrian areas.

### **Signs**

Existing signs would be moved back from the road to allow for construction, then reset according to standards at the completion of the project. At that time signs would be added, removed, or replaced according to their condition and according to a sign plan developed by the park.

### **Eroding Slopes**

Two unstable slopes above the road in the area of the Brink of the Upper Falls intersection are continually eroding material that clogs drainage ditches adjacent to the road. These two areas are each approximately 60 meters (200 feet) in length. Both would require placement of geo-textile reinforcing material, a perforated pipe for draining water from the base of the structure, and placement of rock and embankment material. A layer of topsoil would cover the stabilized slope that would then be revegetated with native plants.

### **Pullouts and Parking Areas**

Many informal (visitor created) pullouts have been established in the project area. Prior to decisions being made on which pullouts should be retained for this project, the road was surveyed for sensitive resources such as wetlands, archaeology sites, and geothermal areas. The main design criteria for all pullouts was to avoid sensitive resources. Where conflicts occurred, pullouts were moved or eliminated.

Fifty existing paved pullouts would be retained and improved at key wildlife and scenic viewing areas, fishing access points, and other areas of interest. Informal pullouts consist of gravel or dirt areas created by visitors. Eleven of these would be redesigned and paved. These parallel pullouts would be approximately five meters wide (16 feet) and of varying lengths with tapers. About seven existing gravel or dirt surfaced pullouts would be obliterated and restored to natural conditions (due to safety and resource concerns), and three new pullouts would be constructed.

### **Mud Volcano Parking Area**

This project would not overlay the existing asphalt at this parking area. However, the entrance to the parking area would be redesigned to address problems with radiuses at the south intersection. Thermal influences under the parking area resulted in the failure of a drainage pipe and the pavement structure. This created a hole approximately three meters (ten feet) in diameter and approximately one meter (three feet) deep. This project would repair the hole by replacing the existing drainpipe, filling the hole with quartzite stone, and re-paving and installing a grate to allow steam to vent.

### **Sulphur Caldron Parking Area**

A hole located towards the south end of this parking area would not be fixed as a part of this project. The hole formed as a result of thermal activity beneath this location in the parking area. The hole serves as an interpretive feature for many visitors, showing how the underlying thermal plumbing of the park changes over time. The rest of the parking area would have an asphalt overlay constructed over the existing pavement. Additionally, a log rail would be constructed

## Alternatives Considered

between the northbound travel lane and the pedestrian walkway overlooking Sulphur Caldron. The rail would be constructed of 300-millimeter (12-inch) diameter log rails supported by natural stone bases. The top of the rail would be at a height of 375 millimeters (15 inches). Curb cuts for wheelchair access to the pedestrian area would be provided from the parking area.

### Grizzly Overlook

Grizzly Overlook is a popular scenic viewing area that is currently experiencing resource damage due to improper drainage and a lack of properly defined pedestrian spaces. As part of this alternative the overlook would have a log curb installed for separating the vehicle and pedestrian areas. This curb would include a cutout for wheelchair access. A 300-millimeter (12-inch) diameter log-rail would be placed at the edge of viewing area. The top of the rail would be at a height of 725 millimeters (29 inches). The rail would be supported by 300-millimeter (12-inch) diameter vertical logs. The support logs would have a 300-millimeter (12-inch) diameter half-log curb placed at ground level between each. The existing gravel surface of the viewing area would be replaced with asphalt. Existing drainage structures would be repaired or replaced. The vehicle parking area would also be overlaid with a new layer of asphalt.

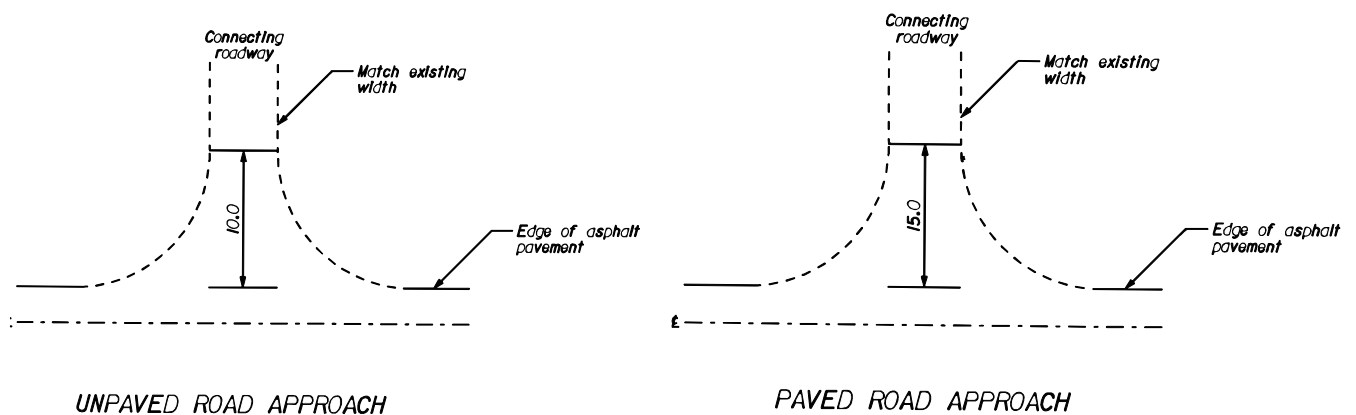
## Intersections

### Canyon Junction

This road intersection is located where the Canyon to Norris road intersects the Canyon to Fishing Bridge road. In this alternative the intersection would be reconfigured with a new striping design on the existing paved and disturbed area.

### Intersection Aprons

There would be no work on side roads except to pave aprons at ten locations. Unpaved road approaches would have a ten-meter (32.8-foot) radius and be paved ten meters from the road edge. Paved road approaches would have a 15-meter (49.2-foot) radius and be overlaid 15 meters from the road's edge.





## **Material Source**

Aggregate material for this project would primarily be obtained from the existing Sylvan Pass pit within the park. About 40,000 metric tons of aggregate material would be used for the Canyon Junction to Fishing Bridge road improvement. In addition, about 33,000 metric tons of select borrow presently stockpiled at the Grebe Lake pit would be used. Limited road base material would be obtained by recycling asphalt removed from the existing road.

## **Staging, Stockpiling, and Disposal Sites**

Staging and stockpiling areas would occur at pullouts within the project area, Sylvan Pass, and the Canyon incinerator site. The incinerator site is located near the government corrals on the west side of the road, just north of the intersection of the Hayden Valley road and the South Rim Drive. Pullouts within the project area would be limited because of visitor use needs. The asphalt hot-mix batch plant would be located at the Sylvan Pass pit, or the Grebe Lake pit. Material excavated from the Sylvan Pass pit would also be processed and stockpiled at the same location. Aggregate material and asphaltic concrete would be hauled from the Sylvan Pass pit via the East Entrance road to the construction site on the Hayden Valley road. Waste material from the project would be disposed of at the Canyon ballfield disposal site and/or the Lake transfer station disposal site.

## **Reclamation/Revegetation**

Reclamation and revegetation following established guidelines set in Appendix A, *Vegetation Management for Construction in Yellowstone National Park*, would be funded and implemented as part of this proposed road improvement project. The park policy is to conserve topsoil and salvage vegetation for reclamation of disturbed areas.

During construction, topsoil from ditches and parking areas would be salvaged, stored in windrows, and reused during reclamation to reduce long-term soil loss, erosion and promote revegetation. No imported topsoil would be used in reclamation. Borrow and aggregate materials and construction equipment would be carefully checked to avoid the importation of exotic vegetation. Requirements to eliminate or mitigate exotics from construction equipment and materials are discussed in Appendix A. Indigenous native plant materials would be used for revegetation, and areas disturbed by construction would be monitored for early detection and removal of exotic species. Standard, approved erosion control techniques and structures would be used during and after completion of construction. Human-disturbed areas contributing sediment to surface waters as a result of construction activities would be promptly stabilized and revegetated to maintain water quality.

## **Geology/Thermal Features**

Thermal features have created openings in the pavement at two parking areas along the Hayden Valley road. These occur at Sulphur Caldron and Mud Volcano. Only the opening at the Mud Volcano would be repaired (see description above). No other thermal design features would be required for this project.

## **Wetlands and Waters of the United States**

No fill material would be placed in natural wetlands. No additional culverts would be added and only one existing culvert would be replaced and re-installed in the original location. Some ditch wetlands will be impacted during ditch cleaning and re-contouring actions. However, consistent with National Park Service policy, there would not be mitigation needed for ditch wetlands, (incidental artificial wetlands). There would be no wetlands affected that are within the Army Corps of Engineers "jurisdictional" authority.

## **Wildlife**

Construction employees would be given instruction on safety in areas frequented by bison, elk, and other large mammals found in the area to avoid potential wildlife/human conflicts.

## **Threatened and Endangered Species**

Much of the project area is in prime grizzly bear habitat. To mitigate the effect of human activity on bears along the road corridor during and following construction activities, the following actions would be incorporated as part of the proposal.

All project-related employees, such as contract and government construction employees, would be given orientation on how to avoid disturbing or encountering bears and how to minimize unavoidable effects or encounters. Orientation would include information about park regulations regarding food storage, disposal of garbage and other bear attractants, and approaching or harassing wildlife.

Material sources within the park would be limited to areas within the construction limits for the project.

At staging areas, no long-term food storage or garbage retention would be permitted. Only bear-proof garbage cans would be used in designated staging or construction-related sites and emptied regularly.

No employee or contractor camps would be permitted outside of existing park developed areas. If contractor employee housing were allowed within the park, ranger patrols would be increased to enforce food security regulations.

If carrion or associated bear activity is documented in the project vicinity, site-specific use restrictions may be imposed.

Because of the nature of wolves to travel widely, there is potential for wolf activity in the project area. The project stipulations outlined for grizzly bears would include an orientation on wolves.

## **Cultural Resources**

Historic properties (including archeological sites and historic structures and features) that have been determined to be eligible for the National Register of Historic Places would be protected and preserved according to the 1993 programmatic agreement (PA) "*Programmatic Agreement Among NPS, ACHP, Wyoming SHPO, Montana SHPO, for Principal Park Road System Improvement, Yellowstone National Park*" (NPS 1993d). Protective measures and proposed mitigation are discussed below.

## Alternatives Considered

A plan for treatment of prehistoric sites was developed by the Midwest Archeological Center (NPS 1993a). This plan provides general guidance for resource-sensitive treatment and protection strategies. The proposed roadwork and staging areas have been designed to avoid historic properties that are eligible for the National Register, including archeological sites and historic road features. In addition, appropriate stop-work provisions and provisions for borrow sources and stockpile areas would be included in the project specifications to minimize potential impacts on historic and archeological resources discovered during construction activities.

Discovery procedures have been developed according to the provisions of the road PA, and outline the process to be followed in the event of an inadvertent discovery. Work limits would be defined in areas near historic properties to prevent inadvertent damage to sites. Sensitive design, monitoring of construction, and definition of work limits would prevent any adverse project impacts.

### **Scheduling of Work Activities**

Road construction is expected to occur primarily in late spring through fall. Total road closure is not feasible, however periodic night closures or a 24-hour road closure may occur. Dig-outs would be scheduled during low-use periods and/or half-width construction would be used to minimize traffic delays. All construction delays and closures would be coordinated with other roadwork occurring in the park. A detailed traffic control plan would be developed as a contract stipulation. There may be up to 30-minute delays from 5:00 a.m. to midnight, then up to 60-minute delays from midnight to 5:00 a.m.

Grizzly bears are known to have dispersed use in the project area. Use is primarily dependent on the availability of winter-killed carcasses and elk calves in the spring. Because there is no way of knowing when or where this activity would occur it would be treated on a case-by-case basis.

### **Visitor Information**

Some visitors would encounter traffic delays because of road paving activities. Park staff would develop and implement a public information program to alert people to closures and projected delays.

### **Construction Stipulations and Mitigation**

Measures to mitigate the adverse environmental and cultural resource impacts of this alternative have been incorporated into the road design. These measures are intended to avoid, minimize, or rectify impacts as described in 40 CFR 1508.20. Additional mitigating measures to protect resources are described below.

### **Other Stipulations**

Some contractor employee housing and offices could be provided within the park in existing park housing/administrative areas. A contractor camp to be used on multiple construction projects may be built at Canyon, and an EA has been prepared for the proposed camp.

During construction, standard erosion control precautions, as outlined under Section 204 of *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects* and

## Alternatives Considered

stipulated in the contract specifications, would be implemented. Sediment and other pollution would be controlled on site so that it did not enter nearby streams or creeks.

Any use of or association with hazardous materials would require contractor compliance with applicable federal, state, and local laws, codes, ordinances, and regulations. In addition, the *Yellowstone National Park Hazardous Materials Response Plan* (NPS 1993c) would be followed to mitigate potential hazardous material incidents within the park boundary and similar incidents outside the boundary requiring mutual aid.

A stormwater pollution prevention plan would be prepared and incorporated into design and specifications, to control sediment on site so that it would not enter nearby streams and creeks. The Federal Highway Administration would develop a pollution prevention plan with the Wyoming Department of Environmental Quality under the National Pollution Discharge and Elimination System (NPDES) Stormwater Management Program.

Equipment would not be serviced or refueled near streams; parking and staging areas would be at least 46 meters (150 feet) from streams or riparian areas. Fuel would be stored in fuel trucks or aboveground storage tanks, and all fuel storage would be in staging areas.

Water for construction/dust abatement would be pumped from surface waters at Otter Creek or the Yellowstone River near Otter Creek. Water trucks and equipment used for water pumping would be cleaned according to Yellowstone National Park standards for preventing the spread of whirling disease and mud snails.

A mitigation program designed to minimize fugitive dust from construction activities would be implemented. No chemicals would be used in dust abatement. Dust abatement would include watering of disturbed areas. Vehicle traffic would be managed within the construction zone, and contractor hauling of materials, supplies, and equipment would be controlled.

## **Project Cost**

Implementing this alternative, including material excavation and processing, road construction, and reclamation would require approximately \$4 to 5 million (2001 dollars).

## **ALTERNATIVE B: No Action**

No modifications to base structure, pavement, slopes, pullouts, parking areas, guardrails, or signs would occur on the Hayden Valley road in the near future. Existing use and maintenance of the road and ancillary features would continue. Maintenance activities such as pothole patching, periodic chip-and-seal coat applications, and removal of rockfall and slumping debris would increase. No additional pullouts would be paved or formalized. Road maintenance activities would require an increasing proportion of park funds. If continued deterioration were allowed, the road might need to close in the future. That would occur if the road became unsafe, and there was not adequate maintenance funding available to repair damaged areas.

### **Design Recommendations**

This No Action Alternative would not require any new designs to be implemented. Routine maintenance would continue on this road segment until eventual reconstruction, ten to fifteen years in the future.

### **Areas of Roadway to be Excavated**

No dig-outs would occur and problems associated with poor base material, such as frost heaves, potholes, and cracking of pavement would continue to occur.

No repairs to the base structure of the road would occur at the Buffalo Ford/Nez Perce Ford area. The saturated base materials would continue to cause problems with road pavement due to severe frost heaving in this area. An increasing amount of effort and funding would be required to keep this portion of the road passable.

### **Ditches**

Under this alternative only routine ditch cleaning would occur. Ditches that have silted in over the span of many years would not be reshaped and rehabilitated.

### **Culverts**

The cleaning of culverts would occur under this alternative. However there would be limited park resources that would allow only a few culverts to be cleaned each year. Many culverts would continue to function improperly until additional funds and resources could be secured in the future.

### **Wall Repairs**

The dry-laid wall south of the LeHardy rapids pull-out would continue to deteriorate, and possibly fail. The road would continue to tip slowly towards the river and the cost to accomplish repairs would rise with each subsequent year that repairs are delayed.

### **Curbs**

No curbs would be replaced and their function of controlling erosion and containing vehicles would be compromised more so as time would pass.

### **Signs**

No changes to signs along the road would occur.

## Alternatives Considered

### **Eroding Slopes**

The two slopes near the road intersection to the Brink of the Upper Falls would continue to erode. Eroded material would continue to clog ditches and require continually increasing maintenance to keep ditches and the road clear.

### **Pullouts and Parking Areas**

No paving or formalization of the existing gravel or dirt pullouts would occur. The current parking areas would not receive resurfacing.

### **Mud Volcano Parking Area**

The hole in the parking area at Mud Volcano would not be repaired. Safety issues associated with the improper radiuses at the southern intersection of the parking area would not be addressed.

### **Sulphur Caldron Parking Area**

This parking area would not have an asphalt overlay applied and no barrier rail would be constructed between the road and pedestrian area.

### **Grizzly Overlook**

No improvements would be made under this alternative. The overlook would not be overlaid with asphalt and a rail would not be constructed.

## **Intersections**

### **Canyon Junction**

Maintaining the current road-striping layout would be accomplished on a periodic maintenance basis as needed.

### **Intersection Aprons**

No aprons would be paved. Small rocks and gravel would continue to scatter out onto the Hayden Valley road, as vehicles pull out from adjacent side gravel roads and turnouts.

## **Material Source**

None required for this alternative.

## **Staging, Stockpiling, and Disposal Sites**

Existing pullouts along the road segment would be used for staging of equipment used in periodic patching and minor repairs to roadway.

## **Reclamation/Revegetation**

There would be no reclamation efforts specific to road projects in this area. Revegetation would not be required due to lack of disturbance to existing conditions.

Alternatives Considered

## **Geology/Thermal Features**

There would be no changes to any thermal or geologic features.

## **Wetlands and Waters of the United States**

There would be no change to wetlands.

## **Wildlife**

Activities related to maintenance work would continue on this road. Existing personnel have received and would continue to receive wildlife safety training related to their jobs.

## **Threatened and Endangered Species**

No actions would be proposed that would affect grizzly bears, lynx, whooping cranes or bald eagles with this alternative.

## **Cultural Resources**

This alternative would have no impact on the prehistoric and historic archeological sites located within the area of potential effect of this undertaking.

## **Scheduling of Work Activities**

Although only periodic routine maintenance would occur, there may be short-term spring or summer road closures to accomplish those repair activities. Delays of 30 minutes may occur. There would be future needs for road closures of several days if such repairs were required.

## **Visitor Information**

Road condition information would be relayed to park visitors via the park's morning reports, and posted as is currently done in campgrounds and visitor centers.

## **Construction Stipulations and Mitigation**

None required for this alternative.

## **Other Stipulations**

None would be required.

## **Project Cost**

In the *State of the Park* (NPS 1999c) report, it was stated that approximately \$210,000 per year would need to be spent in future years to keep this road segment open, passable, and in good driving condition. This amount of money would be needed for sign upkeep, patching and minor overlays of pavement, crack sealing, chip sealing, bridge and retaining wall maintenance, ditch and culvert maintenance, and pavement striping. This expenditure estimate assumes that the road has

## Alternatives Considered

been recently rebuilt and is in good condition. However due to funding shortfalls, road maintenance efforts have not kept up and roads like Hayden Valley have greatly deteriorated.

## **Alternatives Considered but Rejected**

### **Material Source Alternatives**

Sources outside the park, at distances of about 140 kilometers (87 miles) from the project site, were considered impractical because of long haul distances, travel time, increased traffic congestion, road deterioration, potential for accidents, possible exhaustion of these material sources, and high transportation costs.

A number of alternative material sources were considered. Several in-park sources identified in the *Parkwide Road Improvement Plan* (NPS 1992) were sampled and tested by the FHWA. All sources failed to meet one or more of the following criteria: material quality, based on current federal specifications; minimal geothermal effects; and area of potential disturbance less than area of reclamation.

The environmental effects of extracting in-park material sources would generally be comparable to those of extracting outside the park because both in-park and out-of-park sources are in the greater Yellowstone area and have comparable natural and cultural resource components and attributes. Compliance and reclamation requirements would have been similar to those for actions occurring off of park lands.



**TABLE 1: SUMMARY OF POTENTIAL IMPACTS OF ALTERNATIVES**

<b>Impact Topic</b>	<b>Alternative A (Preferred)</b>	<b>Alternative B (No Action)</b>
<b>Soils/Vegetation</b>	Approximately 0.3 to 0.5 hectares (0.75 to 1.25 acres) of disturbance to soil and predominantly non-forested vegetation would occur. There would be short-term impacts to Tweedy's rush and thread rush in disturbed ditches until they re-establish. There would be minimal direct mortality to individual plants where informal pullouts would be improved.	Negligible impacts to roadside soils and vegetation from vehicles using informal pullouts and maintenance activities would continue.
<b>Hydrothermal Resources</b>	No drilling or excavation of road base materials would occur in the Mud Volcano/Sulphur Caldron area.	No impacts to hydrothermal features would occur. The hole in the parking area at Mud Volcano could continue to grow.
<b>Wetlands and Other Waters of the U.S.</b>	No wetlands other than some ditch wetlands would be disturbed.	Same as Alternative A.
<b>Air Quality</b>	Localized, negligible effects on air quality would be short-term and limited to the duration of construction	No new impacts would occur.
<b>Wildlife</b>	No large increase in vehicle speeds would occur; so the rate of road-kills would not be expected to increase. Some localized and short-term displacement of wildlife during construction activities would occur.	Road-kills would continue to contribute to wildlife mortalities; however, road-kills are expected to remain low. There would be negligible, short-term displacement due to road maintenance activities.
<b>Fisheries and Aquatic Resources</b>	Potential for short-term sediment increases, but would be mitigated with erosion control plan.	No new impacts would occur.
<b>Amphibians and Reptiles</b>	Negligible adverse effects to amphibians (Columbia spotted frogs) at Buffalo Ford/Nez Perce Ford.	No new impacts would occur.
<b>Threatened and Endangered Species</b>	This alternative would have "no effect" on grizzly bear, gray wolf, lynx, bald eagle, or whooping crane.	Same as Alternative A.
<b>Prehistoric and Historic Archeological Resources</b>	Archeological site 48YE243 would be monitored during construction.	Sites would continue slow deterioration from erosion and use of informal pullouts.
<b>Socioeconomic</b>	In the short-term, some visitors would be inconvenienced by road construction activities including 30-minute delays, and one-hour delays from midnight to 5a.m. Most businesses within the park would not be negatively affected to a noticeable degree. Businesses and	Continuing the current situation in the project area would not improve visitor experiences and would expose visitors, staff, and their property to increasing risk of injury and damage. Although the cost of road improvements would be avoided in the

Alternatives Considered

<b>Impact Topic</b>	<b>Alternative A (Preferred)</b>	<b>Alternative B (No Action)</b>
	<p>individuals located outside the park should be affected only minimally. The regional economy would be enhanced by construction expenditures of approximately \$4.5 million and other spending induced by this work on the park road system.</p> <p>Long-term benefits would result from improved safety, a smoother and wider surface, and more enjoyable experiences for motorists. The tourism segment of the economy would be more secure by improvements to the road system in Yellowstone. Park operations would improve because of reduced road maintenance costs, and a safer roadway. Short-term costs to visitors would be offset by short- and long-term benefits.</p>	<p>short-term, those savings would be achieved at the threat of moderate to major damage to life and property, and much greater operational expenditures in the long run. On-going maintenance and safety problems would not be resolved.</p>

## **ENVIRONMENTALLY PREFERRED ALTERNATIVE**

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that "[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
- Preserve important historic, cultural, and natural aspects of our heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
- Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Given the above criteria, Alternative A was determined to suitably fit the balance that is required to be met as the environmentally preferred alternative. Alternative A best preserves and enhances cultural and natural resources over the long-term. Re-paving the road at the existing width, with additional pullouts also formalized, best meets the national environmental policy expressed in NEPA (Sec. 101(b) to fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

Alternative B, the No Action Alternative, would not strike the balance between public safety and preservation and repair of features.

## **AFFECTED ENVIRONMENT**

### **Regional Context**

Yellowstone National Park encompasses about 890,312 hectares (2.2 million acres) primarily in northwestern Wyoming and extending into Idaho and Montana. The park has a surfaced road system of about 531 kilometers (330 miles); roads enter from the north, northeast, east, south, and west and connect to the historic Grand Loop Road, a figure-eight road system (see the Vicinity map page 2). The park road system was originally surfaced and paved before the beginning of World War II. Most roads have since deteriorated to the point where routine maintenance can no longer preserve them or provide visitors with safe and enjoyable driving experiences.

Yellowstone National Park is at the heart of the region known as the Greater Yellowstone Area. The area comprises almost 4,856,247 hectares (12 million acres) and is one of the last largely intact ecosystems in the world's temperate zone. In addition to Yellowstone, the area contains two other national park system units — John D. Rockefeller, Jr., Memorial Parkway and Grand Teton National Park. Portions of seven national forests — Gallatin, Custer, Shoshone, Bridger-Teton, Targhee, Beaverhead-Deerlodge, and Caribou — are within the Greater Yellowstone Area, as are two units of the national wildlife refuge system, the National Elk Refuge and Red Rocks Lakes National Wildlife Refuge. Although public lands make up the majority of the area, state and private lands are also included. The area extends across portions of 17 counties in three states. Yellowstone's size and the number of geopolitical entities at the federal, state, and local level combine to create a complex administrative environment within the Greater Yellowstone Area.

### **Road Use and Character**

The Hayden Valley road generally follows the western banks of the Yellowstone River from Canyon to Fishing Bridge. Views of the river are common from many vantage points along the road. Wildlife such as bison, elk, bear, pelicans and swans are regularly seen.

In 1992 there was an annual Average Daily Traffic (ADT) of 1,860 and a seasonal ADT of 6,210 on this Hayden Valley road segment. Primary activities of visitors using this road segment currently include wildlife viewing, photography, fishing on portions of the Yellowstone River, bird watching, and picnicking.

### **Pullouts and Parking Areas**

There are currently 68 pullouts along this road segment. Of these, 50 are paved and 18 are informal graveled pullouts. Many of the informal pullouts are narrow, have steep cross slopes, or are located in areas of poor sight distances.

## **Natural Resources**

### **Geology, Topography, And Soils**

Yellowstone National Park is mainly a volcanic plateau varying in elevation from about 1,610 meters (5,300 feet) along the Yellowstone River in Montana to 3,460 meters (11,360 feet) at Eagle Peak along the eastern boundary of the park in Wyoming. Mountains surround the plateau except to the southwest, where the plateau descends to the lower Snake River plains of Idaho. The park encompasses mountains, canyons and valleys cut by streams flowing from the Continental Divide. Elevations along the Hayden Valley road range from 2,344 meters (7,690 feet) in the Hayden Valley bottom to over 2,652 meters (8,700 feet) on the surrounding plateau. However, the road follows a fairly flat grade, changing just a few hundred feet over 24 kilometers (15 miles). The entire Hayden Valley road is within the 630,000-year-old caldera associated younger rhyolite flows and ring-fracture zone. Parts of Hayden Valley contain layers of very fine sand, silt, and clay several tens of feet thick that accumulated along the bottom of a large lake. This lake formed behind a glacial dam across the Yellowstone River near Upper Falls. Some of the glacial dams broke and released water catastrophically, causing giant floods; the occurrence of one such flood is particularly evident along the Yellowstone River valley near Gardiner, Montana (USGS 1976). The ancestral Hayden Lake left behind deposits to form the rolling, grassy hills of today's Hayden Valley (Good and Pierce 1996).

### **Hydrothermal Resources**

Thermal features that occur along the Hayden Valley road include Sulphur Cauldron and Mud Volcano, which also contain a dense collection of thermally influenced wetlands in the area (see Wetland Resources discussion below). There have not been thermal influences to the roadway itself. However two adjacent parking areas have had portions of pavement give away, creating holes in the surface of the pavement. In both cases wooden barricades have been placed around the openings to keep traffic and pedestrians away.

### **Vegetation**

The vegetation along the road corridor from Canyon Junction to Fishing Bridge Junction is characterized by extensive meadows interspersed among the lodgepole pine forest that dominates the Yellowstone Plateau. The forest occurs primarily at the northern and southern portions of the road segment with the characteristic understory of elk sedge, grouse whortleberry and various forbs. An extensive sagebrush steppe occurs in the Hayden Valley, dominated by Idaho fescue with many additional grasses, sedges, and forbs. Several streams with extensive associated wetlands punctuate Hayden Valley. Most of the road segment parallels the Yellowstone River and intersects various wetlands associated with the river and tributaries.

The valley bottom was once an arm of Yellowstone Lake (Fritz 1985). When the lake receded, fertile lacustrine deposits were left behind on the valley floor (Graham 1978). Flora in the valley consists of shrubs, forbs, grasses, and sedges. Numerous graminoid-

## Affected Environment

dominated wetlands are present in the valley. The forested plateau surrounding Hayden Valley is dominated by lodgepole pine (*Pinus contorta*) that occur on infertile rhyolite soils (Despain 1990). Spruce-fir stands are interspersed throughout areas of more favorable moisture regimes such as pond margins, north slopes, and drainages (Graham 1978).

### Rare Plants

There are no federally listed or candidate (Category I) plant species that occur in the park. However, there are two endemic plant species that occur only in Yellowstone Park, Ross' bentgrass, *Agrostis rossiae*, which occurs in geothermal areas along the Firehole and in the Shoshone Geyser Basin, and Yellowstone sand verbena, *Abronia ammophila*, which is restricted to sandy lakeshore around Yellowstone Lake. Neither species was found along this segment of road. Ute ladies'-tresses, *Spiranthes diluvialis*, Ross' bentgrass, *Agrostis rossiae*, and Yellowstone sand verbena, *Abronia ammophila*, were not located along the road segment.

Plant species of special concern are those species that have been recognized by the state heritage programs as being rarely encountered within the state. Because Yellowstone occurs near the state boundaries of three states, Wyoming, Montana, and Idaho, all three state lists were consulted through the primary emphasis was on surveying for Wyoming plant species of special concern.

Prior to the rare plant survey along the Hayden Valley road segment the only species of special concern known to occur along this section of road was *Haplopappus macronema* var. *linearis* that had been previously observed along the road (NPS 2000c). A total of four species of special concern occur along the Canyon Junction to Fishing Bridge Junction road segment: *Haplopappus macronema* var. *linearis*, *Juncus filiformis*, *Juncus tweedyi*, *Lonicera caerulea* var. *caurina*. The survey resulted in the mapping of the boundaries of 57 sites within the road corridor where one or more of these species occur.

During the summer of 1999, the road from Canyon Junction to the Fishing Bridge Junction was surveyed for rare plants. Because the road project is an overlay (3R) project, the focus was to locate rare plant populations immediately adjacent to the road. The road shoulders of the entire road segment were walked on both sides. In addition, several areas proposed for expansion of pullouts were surveyed to 61 meters (200 feet) from the center of the current road alignment. Picnic areas and road pullouts were surveyed immediately adjacent to the area of disturbance in order to locate any plant populations that might be adversely affected if minor adjustments to the parking area or picnic area were implemented.

### Wetlands and Other Waters of the United States

Surveys to determine wetland delineations were accomplished in both the 1999 and 2000 field seasons (NPS 2000a). The results were 239 jurisdictional wetlands within the 30.5-meter (100-foot) limit along the 24.8-km (15.1 miles) of highway between Canyon Junction and Fishing Bridge Junction. Three types of wetlands were encountered: (1) naturally occurring non-thermal wetlands, (2) naturally occurring thermally influenced wetlands, (3) human-influenced wetlands. The naturally occurring wetlands exhibited four (Cowardin et al. 1979) classes of wetlands: Palustrine/Emergent (PEM),

## Affected Environment

Palustrine/Forested (PFO), Riverine/Lower Perennial (R2) and Riverine/Upper Perennial (R3) with several variations within these types. The PEM and PFO wetlands occurred along the Yellowstone River floodplain and were representative of abandoned river channels, floodplain wetlands, or seeps along the river terraces. The R2 wetlands represented the Yellowstone River streambed or gravelly stream banks. The R3 wetlands were along small creeks that fed the Yellowstone River. The thermally influenced wetlands were fumaroles, mudpot, hot and warm springs, and associated thermal barrens. They were of two classes: Palustrine/Unconsolidated Bottom (PUS) and Palustrine/Emergent (PEM). The human influenced wetlands were wetlands formed in roadside ditches and wetlands altered by the imposition of road culverts during earlier road construction. The wetlands covered a total of 77.58 hectares (191.71 acres). Of this total, 44.39 hectares (109.70 acres) were contained within the high water mark of the Yellowstone River and 34.49 hectares (85.23 acres) were outside of the Yellowstone River. Human-influenced wetlands (ditch wetlands-incidentals artificial wetlands) numbered 30 and covered a total of 0.60 hectares (1.49 acres).

Data was described in two road segments within the report, as survey results were tabulated separately for each field season's road segment accomplished. The portion of road from Canyon Junction to 4.8 kilometers (three miles) south of Mud Volcano area had a total of 214 wetland sites. There were 25 jurisdictional wetlands within the 30-meter (100-foot) limit along the 6.8 kilometers (4.2 miles) of highway between Fishing Bridge and a point 4.8 kilometers (three miles) south of Mud Volcano (NPS 2000a).

## Air Quality

Air quality and visibility are generally excellent. Yellowstone is a mandatory Class 1 area where air quality degradation is unacceptable under the Clean Air Act of 1977. Acid precipitation is monitored at Tower, and ozone, sulfur oxides, and fine particulates are monitored at Lake. Carbon monoxide conditions are monitored at the West Entrance. There are seasonally high amounts of carbon monoxide at the West Entrance. Additional information on Yellowstone's air quality can be obtained from the National Park Service's Air Resources Division publication *Assessment of Air Quality and Air Pollutant Impacts in National Parks of the Rocky Mountains and Northern Great Plains* (Peterson and Sullivan 1998).

## Wildlife

### Overview

Park personnel accomplished an evaluation of road-killed large and small mammals, and threatened and endangered species along the Canyon Junction to Fishing Bridge Junction (NPS 2000d). A variety of large mammals are known to make use of the Hayden Valley area, including bison (*Bison bison*), elk (*Cervus elaphus*), moose (*Alces alces*), mule deer (*Odocoileus hemionus*), whitetail deer (*Odocoileus virginianus*), grizzly bear (*Ursus arctos*), black bear (*Ursus americanus*), mountain lion (*Felis concolor*), wolves (*Canis lupis*), and coyotes (*Canis latrans*).

Small mammals observed along the road corridor include badger (*Taxidea taxus*), beaver (*Castor canadensis*), red fox (*Vulpes fulva*), pine marten (*Martes americana*), porcupine

## Affected Environment

(*Erethizon dorsatum*), river otter (*Lutra canadensis*), and long tail weasel (*Mustela frenata*) (NPS 2000d).

This report shows that from 1989 to 1998, 1,106 large mammals were hit and killed by vehicles on primary paved roads within all of the park. Of these, 56 large mammals were hit and killed on the Canyon Junction to Fishing Bridge road corridor, an average of six per year (+/- 3 standard deviation).

### **Number of Different Species of Large Mammals Hit and Killed by Vehicles on the Canyon Junction to Fishing Bridge Junction Road in Yellowstone National Park, 1989-1998**

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Bison	2	1	4	3	3	3	3	5	2	0	26
Coyote	0	0	0	2	0	1	1	2	0	0	6
Elk	1	2	2	1	0	1	0	0	0	0	7
Moose	2	0	0	0	0	1	0	0	1	1	5
Mule Deer	1	1	3	2	1	1	0	1	2	0	12
<b>Total</b>	<b>6</b>	<b>4</b>	<b>9</b>	<b>8</b>	<b>4</b>	<b>7</b>	<b>4</b>	<b>8</b>	<b>5</b>	<b>1</b>	<b>56</b>

Source: (NPS 2000d pg. 10, summarized)

During the same period (1989-1998) incident reports listed two pine marten, one badger, one porcupine, and one snowshoe hare that were hit and killed on this road segment. Many more small mammals were probably hit and killed by vehicles but were not reported, and there is no similar reporting system as for large mammals.

## **Birds**

Researchers in the summer 2000 field season conducted bird inventories that consisted of point counts, aerial surveys, and incidental observations. A total of 62 bird species were detected during the point counts. This is one of the most diverse roads for birds in Yellowstone National Park. American robin, yellow-rumped warbler, common raven, ruby-crowned kinglet, and Lincoln's sparrow were the most easily detected and abundant species found along this road segment.

The following species were also detected along the Canyon to Fishing Bridge road segment: osprey, trumpeter swan, peregrine falcons, northern goshawk, great gray owl, long-eared owl, sandhill crane, Swainson's hawk, and short-eared owl. All species mentioned above were observed foraging/ hunting within the confines of the study area, but not one of these species were found nesting within the immediate proximity of the road (NPS 2000b).

The ornithological assessment conducted during the summer of 2000 noted that there was a mud flat habitat associated with the confluence of Alum Creek and the Yellowstone River in the Hayden Valley. The report stated that the sand bar/mud flat habitat was critical for migrating shorebirds and represents some of the most important shorebird habitat in Yellowstone National Park. These mud flats were most likely created when the road was built through the Hayden Valley, backing sediment upstream or west of the road. These mudflats are historical and date back to the 1920s. Shorebirds have also historically used this area as a stopover point during migration (NPS 2000b).



**Canyon Junction to Fishing Bridge Junction  
Species Richness and Abundance (Based on 33 census points)**

American Robin	26	Western Tanager	2
Yellow-rumped Warbler	20	American Wigeon	2
Common Raven	15	Red-tailed Hawk	2
Ruby-crowned Kinglet	15	European Starling	2
Lincoln's Sparrow	12	Western Meadowlark	2
White-crowned Sparrow	12	Trumpeter Swan	2
Savannah Sparrow	12	Swanson's Hawk	2
Dark-eyed Junco	12	Sora	2
Common Merganser	10	Killdeer	2
Spotted Sandpiper	10	Warbling Vireo	2
Canada Goose	9	Clark's Nutcracker	2
Lesser Scaup	8	White-winged Crossbill	1
Cliff Swallow	7	Hermit Thrush	1
Mountain Chickadee	7	Western Grebe	1
Pine Siskin	7	Sand Hill Crane	1
Barrow's Goleneye	7	White-breasted Nuthatch	1
Chipping Sparrow	6	Northern Pintail	1
Brown-headed Cowbird	6	MacGillivary's Warbler	1
Common Snipe	5	Northern Shoveler	1
Mallard	4	Green-winged Teal	1
Mountain Bluebird	4	California Gull	1
Vesper Sparrow	4	Bank Swallow	1
American Crow	4	Great Blue Heron	1
American White Pelican	4	Red-winged Blackbird	1
Gadwall	3	Brewer's Blackbird	1
Bufflehead	3	Red Crossbill	1
Northern Flicker	3	Hairy Woodpecker	1
Bald Eagle	3	Tree Swallow	1
Sage Thrasher	3	Osprey_	1
Brewer's Sparrow	3	Cassin's Finch	1
Gray Jay	2	Black-capped Chickadee	1

Source: (NPS 2000b)

**Fisheries and Aquatic Resources**

Fish, both native and introduced, are an important component of the park's animal life. When explorers first visited Yellowstone, the vast majority of lakes, and most streams above major waterfalls or cascades, were devoid of fish. As a result of stocking for increased angling opportunities in early park years, the Yellowstone fisheries is now comprised of 12 native and five introduced species. These include the native westslope and Yellowstone cutthroat trout, longnose dace, arctic grayling, longnose sucker, and the introduced brown, brook, and rainbow trout. This mixture provides high-quality angling opportunities for visitors as well as food for birds, otters, grizzly bears, and other wildlife.

Rivers and creeks that flow through the project area are the Yellowstone River, Otter Creek, Alum Creek, Trout Creek, and Elk Antler Creek. Within the proposed project area, fisheries consist primarily of Yellowstone cutthroat trout, longnose dace, and an occasional

## Affected Environment

lake trout. There are numerous pullouts that provide convenient access to the Yellowstone River, a favored fishing site. Rivers and creeks in this area, where open to angling, are the most heavily fished areas in the park. The Yellowstone River is closed for fishing for 9.7 kilometers (six miles) in the heart of the valley, to prevent wildlife displacement.

Streams and lakes in Yellowstone are designated as Class 1, Outstanding Resource Waters, by the State of Wyoming. Class 1 waters are anti-degradation waters, which means that existing water quality must be maintained.

### **Amphibians and Reptiles**

Reptiles and amphibian species found on this section of road were documented by a field study in 1999 (Patla 1999). Of the ten species of amphibians and reptiles found in the park, four species of amphibians were found in or near the study area in 1999. Blotched tiger salamanders (*Ambystoma tigrinum melanos*) are widespread and common in North America and in portions of Yellowstone National Park. They breed in ponds or lakes in sagebrush flats, meadows, or forests. Adults spend most of their time under the ground surface, in rodent burrows or burrows of their own excavation, which may be hundreds of feet from aquatic habitat (Koch and Peterson 1995).

Western (boreal) toads (*Bufo boreas boreas*), are widespread in North America, but declines in several parts of their range have been noted in the past ten years. They breed in lakes, permanent and ephemeral ponds, slow streams and river backwaters. In Yellowstone, high pH and high conductivity generally characterize breeding sites, and many breeding sites are geothermally influenced.

Boreal chorus frogs (*Pseudacris triseriata macular*) are widespread and common throughout much of North America, and are widespread and common-to-abundant in many parts of Yellowstone National Park. Chorus frogs breed in shallow bodies of water with emergent vegetation.

Columbia spotted frogs (*Rana pretiosa*) range from northwest Wyoming to southern Alaska. Throughout much of the Pacific Northwest the spotted frog population of the main portion of the species range (including YNP) appears to be doing well and is no longer considered a candidate for the endangered species act. Spotted frogs breed in a variety of shallow-water habitats, including temporary pools, ponds, and lake edges. Adult and juvenile frogs forage in wet and moist meadows and along the edges of ponds, lakes, and streams.

One reptile species, wandering garter snake (*Thamnophis elegans vagrans*) is documented by a single (previous) record. These are common-to-abundant throughout their range in western North America and they are the most widespread and common reptiles within Yellowstone National Park. Wandering garter snakes are usually found in the vicinity of water, and communally hibernate, often in rocky areas with a southern aspect.

This 1999 field study found 31 amphibian sites. Ten of these sites were 30 meters (98.43 feet) or less from the existing road, including five breeding sites.

**Site Number Summary for Historical and Previous Records and 1999 Survey  
Observations of Amphibians and Reptiles along the Grand Loop Road in YNP,  
Canyon Junction to Fishing Bridge Junction**

Species	Historical and Previous Sites	1999 Survey Sites	Totals	Remarks
<b>Blotched Tiger Salamander</b>	3	3	5	1 site in common from previous survey
<b>Boreal Toad</b>	2	2	3	1 site in common
<b>Boreal Chorus Frog</b>	4	20	22	2 sites in common
<b>Spotted Frog</b>	8	16	22	2 sites in common
<b>Wandering Garter Snake</b>	1	0	1	
<b>TOTAL</b>	<b>11</b>	<b>31</b>	<b>34</b>	

(Patla 1999 page 10)

## Threatened and Endangered Species

During the ten-year period, 1989 through 1998, no grizzly bears, gray wolves, lynx, or other species of mammals listed as threatened, endangered, nonessential experimental or candidate were hit and killed by vehicles on the Canyon to Fishing Bridge Junction road corridor (NPS 2000d).

### Grizzly Bears

In 1983 the Interagency Grizzly Bear Committee (IGBC) was formed to ensure that the six ecosystems identified as grizzly bear recovery areas were managed in ways that would help grizzly bear recovery. The *Grizzly Bear Recovery Plan* (USFWS 1993) guides the recovery effort.

The greater Yellowstone grizzly bear population is the second largest of the recovery populations and is estimated to have a minimum of 280-610 bears (Eberhardt and Knight 1996). Grizzlies range over 2.2 million hectares (5.5 million acres) within the greater Yellowstone ecosystem; with nearly 40 percent of this range (0.9 million hectares or 2.2 million acres) within Yellowstone National Park. Yellowstone's bear management program is directed toward preserving and maintaining the grizzly bear population as part of the park's native fauna, while providing for visitor safety. Recovery and management of the grizzly bear is of the highest priority.

From 1986-1999 there were 649 reported sightings of grizzly bears within 500 meters (1,640 feet) of the Canyon Junction to Fishing Bridge Junction road corridor. The sightings occurred all along this stretch of road (NPS 2001d).

### Lynx

A biological assessment of Canada lynx activity and habitat included the evaluation of the Canyon to Fishing Bridge road (NPS 2000e). While there are historical records of lynx within the greater Yellowstone ecosystem, and the project area contains habitat suitable for lynx, this assessment found no sign of lynx. Five scent stations were placed along sections of the road corridor, and left out to provide a total of 140 total nights coverage of detection

## Affected Environment

time in the fall of 1999. In addition, researchers sought to document the presence or absence of snowshoe hare, which can make up from 35 percent to 97 percent of the lynx diet. However, no observations or sign of snowshoe hares were made. This does not establish with complete assurance that lynx are not present in these areas, as habitat potentially suitable for lynx is near all road corridors. There is a historical sighting, made by an inexperienced observer in January 1981, west of the Mud Volcano area.

### **Bald Eagle**

Bald eagles are found year-round along the stretch of the Yellowstone River that parallels the Canyon to Fishing Bridge road. Although three bald eagle nests have been located in the general vicinity of this study area, all nests are found a minimum of 1.6 km (one mile) from this road and hidden in heavily forested timber (NPS 2000b).

### **Whooping Crane**

Whooping cranes have been occasional summer residents of Yellowstone. At present no whooping crane population is in the park. The single individual from the Gray's Lake experiment currently resides west of the park in Idaho. In recent years this crane has summered in the southern half of the park. This crane is the last of the initial experiments, to cross-foster whooping crane eggs under sandhill crane nests, at Gray's Lake in Idaho. Whooping cranes were not found during field surveys (NPS 2000b).

### **Gray Wolf**

Wolves in the Yellowstone area are designated as an experimental population, and therefore no areas are designated as critical habitat for wolves (USFWS 1994). Human-caused mortality and availability of prey are the two most limiting factors for wolf populations (Mech 1970). To date, most human-caused mortality of wolves in the Greater Yellowstone Area has come from management removals (mostly related to livestock depredations), illegal kills (from poaching), and by collisions with vehicles. Within Yellowstone National Park, there has been no mortality of wolves due to either management removals or illegal kills. Nine wolves within the park have been killed in collisions with vehicles. Prey species for wolves are considered abundant in the park, with elk being the primary prey species.

As of December 2000, 164 to 169 wolves comprised of 16 groups or packs inhabit the Greater Yellowstone Area. At this time 57 wolves were radio-collared within Yellowstone National Park; 73 wolves were collared in the Greater Yellowstone Area. Wolves travel widely and do not appear to be disturbed by human presence, except during denning. Wolf pups are generally born in late March to May.

From 1995-1999, there were two reported sightings of wolves within 500 meters of the Canyon Junction to Fishing Bridge Junction road corridor. The sightings occurred at Otter Creek and Elk Antler Creek (NPS 2001d).

### **Candidate or Proposed Species**

The Yellowstone cutthroat trout is a native fish species present in the Yellowstone River petitioned for listing under the Endangered Species Act (50 CFR Part 17). A status review conducted in 2000 determined that the species was not eligible for listing on either threatened or endangered species lists. National Park Service management goals mandate protection and restoration of native species.

## Affected Environment

It has been determined that fluvial Arctic grayling meet the criteria to be a candidate species to add to the list of threatened and endangered wildlife and plants. However, this species has not been found in the Yellowstone River or other creeks in the Hayden Valley.

## Cultural Resources

### Prehistory

Early humans have occupied and used the greater Yellowstone area for more than 11,000 years, and possibly as long as 13,000 years. The earliest archeological evidence of use of Yellowstone National Park (YNP) dates back to almost 10,000 years before the present (b.p.) when small groups of Paleoindians are thought to have moved through the area hunting large game animals, and likely fishing, as evidenced by lakeside campsites. By about 7,500 years ago, major environmental changes greatly altered the range and quantity of plant and animal species. Archaic groups adapted to these changing conditions by developing new lithic technologies and by hunting small game and increasing their use of gathered wild plants. From around 3000 BC to AD 1600, prehistoric groups such as McKean, Pelican Lake, and Avonlea cultures utilized the area now within Yellowstone National Park and its resources, leaving behind archeological traces of campsites, some with food processing areas, quarries, and lithic workshop areas. Once again the climate cooled and, during the period known as the Little Ice Age (AD 1450 to AD 1850), archeological evidence indicates there was significantly less use of the area than the preceding 1,000 years. Yellowstone has material remains of cultures whose core areas were the Great Plains, the Great Basin, and the Intermountain Plateau.

### History

A number of tribes are known to have used this area historically, including the Crow and Blackfeet, both of whom had early treaty interests in the greater Yellowstone River drainage area. Early Euroamerican explorers documented summer occupation of areas within the park by Shoshonean-speaking bands known as "Sheepeaters" and occasioned upon raiding bands of Blackfeet during the early and middle nineteenth century (Haines 1977). By 1840, the great bison herds west of the continental divide had been decimated and some native peoples began traveling through Yellowstone National Park and the surrounding area in search of the bison herds to the north and east of YNP. The Hayden survey party, undertaking the first mapping of Yellowstone National Park, found the Bannock (and Shoshone) traveling through YNP on ancient trails. The Nez Perce, in their flight of 1877 also traveled through YNP on ancient trails. With the creation of reservations around 1868, the remaining Native Americans were moved out of the park to the Wind River, Shoshone, Lemhi, and other reservations.

Today the tribes who are affiliated with Yellowstone National Park, and with whom consultation occurs on a semi-annual basis, are (listed in alphabetical order): Assiniboine and Sioux Tribes of Ft. Peck; Blackfeet; Cheyenne River Sioux; Confederated Tribes of Salish & Kootenai; Couer d'Alene tribe; Crow; Crow Creek Sioux; Eastern Shoshone; Flandreau Santee Sioux; Gros Ventre & Assiniboine; Kiowa Tribe of Oklahoma; Lower

## Affected Environment

Brule Sioux; Nez Perce of Lapwai, Nespelem, and Colville; Northern Arapaho; Northern Cheyenne; Oglala Sioux, Rosebud Sioux, Shoshone-Bannock; Sisseton-Wahpeton Sioux; Spirit Lake Sioux; Standing Rock Sioux; and Yankton Sioux.

During the latter part of the nineteenth century, Euroamericans homesteaded in the upper Yellowstone area. Increasing numbers of explorers, scientists, and visitors publicized Yellowstone's resources and scenery, leading to formal establishment of the area as Yellowstone National Park in 1872 under the Department of the Interior. Conflicts with the Nez Perce and Bannock Indians, combined with inadequate funding and personnel needed to control poaching and vandalism, resulted in transfer of park management to the United States Army in 1886. Early park management (the Army, and after 1918 the National Park Service) helped to shape the philosophical direction for the park. This philosophy carried over into design and construction of visitor facilities, including roads, stage stops, resorts, hotels, camps, and dumps. Included in this construction were numerous structures built in a style that has come to be known as rustic architecture. Examples include the Old Faithful Inn, the Norris, Madison, and Fishing Bridge Museums, and the Northeast Entrance Station, all National Historic Landmarks.

Development of the Yellowstone road system was a crucial element in park management and the growth of area tourism. The Grand Loop Road was the first large scale designed, planned system giving people access into the "scenic splendors" of the park. This effort by the Army Corps of Engineers created a national road in an isolated region at a time when American road building was in its infancy. The massive scope of the project, the extraordinary engineering problems posed by the climate and area geology, and the difficulty of transport and logistics made this a landmark effort. Additionally, the techniques pioneered for the building of roads in a wilderness setting established precedents for later construction all over the nation.

The Yellowstone road system was initiated in 1877 when Superintendent Philetus Norris proposed a route or bridle path running along the Gibbon River from the north entrance at Mammoth Hot Springs to the west entrance, to provide access to all of the major points of interest on the west side of the park. By the end of 1880, Superintendent Norris had completed the first wagon road access to Hayden Valley using a route over Mary Mountain. Six kilometers (four miles) of road were also constructed between Trout Creek and Alum Creek to provide access to Sulphur Mountain. In 1883, Lieutenant Dan C. Kingman, U.S. Army Corps of Engineers, came to Yellowstone and began a systematic approach to building roads in the park, establishing the first park road standards. The first wagon road providing access to Hayden Valley was constructed using a route from the Upper Geyser Basin on the Firehole River over Mary Mountain to the Yellowstone River at the north end of Hayden Valley. In 1886 a new route between Norris and Canyon was constructed to replace the road over Mary Mountain.

Lieutenant Hiram Chittenden took over the responsibility of road construction in 1891 with one of his first projects being the road from the Grand Canyon of the Yellowstone to West Thumb via the Yellowstone River and Yellowstone Lake. By 1892, the road from Canyon Junction to Yellowstone Lake was completed. Between 1906 and 1908 repairs were made

## Affected Environment

to the wagon road and by 1912, the park administration began considering improvements that would be necessary to bring the park roads to standards that would accommodate automobiles. Also in 1912, oil and water tanks were placed in various locations along the road for dust abatement, a 30-foot timber truss-bridge was built over Alum Creek, and a trestle bridge with pile bents and wooden stringers was recommended for replacing the wooden Otter Creek Bridge. On August 1, 1915, the first automobiles were allowed into the park. In 1917 the recommendation was to reroute the Lake to Canyon road via Sulphur Mountain, from Trout Creek, utilizing an old road.

In 1926 the National Park Service and the Bureau of Public Roads signed a Memorandum of Agreement relating to the survey, construction, and improvement of roads in the national parks. In 1931-32 a location survey report was prepared for the Lake Junction to Canyon road with the Bridge Bay to Mud Volcano segment of road being reconstructed first. Grading and base surfacing projects in the Canyon area were begun in 1949, and, in 1957, base and top surfacing of the Lake to Canyon Junction road, including construction of adjacent parking areas, was undertaken as part of the MISSION 66 program.

The Canyon Junction to the Fishing Bridge Junction segment of the Grand Loop Road takes visitors on a journey between the grandeur of the Grand Canyon of the Yellowstone and the expansive vistas of Yellowstone Lake. The route runs along the Yellowstone River passing through the abundant wildlife in Hayden Valley and the thermal features at Mud Volcano.

## Documentation of Cultural Resources

Although the undertaking (the resurfacing of the current alignment) is not expected to impact areas outside the footprint of disturbance of previous road construction, inventory and documentation of the prehistoric and historic archeological sites was undertaken to document and identify each site's eligibility to the National Register. Section 110 of the National Historic Preservation Act of 1966, as amended, requires this to be done prior to discussion of the effect of the undertaking, addressed under Section 106 of the same act. The Yellowstone River area is rich with evidence of prehistoric use. The current road alignment bisects or abuts numerous prehistoric and historic archeological sites.

Early archeological research in the park generally was limited in scope and confined to non-systematic inventory. The first professional archeological investigation in Yellowstone National Park was conducted, in part by J.J. Hoffman (Montana State University - Missoula), and identified prehistoric archeological sites along the Yellowstone River in the Hayden Valley. The State University of New York-Albany conducted archeological inventory in Hayden Valley and the Chittenden Bridge area in 1980, and the Midwest Archeological Center conducted an archeological inventory and site testing in the Fishing Bridge area. An additional archeological inventory was conducted in conjunction with the Canyon water treatment facility.

In anticipation of the repair of the Canyon Junction to Fishing Bridge Junction segment of road, archeologists intensively inspected the ground surface extending 100 meters (328

## Affected Environment

feet) on each side of the existing roadway. Areas with lithic or historic ground scatter were shovel tested to ascertain the presence, or absence, of buried cultural material. Archeological inventory of this road segment was conducted in three episodes. The Office of the Wyoming State Archaeologist completed the inventory of the north portion of the road corridor in 1995. The inventory of the west side of the remainder of the highway completed in 1998. The inventory of the east side of the road was conducted in 1998 by the Museum of the Rockies in conjunction with the Yellowstone River inventory research project. Archeological inventory and site documentation were also conducted in 1999 at the Otter Creek Bear-Feeding Station and access road (NPS 2000f).

National Register (NR) testing of 12 prehistoric archeological sites that are bisected by the current road alignment was conducted in 1999 by the Office of the Wyoming State Archeologist. Further NR testing of eight prehistoric sites adjacent to the existing alignment, and two historic sites in staging and wetland mitigation areas, was conducted by the Office of the Wyoming State Archaeologist in 2000.

A systematic survey of the bridges, drainage structures, and other historic features of the road was conducted in 1995. Documentation of the historic bridges, retaining walls, box culverts, masonry culvert headwalls, and other landscape elements of this segment of the Grand Loop Road was combined with information from the historic resource study, *The History of the Construction of the Road System in Yellowstone National Park, 1872-1966* (Culpin 1994). This information provided the documentation necessary to evaluate the historic road as eligible for the National Register and define the Grand Loop Road Historic District.

Dr. Larry Loendorf and Dr. Peter Nabokov compiled the ethnographic overview and assessment of Yellowstone National Park. The final draft is presently being prepared for publication. The ethnographic overview and assessment is used to help identify traditional cultural properties that might be located in the project area. In the early planning phases of this project, the park initiated consultation with Native American tribes through scoping letters and during tribal consultations held every spring and fall with the 24 tribes affiliated with Yellowstone National Park.

## Description of Cultural Resources

All prehistoric and historic archeological sites and historic structures, including road features, were documented and evaluated for eligibility for listing on the National Register of Historic Places. Consultation with the Wyoming State Historic Preservation Officer provided concurrence for those NR eligible archeological sites and structures found within the area of potential effect (APE) along the roadway between Canyon Junction and Fishing Bridge Junction. The table in the Environmental Consequences section itemizes the NR eligible sites within the area of potential effect, describes the affect of the project on the site, and identifies any compliance needed.



## **Prehistoric Archeological Sites**

The park's prehistoric archeological sites provide evidence of human occupation in this area for approximately 10,000 years. These tangible remains provide the only viable means of understanding past cultures which lacked written records, and provide the basis for continued scientific research. The road corridor through Hayden Valley parallel to the Yellowstone River, is an ancient travel corridor and is rich in prehistoric archeological sites from the Paleoindian, Archaic, McKean, and Pelican Lake cultures. The NR-eligible prehistoric sites located adjacent to, or bisected by, the existing road corridor are listed below.

Prehistoric site 48YE446 is located west of the road and contains several buried cultural levels radiocarbon 14 dated to 4380 years before present (b.p.) and 8550 years b.p.

48YE445 is a prehistoric lithic surface scatter with buried cultural deposits located between the Yellowstone River and the current road alignment. Pelican Lake period (between 3000 to 1800 years b.p.) diagnostic tools were recovered from this site.

Bisected by the road, two sites (48YE448 and 48YE415) are large buried prehistoric sites with evidence of multiple use by prehistoric peoples as far back as 8500 years ago. Scottsbluff tools were recovered from buried levels at both sites.

Prehistoric site 48YE659, also bisected by the current road alignment, contains buried cultural levels containing Middle Archaic diagnostic tools.

Charcoal from a buried hearth yielded a date of 3210 years b.p. at site 48YE240. This prehistoric site is bisected by the road and is a large site extending to the Yellowstone River.

A large multi-component site bisected by the road and extending to the Yellowstone River, 48YE243 consists of prehistoric buried components containing diagnostic tools indicating Paleoindian, Early Archaic, and Middle Archaic use. The site also contains a historic component, the ruins of a cabin, possibly the Mud Geyser Soldier Station.

48YE241 is a large prehistoric site adjacent to the road on one side, the Yellowstone River on the other side, and contains buried cultural material. Non-destructive testing of obsidian recovered from buried levels at this site revealed that some of the obsidian came from Bear Gulch, located in the Centennial Mountains of northeastern Idaho.

48YE545 is another large prehistoric site adjacent to the road on the west side with buried cultural deposits containing tools diagnostic of the Late Prehistoric and Archaic periods.

Buried cultural deposits at prehistoric site 48YE244 yielded tools from the Pelican Lake, Middle Archaic, and Late Prehistoric cultures. This site is bisected by the road and abuts the Yellowstone River.

## Affected Environment

48YE304 is a very large habitation and lithic workshop site with buried components dates ranging from the earliest Paleoindian habitation of YNP to Late Prehistoric use. The site is bisected by the Canyon Junction to Fishing Bridge Junction road, the East Entrance road, and various utility corridors.

There are numerous prehistoric archeological sites in the vicinity of the road but outside the area of potential effect of this undertaking. The Yellowstone River inventory, a research project funded by grants and donations and not part of the Grand Loop Road reconstruction undertaking, provides documentation of many of these sites. An archeological inventory of the Hayden Valley completed in the 1950s provides additional information on prehistoric sites in the vicinity. There would be no impact to prehistoric archeological sites located in the vicinity of the road corridor.

## Historic Archeological Sites

Yellowstone's historic resources reflect a number of significant historical themes, including the growth of tourism, Yellowstone as a "proving ground" for America's national park system, Army protection and management of the park's resources, and the park's pioneer road transportation system. The *Archeological Treatment Plan for the Yellowstone Federal Highways Projects, Historical Archeological Resources* (NPS 1993b) was developed at the beginning of the 20-year road improvement program, and provides guidance in identification, interpretation, and excavation of Yellowstone's historic archeological sites. There are two historic sites located within the area of potential effect of the Canyon Junction to Norris Junction road resurfacing project. Field documentation of both sites was completed in 2000 by the Office of the Wyoming State Archaeologist. Additional archival research was conducted on both sites and, although both sites are determined ineligible by the NPS, WYSHPO review of the site documentation and comment on NR eligibility of the sites is in the process of being completed.

Site 48YE155 is the historic Canyon transportation compound, which is located on the east side of the current road alignment. The site was initially utilized by the Yellowstone National Park Transportation Company to store and service stagecoaches in the 1890s, then used to store and service the White Motor Coaches in the 1920s and 1930s, and later, the diesel buses. The transportation complex was razed in the 1960s with near total obliteration of the structural remains. Because of the extensive disturbance with loss of integrity, the site is considered ineligible. The portion of this site located within the road corridor was recorded previously and that portion was determined ineligible for the NR with the WYSHPO comment that if project impact to the site extended further than the current road corridor, the entire site should be further investigated and documented. In anticipation of the obliteration of several small segments of roadway/pathways, removing artificial barriers and providing for the restoration of wetlands within the site boundary to their original condition, site disturbance may be unavoidable. The site has lost integrity and is not eligible for the NR.

The historic Canyon incinerator site, 48YE23, is located on the service road to the government corrals. This historic dump, including the site of the incinerator facility where

## Affected Environment

all area garbage was burned, contains historic surface debris dating from 1903 to 1950. The incinerator was constructed in 1929 and used until World War II, when the NPS was short of manpower to operate the incinerators. The utility was demolished in 1949 and afterwards parts of the site graded to level. A portion of this site was originally documented in the 1989 post fire inventories of burned areas within the park. Additional archival research was completed and the site recorded by the Office of the Wyoming State Archeologist (OWSA) in 2000. WYSHPO concurred with YNP in determining that this site had lost integrity due to demolition and grading and, therefore, was not eligible for the National Register. The site is being considered for construction staging and stockpile use during the resurfacing of the Canyon Junction to Fishing Bridge Junction road segment.

The Otter Creek Bear Feeding Station (48YE927), constructed in the 1930s was a popular tourist attraction in the 1930s and 1940s where hotel garbage was fed to the bears on a regular schedule. During its height as many as 600 cars used the facility each day. An abnormally large concentration of bears in the area became dangerous and the site was closed in 1942 with the grandstand and feeding structures being razed in 1946. The Otter Creek Bear Feeding Station and access road have been documented and are considered by the NPS as not eligible for the National Register. The site is in the vicinity of the road construction project and would not be impacted by the resurfacing of the road.

There are numerous historic dumps in the vicinity of the road but located outside the road corridor. They contain trash and debris left behind from various episodes of road construction, Civilian Conservation Camps, hotels, tourist camps, and army camps. Also in the vicinity of the Canyon Junction to Fishing Bridge Junction road is the site of the famous and much photographed Canyon Hotel, designed by renowned architect Robert Reamer. A fire destroyed this hotel, and associated structures, in the 1960s. The short Crystal Falls road, between the North Rim Drive and the Artist Point Road, is the location of other historic structures since removed. No work would be done on this road. Historic sites within the vicinity of the road resurfacing would not be affected.

## **The Historic Road System**

The Canyon Junction to Fishing Bridge Junction portion of the Grand Loop Road Historic District has been determined eligible for the National Register of Historic Places. As a component of that historic district, the bridges, culverts, stone walls, and other historic structural components of the road are important contributing features.

The early wagon and auto roads utilizing various alignments along the Yellowstone River corridor to connect the Canyon area to Yellowstone Lake were constructed by the NPS with the assistance of the Army Corps of Engineers and later reconstructed by the Bureau of Public Roads. The earliest road providing wagon access from the Old Faithful area, over Mary Mountain, into Hayden Valley is still visible and used as a hiking trail. The Mary Mountain Road 48YE781, has been partially documented and determined eligible for listing on the National Register in 1994 as part of the reconstruction of the Madison to Biscuit Basin segment of the Grand Loop Road Section 106 compliance. The historic Mary

## Affected Environment

Mountain wagon road terminates at the west end of the service road north of Trout Creek and, thus is not within the area of potential effect of this project.

Some abandoned portions of previous road alignments between Canyon and Yellowstone Lake are still visible although they are not eligible for the National Register due to lack of distinctive engineering and composition features. Although not always completely possible, obliteration and re-vegetation of former roadbeds was a deliberate practice during the 1920s and 1930s in an effort to restore the abandoned road corridors to their natural setting. The historical significance of the Canyon Junction to Fishing Bridge Junction road, also known as the Hayden Valley Road, is derived from the overall site, setting, and the long-standing function of conveying visitors to special places within the park. The importance is not in the width, alignment, surfacing, or traffic patterns, or in the roads appearance during the historic period.

The road structures and features of the Hayden Road have been documented and are considered eligible and contributing to the National Register significance of the Grand Loop Road (48YE520).

The Otter Creek Bridge (48YE797) is the only historic bridge located within the Canyon Junction to Fishing Bridge Junction road segment, and is eligible for the National Register. It has been documented using the Historic American Engineering Record (HAER No. Wy-32). The bridge is an arched concrete deck girder type with concrete abutments and was constructed by Charles M. Smith in 1935. The bridge is in fair condition, experiencing some spalling of the concrete. Other than resurfacing of the bridge pavement, no repairs would be done on the bridge.

The historic features of the Canyon Junction to Fishing Bridge Junction segment of the Grand Loop Road include six segments of dry-laid stepped retaining walls. All six retaining walls are located on the east side of the road, along the west banks of the Yellowstone River. They range in height from 0.61 meters to 15 meters (2 feet to 50 feet), and in length from 37.5 meters to 113 meters (123 feet to 370 feet). All are constructed of coarse rectangular fieldstone. Five of the walls are in good condition with one wall displaying bulging and slumping on the lower segment of the wall. Although repair of retaining walls is generally not undertaken as part of a resurfacing project, repairs or support to the slumping portion of the wall is currently included in this project. The slumping center portion of the wall would be carefully disassembled with the stones being conserved for re-stacking after the material behind the wall is stabilized. The appearance of the historic dry-laid stone wall would remain as originally constructed.

There are three pair of masonry box culverts; 134 type A culverts (mortared stone headwalls with a single culvert pipe); one type B culvert (drop inlet); seven type C culverts (mortared stone headwalls with wing walls); one type D culvert (mortared stone headwall with double culvert pipes); and five type E culverts (with stone flumes). Also located along this road segment are three stone flumes not associated with culverts, one segment of stone curbing, and one timber drainage structure. The resurfacing of the road would not include repairs to drainage structures except in areas of road base failure due to poor drainage.

## Affected Environment

These isolated incidences of culvert repair would be done in accordance with the guidelines set forth in the programmatic agreement with stone structures being documented, dismantled, repaired and reconstructed to provide a similar appearance.

## The Cultural Landscape

According to the National Park Service's *Cultural Resource Management Guideline* (NPS 1997), a cultural landscape is

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

Thus, cultural landscapes are the result of the long interactions between people and the land; the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by historical land-use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past; a visual chronicle of its history. The dynamic nature of modern human life, however, contributes to the continual reshaping of cultural landscapes; making them a good source of information about specific times and places, but at the same time rendering their long-term preservation a challenge.

The road system in Yellowstone National Park represents the continuing design philosophy first recognized by the Army Corps of Engineers, and later expanded upon by the landscape architects of the NPS, in which the designed features impart to the visitor a feeling of "blending with nature." The road and its features are considered part of the landscape rather than separate from the landscape, and as such, the road has evolved into a historic landscape. The design of the Grand Loop Road system was intended to provide the visitor with scenic and interesting views as well as access to the geysers and other places of special beauty in the park. The designed features such as the guardrails and guardwalls, culverts, embankments, and designed pullouts are considered part of the system, and impart to the visitor a feeling of "blending with nature."

The use of the road has remained the same, but a historic landscape is not static and changes to meet the needs of visitors and to improve with advancing technology. Other changes in the road system demonstrate the impacts of weather and geology. The continuation of the earlier design philosophy in most cases has produced a modern road system with a high degree of feeling.

The road from Canyon Junction, through Hayden Valley along the Yellowstone River to Yellowstone Lake is truly a scenic delight. This segment of road is one of the most popular bison viewing areas, providing ample opportunity to photograph the majestic animals. Elk commonly spend time "lounging" in the tall grass, both black bears and grizzly bears are abundant along the river corridor, and fishing birds frequent the area. The road provides access to the Mud Volcano/Sulphur Cauldron walks and viewing areas that constitute the historically constructed cultural landscapes.

## **Socioeconomic Environment**

### **General**

Yellowstone plays a prominent role in the social and economic life of the Greater Yellowstone Area. Gateway communities have developed outside the park's five entrances — Cody, Dubois, and Jackson in Wyoming, and Cooke City/Silver Gate, Gardiner, and West Yellowstone in Montana. The Montana gateway communities are on the immediate border of the park or within a few miles. The Wyoming gateway communities are an hour's drive or more from the park's boundary.

The gateway communities provide food, lodging, medical services, groceries, gasoline, other automotive supplies/services, gifts, souvenirs, and other goods and services to the public. The availability of services varies from community to community. Quantity and quality of services depend on the size of the community and the volume of traffic passing through. The gateway communities are relatively small. The link between tourism and all the gateway communities is evident. Remote areas the size of these local communities would not have the types and number of permanent and seasonal businesses if they were not located near Yellowstone National Park and did not have access to the visitors the park attracts. The economic viability of the gateway communities depends heavily on the recreation and tourism traffic that is generated by Yellowstone and other public recreation destinations. The flow of traffic through the park, in turn, depends on the maintenance and improvement of the park's road system. Gateway communities understand this relationship.

The 2000 Census documented the following gateway populations: West Yellowstone, MT (pop 1,177); Gardiner, MT (pop 851); Cody, WY (pop 8,835); Jackson, WY (pop 8,647); and Dubois, WY (pop 962). All of these areas' populations increase in the summer with tourism.

Throughout the Greater Yellowstone Area, public lands provide the basis for much of the economic activity (recreation, mining, forestry, and agriculture) that occurs within the region. During the last few years many communities in the area have experienced a structural change in their economies. The communities are now less dependent on extractive industries (mining and timber) that are subject to boom-and-bust cycles.

Less than two percent of Yellowstone National Park is developed. Park infrastructure includes utilities, trails, roads, employee housing, administrative headquarters, and visitor services facilities in various areas throughout the park. The total developed area has decreased in recent years, as park managers have removed some developments from resource areas and other developments have been consolidated.

The large volume of visits the park receives each year has resulted in Yellowstone National Park being the focus of much of the economic activity in the area. Within the park itself economic activity is concentrated at six locations along the road system: Fishing Bridge, Lake Village, and Bridge Bay; Canyon Village; Tower/Roosevelt; Mammoth Hot Springs; Old Faithful; and Grant Village. A wide range of services including campgrounds, food,

## Affected Environment

gas, lodging, transportation, horse and boat rentals, and medical services are provided by the private sector through concession contracts. The park's developed areas are established near popular, scenic features of the park. These developed areas evolved because of the need for goods and services within the park by the visiting public, the administrative and operational needs of the park, and the distance and isolation from other goods and services.

Peak summer NPS employment (permanent and seasonal) averages approximately 750 persons (2000 figures). Most of these people and the majority of over 3,600 employees hired by concessioners during the summer season live in the park. Park staff and concessioner employees make up several small communities centered on the above park locations plus six other smaller developments.

Canyon and Fishing Bridge are near the terminus of each end of the project area. Canyon is comprised of government facilities including maintenance areas, employee housing, a visitor center, and a ranger station. Concession facilities include overnight lodging, food service, two stores, gift shops, a campground, public showers, a public laundry, horseback rides, and employee housing. Fishing Bridge/Lake Village is comprised of a government administrative area, employee housing, and a visitor center. Concession facilities include a RV-only campground with a shower, laundry, and small store. Nearby facilities include a food service, a general store, a service station, and an auto repair shop.

Visitor use and economic activities supporting this use are highly seasonal. June, July, and August are the months of highest use; with 50 percent of the park's visitation arriving in July and August. The shoulder-season months, May and September, receive less use but the volume is still heavy. Use in the winter months is relatively low, accounting for about six percent of the overall visitation. In the late 1980s and early 1990s, winter use grew 10 to 15 percent annually, reaching more than 140,000 in 1992-93. In 1996-97, winter use had dropped to approximately 113,000. The winter of 2000-2001 saw winter use back up to 139,000.

In 2000 the park received in excess of 2.8 million recreational visits, and visitation during the past decade has ranged from 2.8 million to 3.14 million. These visits represented more than one million vehicles entering the park and using the road system within the six-month period from May through October. The West Entrance accounted for approximately 37 percent of the vehicles, and the North Entrance provided access for approximately 19 percent of the total. The Northeast Entrance was the least used, providing for little more than one-twentieth of the total traffic entering the park. The remaining amount was split between the South and East Entrances, with the South Entrance receiving slightly more.

## **Parkwide Road Conditions and Use**

Five park entrance roads lead into the Grand Loop Road, which is the main road providing access to the interior of the park. The seasonal nature of park use is dictated by climate and local weather patterns. During the winter season snow covers the road system. Park roads are closed from approximately November 1 to late April. Most snow-covered roads are currently open for snowcoach, snowmobile, and cross-country ski use. The only exception



## Affected Environment

is the road through the park that connects Gardiner and Cooke City, Montana. This 89-kilometer (55-mile) road is plowed to allow wheeled vehicles winter access to both Cooke City and Silver Gate, Montana.

Nearly 529 kilometers (329 miles) of park roads are open to the public and are intended to accommodate various types of vehicles. Everything from bicycles to commercial tour buses uses the roads. A moratorium was placed on additional bicycle tours in 1998. Great stress is also placed on some segments of the road system by the large numbers of tour buses that regularly come to the park. A fully loaded tour bus can have axle weights exceeding those of a loaded logging truck. Commercial truck traffic is prohibited from using park roads as thoroughfares. However, some large trucks and equipment must pass through the park to provide the goods and services required by the visiting public. Maintaining the facilities and roadways in the park also requires equipment, vehicles, and personnel using these same travel routes. Emergency vehicles such as fire trucks, ambulances, and tow trucks also use the road, and snowplows, snow blowers, and graders are used on plowed roads. Snow removal to open the roads for the summer season requires a variety of snow removal equipment to remove snow depths up to 6.0 meters (20 feet) and the ice layers at pavement level.

Many segments of the park's road system are paved to a width of 6.0 to 7.23 meters (20 to 24 feet) with no discernible shoulders. Recreational vehicles up to eight feet six inches wide with side mirrors extending out another 45.7 cm (18 inches) on each side are common throughout the park. Automobiles, recreational vehicles, and pickup trucks are the most common vehicles on the roads. Visitors frequently bring their recreational trailers, or boat trailers into the park. The existing poor road condition is the result of a variety of factors: increased number of vehicles, heavy vehicles, poor road materials, inadequate ditching and drainage structures, winter use that contributes to the frost depth, and inadequate width to protect against rockfall. The lack of cyclic maintenance including chip and seals, overlays, ditching and shoulder maintenance, inadequate and poorly constructed pullouts, and age have resulted in potholed, frost-heaved, soft, cracked, rutted roads. Rockfall, weather, wildlife, and other unforeseen conditions also add to the hazards of driving.

Accidents occur more frequently on two-lane, narrow, winding roads with poor surface conditions and obstructions close to the travelway. The present road system has numerous segments that meet all of these criteria. The guidelines in the *Park Road Standards* (NPS 1984) present design criteria to provide a safe travel route for visitors. Emphasis is placed on width to accommodate vehicle numbers and types; and grades, sight distances and consistency criteria are presented to address safety concerns. Some accident causes include large vehicles swerving to avoid vehicles that have crossed the centerline as a result of avoiding potholes or animals, or careless drivers whose attention drifts to view an animal or scenic view, or a driver riding the centerline for fear of dropping off the edge of the road.

Traffic patterns that are hard to equate in normal traffic terminology include vehicles parked in the middle of the road, doors open and driver and passengers by the side of the road or in the woods observing wildlife. One car becomes two, two becomes three, and soon there is a traffic jam more commonly known in park terminology as a "wildlife jam".

## Affected Environment

Designing pullouts to allow the traffic to pull off the road to observe the wildlife is difficult when the feature is moving. The road becomes the parking area. The narrower road widths do not provide a width that allows the traffic to move to the shoulder and still allow other vehicles to travel through the congestion. The lack of a shoulder also does not provide a safe area for pedestrians to observe wildlife. In an attempt to pull to the side of the road, vehicles destroy vegetation as well as damage the road edge. Wildlife jams can sometimes result in gridlock of the roadway as well as create hazards from having vehicles stopped in areas with poor sight distances.

### **Canyon to Fishing Bridge Road Conditions and Use**

The Canyon to Fishing Bridge section of the Grand Loop Road is a primary north to south connector in the transportation network in the park. The road provides access to various natural features along this route as well as provides opportunities for hiking, wildlife viewing, picnicking, and other recreational activities. The road from Canyon to Fishing Bridge is an integral part of the Grand Loop Road transportation system for both the visitor traffic as well as the support system of suppliers, vendors, emergency services, administrative, maintenance, and other support functions provided by the park concessioners and the National Park Service. The concessioners must restock their food service, grocery operations, and gift shops almost daily during the summer season.

Park Service support includes operations such as garbage pickup, trail and overlook maintenance, hazard tree removal, snow plowing, and road maintenance activities such as pothole patching, ditch cleaning, chip sealing and overlaying. Road maintenance includes the hauling of aggregates and asphalt, and the graders, laydown machines and rollers to place this material. Due to the limited construction season in this mountainous climate, these activities must be performed during the same time as high visitation. This work often disrupts traffic flow and requires coordination of both the park visitors' safety as well as the safety of the workers. The present road creates hazards during these maintenance activities due to limited sight distances and the lack of adequate working room for flaggers, graders, and traffic passing through the area.

The area from Canyon to Fishing Bridge is currently open to over-snow use. The goal is to have the road open to wheeled vehicles from the first week in May to first week in November.

## ENVIRONMENTAL CONSEQUENCES

### Overview

The National Environmental Policy Act (NEPA) requires that environmental documents disclose the environmental effects or consequences of a proposed federal action and any adverse effects that cannot be avoided should the proposed action be implemented. In this instance, the proposed federal action involves road resurfacing between Canyon Junction and Fishing Bridge Junction, as described in this document.

The intent of this section is to provide an analytical basis for comparison of the alternatives and the impacts that would result from implementation of these alternatives. Impact topics have been selected for the analysis based on the potential for effects on significant resources and other key issues identified during planning. This section is based on scientific and analytical review of information collected by the National Park Service and provided by other agencies. Expected impacts are described for each of the alternatives considered.

Regulatory guidelines for implementation of NEPA require an analysis of the cumulative effects of a proposed action as defined in 40 CFR 1508. These guidelines state that a cumulative effect is the effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions.

In addition to determining the environmental consequences of the preferred and other alternatives, National Park Service policy (*Management Policies, 2001*) requires analysis of potential effects to determine whether or not actions would impair park resources. The following analysis of impacts was based upon whether the impacts would be:

- **beneficial** (a positive change in the condition of the resource, or a change that moves a resource toward its desired condition);
- **adverse** (a negative change in the condition of the resource, or a change that moves a resource away from its desired condition);
- **direct** (an effect that is caused by an action and occurs at the same time and place);
- **indirect** (an effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable);
- **short-term** (an effect which in a short amount of time would no longer be detectable, as a resource returns to its pre-disturbance condition; generally less than 5 years);
- **long-term** (a change in a resource or its condition that does not return to pre-disturbance levels and for all practical purposes is considered permanent).

The analysis is also based upon whether the intensity or severity of the impacts are:

- **negligible** (the impact is at the lowest levels of detection);
- **minor** (the impact is slight, but detectable);
- **moderate** (the impact is readily apparent)
- **major** (the impact is a severe or adverse impact or of exceptional benefit).

## Impairment

In addition to determining the environmental consequences of the preferred and other alternatives, National Park Service policy *Management Policies* (NPS 2001a) requires analysis of potential effects to determine whether or not actions would impair park resources.

The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service 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 National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service 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 National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute an impairment. An impact would be more likely to constitute an impairment to the extent it affects a resource or value whose 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 or to opportunities for enjoyment of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

Because the impacts described in the following two alternatives (A and B) do not severely affect a resource or value whose conservation is as described above, there would be no impairment of the park's resources or values.

## **Alternative A (Preferred): Recycle and Overlay the Existing 25.3 Kilometers (15.7 Miles) Hayden Valley Road from Canyon Junction to Fishing Bridge Junction, with Additional Pullouts Paved**

### **Natural Resources**

#### **Geology, Topography and Soils**

Impacts to geology, topography, and soils would result from the placement of minor amounts of fill material and ditch cleaning. Negligible impacts from material being used to increase the size of informal, visitor-created pullouts would result. The total acreage of land disturbed by this project outside the existing road prism (ditch to ditch) would be approximately 0.3 to 0.5 hectares (0.75 to 1.25 acres). The width of some informal gravel pullouts may be increased by a few feet while the length of the pullouts would vary by location. Loss of habitat due to the minor increase in size of the pullouts would be negligible. In the 38 areas that dig-outs would occur, about 2,635 linear meters (8,650 feet) of roadway would be dug out to a depth of about one-meter (three feet). These soils would be replaced with well-draining engineered fill material. No additional disturbance beyond the existing road prism would result. This project would not impair any of these resources within the park.

#### **Hydrothermal Resources**

There are two thermal areas located close to this section of road. The Sulphur Caldron hydrothermal feature is located below road grade, to the east side of the road on the west bank of the Yellowstone River. The Mud Volcano area is located to the west of the road just south of Sulphur Caldron. Neither of these hydrothermal features is located directly under or adjacent to the road and would not be impacted by this road project. No drilling or excavation of the road base materials would occur in either of these two locations. Therefore there would be no impairment to hydrothermal resources in the park.

#### **Vegetation**

The vegetation disturbed by this alternative would consist solely of plants growing in existing ditch lines, or on the fringes of gravel or informal pullouts. There would be a negligible adverse effect to vegetation, with no impairment resulting. A small amount (approximately 0.3 to 0.5 hectares or 0.75 to 1.25 acres) of roadside vegetation would be permanently lost following formalization and addition of new pullouts or parking areas. Much of this habitat has been previously disturbed.

#### **Rare Plants**

Narrowleaf goldenweed, *Haplopappus macronema* var. *linearis*, would be expected to recolonize the roadside after disturbance as long as substrate remains unchanged. Tweedy's rush, *Juncus tweedyi*, and thread rush, *Juncus filiformis*, are both capable of colonizing disturbed sites such as roadside ditches. Currently both species are present in one roadside ditch area. Even though this area would be impacted by ditch cleaning these rushes would

## Environmental Consequences

be expected to reestablish. Western honeysuckle, *Lonicera caerulea*, was found at one site—a single plant along the road— and would not be disturbed by this proposed action (NPS 2000c). There would not be an impairment to rare plants as the result of this alternative.

### **Wetlands and Other Waters of the United States**

Some ditch wetlands (incidental artificial wetlands) would be impacted due to ditch cleaning and reshaping efforts. None of these ditch wetlands are considered jurisdictional wetlands by the Army Corps of Engineers definitions and would not require mitigation. Also, consistent with National Park Service policy, these are not wetlands that would require mitigation. It is expected that many of these ditch wetlands would re-establish themselves over a period of time. Some ditch wetland habitat would be disturbed by ditch cleaning, but is expected to reestablish. No adverse effects to wetlands are anticipated and there would be no impairment to wetland resources in the park.

### **Air Quality**

There would be no significant impacts on air quality or visibility in the park or region; effects would be temporary and limited to the duration of construction. Dispersed dust and mobile exhaust emissions would be caused by truck traffic and equipment activity. Hydrocarbon emissions would occur at the hot mix plant for asphalt concrete production at the Sylvan Pass pit during paving operations. Dust and hydrocarbons would not be in sufficient quantities to degrade park air quality. All contractor activities would comply with state and federal air quality regulations, and contractors would operate under applicable permits. These actions would not constitute an impairment to air quality within the park.

### **Wildlife**

#### **Overview**

The Canyon to Fishing Bridge road segment has a large mammal road-kill rate identical to the parkwide average when compared to paved, primary roads parkwide. Five different species (bison, coyote, elk, moose, mule deer) of large mammals were killed by vehicles on the Hayden Valley road segment. For each of these five species, less than one percent of the estimated total park population were killed annually in collisions with vehicles. A human-caused mortality of less than one percent is not expected to cause a significant negative impact on population decline in these species. As an example, from 1994 to 1999, the subpopulation of bison that summer in the Hayden Valley area averaged 1,745 bison (W.Clark, NPS, Pers. Commun). Vehicles on the Hayden Valley killed less than one percent of this subpopulation each year. Although road-kills occurred fairly evenly all along the canyon to Fishing Bridge road, small concentrations of vehicle/animal collisions were noted just south of the Otter Creek Bridge, and just south of both the Alum Creek and Elk Antler Creek culverts.

Posted speed limits, average actual vehicle speeds, road conditions, road design, adjacent roadside vegetation cover type, and wildlife population numbers (Gunther and Biel 1999) as well as park visitation and mode of transportation (NPS 1999d) all influence the frequency of vehicle-wildlife collisions. Based on the premise that the Canyon Junction to Fishing Bridge Junction road would be resurfaced at its existing width and alignment, it is not expected to result in a significant increase in average vehicle speeds. Therefore, the

## Environmental Consequences

project is not expected to increase the rate of wildlife-vehicle collisions. The project should not have any significant negative impacts on the population numbers of any mammals listed as threatened, endangered, nonessential experimental, or candidate species.

Road-kills would continue to contribute to wildlife mortalities. However, the number of wildlife mortalities on this road are expected to remain low, because there would be no adjustments to the alignment of the road or change in speed limits along the roadway. Some increase in vehicle speeds could occur due to a smoother road surface, but no significant increase in wildlife mortality is anticipated under this alternative.

Food and garbage would be managed to ensure that it was not available to bears or other wildlife. The presence of humans and associated food attractants can lead to wildlife/human conflicts, in particular conflicts with bears, which sometimes requires removal of the animal from a roadside. Orientation sessions, including information on bears and wolves, would be conducted for construction personnel to reduce the potential for conflicts at construction sites and along the project route. Black bears, coyotes, and other animals such as eagles, hawks, owls, foxes, wolverines, and cougar opportunistically make use of available foods, including carrion in the spring.

It is likely that wildlife would be temporarily displaced from habitat adjacent to the road due to construction equipment and activity for the duration of the project. Bears are predominantly active during evenings, night, and early morning time periods. Most observed bear activity along the road corridor was reported in spring and summer seasons, with fewer reports recorded during the fall. Most construction would occur during the late spring to fall months, thus somewhat overlapping the time when bears are most active. Traffic volumes would continue to increase with park visitation and could affect wildlife. However, this effect would be independent of this road project and cannot be accurately measured.

No impacts to elk, bison, or other wildlife populations are anticipated. No increases in wildlife mortalities are expected, as potentially disturbing construction activities would be temporary and confined to the road corridor. All staging or material storage areas would be confined to previously disturbed areas along the road corridor, and construction would not occur during the winter season. Wildlife foraging and reestablishment of migration and use patterns following construction is expected.

No impairment to these wildlife resources would occur as a result of implementing this proposal.

### **Birds**

Ornithological studies revealed none of the following bird species nesting close to the road and stated that birdlife should not be affected by a road overlay. Peregrine falcons, osprey, trumpeter swan, northern goshawk, great gray owl, long-eared owl, sandhill crane, Swainson's hawk, and short-eared owl, although found to be within the confines of the study area, were not found to be nesting within the immediate proximity of the road. Therefore, these species should not be affected by road construction activities (NPS 2000b).

However, bird researchers did report a particular concern with maintaining the sediment load that is created upstream or west of the point where Alum Creek crosses under the

## Environmental Consequences

Canyon to Fishing Bridge road. The report stated: "Removing the culvert or replacing it with a more modern bridge or simply increasing the size of the culvert would flush existing deposited sediment out of Alum Creek and into the Yellowstone River. This action would not only jeopardize water quality, but also some of the most important shorebird habitat in Yellowstone National Park. Maintaining the ecological integrity of the area is highly recommended." No changes to this culvert are proposed as part of this project.

This alternative would not cause impacts that would result in an impairment to birds within the park.

### **Fisheries and Aquatic Resources**

Ditch cleaning and dig-outs to replace substandard road base materials could have the potential to increase sedimentation in the short-term by a negligible amount. An erosion control plan would be in place for this contract. This plan would specify actions and placement of sediment traps to prevent most sediment from reaching any water bodies within the project area. Measures would be in place to prevent spread of exotic species or diseases to fisheries resources by the sanitation of water trucks used for dust abatement. There would be no change to the bridges and culverts on any rivers or creeks that would impede fish passage. No effect on spawning cutthroat would be expected. Actions related to this project would not impair fisheries or aquatic resources.

### **Amphibians and Reptiles**

The specific locations found in Patla's 1999 amphibian survey were later compared to the locations where pullouts would be paved. This was to ensure these populations located close to the road's edge would not be impacted. The amphibian site in the Buffalo Ford/Nez Perce Ford area (sites #22-25) contained Columbia spotted frogs on both sides of the road, though this was not found to be a breeding location (Patla 1999). Road construction activities in this area would have a negligible adverse affect on these populations. Although some sites are close to the road edge, no amphibian breeding sites would be affected. There would not be an impairment to amphibian or reptile resources.

### **Threatened and Endangered Species**

#### **Grizzly Bears**

Grizzly bears require large areas containing a diversity of habitat types. The species thrives best when its habitat is isolated from humans and their activities. Although it can and does adapt to the presence of humans, it has not adapted to intensive use and modification. Park roads within or adjacent to bear habitat can affect bear populations both indirectly and directly (NPS 2001d).

Indirect impacts include reduction of habitat effectiveness due to human-caused displacement of bears from high-quality habitat adjacent to road corridors, habituation, and other behavior modifications. Schleyer (1983) reported that grizzly bears generally avoided areas of human activity and reacted to disturbance by moving elsewhere. Schleyer (1983) also reported that following a disturbance by humans, bears moved a minimum of 3.2 kilometers (2 miles) before stopping and remaining in an area. Human-caused displacement of bears from habitat near recreational developments (Mattson and Henry 1987, Reinhart and Mattson 1990), roads (Green and Mattson 1988), backcountry campsites (Gunther



## Environmental Consequences

1990), and recreational trails in nonforested areas (Gunther 1990) has been documented. Conversely, some bears may not be displaced by human activity along roads, but rather may become habituated to people in an effort to access quality habitat along road corridors. Although habituation may increase the efficiency of bear habitat use in some instances by reducing displacement and minimizing the frequency of energy demanding responses (Jope 1982), it often results in the bear being removed from a population due to concern for human safety (Gunther 1994).

Direct effects include human-caused bear mortality and loss of habitat that is paved during road and pull-out construction. There have been no reports of grizzly bears having been hit by vehicles along the Canyon Junction to Fishing Bridge Junction road segment. However, grizzly bears have been hit and killed on other road segments in Yellowstone National Park in the past (NPS 1999d). Observations of grizzly bears in developed areas of Yellowstone National Park are frequently reported. The actual loss of habitat to bears from the road resurfacing and pullout construction is likely to be minimal.

Human-bear conflicts are caused by bears that have become habituated to people and forage within close proximity to the road. Visitors often approach these bears too closely creating an unsafe situation that requires monitoring by park personnel. This also contributes to the further habituation of bears to people. To prevent bear-human conflicts, proper sanitation of human foods, garbage, and other bear attractants by road construction workers would be required. Road construction employees would also be given orientation programs on how to avoid encounters and minimize disturbance of bears.

Restrictions on construction activity at individual staging /storage areas and work sites would be implemented based on the presence of carrion and bear related activity.

As the road would be resurfaced at the existing width and alignment, it is not expected that the project would greatly increase vehicle speeds. It is not expected that this project would increase the rate of vehicle-wildlife collisions (NPS 2000d).

To mitigate the effect of human activity along the road corridor, during and following construction activities, the following actions would be incorporated as part of the proposal.

All project-related employees, such as contract and government construction employees, would be given orientation on how to avoid disturbing or encountering bears and how to minimize unavoidable effects or encounters. Orientation would include information about park regulations regarding food storage, disposal of garbage and other bear attractants, and approaching or harassing wildlife.

At staging areas, no long-term food storage or garbage retention would be permitted. Only bear-proof garbage cans would be used in designated staging or construction-related sites and emptied regularly.

Employee or contractor camps would be permitted in existing developed or disturbed areas if housing were needed for such employees within the park. Increased ranger patrols would be assigned, as necessary, to contractor camp areas to help patrol for food security.

## Environmental Consequences

If carrion or associated bear activity is documented in the project area, use restrictions may be imposed. These restrictions may result in temporary delays or changes in work schedules for the contractor.

Under this alternative, it is expected that this overlay project would cause a short-term displacement of some bears from near the road during construction. With measures designed and instituted to minimize impacts on grizzly bears in the project area, construction activities would have a determination of "no effect" to the existence of the grizzly bear population in the Yellowstone ecosystem. This action would not constitute an impairment to grizzly bears found within the park.

### **Lynx**

Site surveys conducted revealed no indications of lynx being present in the project area. In addition there have been no road-killed lynx reported on the Canyon Village to Fishing Bridge Junction road and no sign of snowshoe hare was present while conducting the lynx survey, it was concluded that there would be "no effect" on lynx due to this project (NPS 2000e). This action would not constitute an impairment to lynx found within the park.

### **Bald Eagles**

Although bald eagle nests have been located in the general vicinity of this proposed road project, all nests found were a minimum of one mile from the Hayden Valley road and hidden in heavily forested timber. The bald eagle nests identified are well insulated from the road and would not be affected by construction-related activities. Therefore this alternative would have "no effect" on bald eagles, and no impairment would result.

### **Whooping Cranes**

Because this species is not present in the area, this project would have a "no effect" determination on whooping cranes and they would not be impaired by this alternative.

### **Gray Wolves**

Indirect effects to wolves could be caused by heavy equipment and construction that may cause wolves to avoid the road corridor during the period of repair (NPS 2001d). While some wolves may be temporarily displaced from roadside habitat by noise and disturbance of construction activities, wolves travel widely and have not appeared to alter their habits even when being viewed by hundreds of visitors. The project stipulations outlined for grizzly bears would include an orientation on wolves. Similar to bears, if wolf activity occurs in the project area, restrictions on a contractor's activities may be imposed. The proposed road construction is not expected to increase wolf mortality or significantly impact elk or any other species preyed upon by wolves (NPS 2001d). The proposed project would have a determination of "no effect" to gray wolves. There would also be no impairment to wolves as a result.

## **Cultural Resources**

### **Archeological and Ethnographic Resources**

Intensive archeological surveys identified archeological sites along the roadway corridors. Some sites were determined to be not eligible with WYSHPO concurrence. All potentially

## Environmental Consequences

eligible sites identified in the survey process that were bisected by the current road alignment or were located adjacent to the roadway or a parking/pullout area were tested and the National Register eligibility of each site evaluated. Areas to be considered for staging and stockpile of construction materials and equipment were also inventoried and evaluated.

Alternative A, the preferred alternative, is the resurfacing, restoration, and rehabilitation of the driving surface of the present alignment. The road would not be widened and disturbance would be confined to the existing road corridor. There are several areas of the road in need of repair where road failure is due to inadequate drainage. This would be done by digging out the saturated road base and repairing or upgrading the drainage structure. The extent of construction impact for these types of repairs is not expected to extend past the footprint of disturbance of previous road construction. If dig-outs occur within the boundaries of National Register eligible archeological sites, the construction process would be monitored. A drainage and road base repair dig-out is anticipated in the area of prehistoric site 48YE243, in the Buffalo Ford/Nez Perce Ford area. In October of 2000, FHWA geo-technical staff and YNP staff sunk three 14-inch exploratory drill holes through the road surface and road base into the soils beneath to road to ascertain if cultural materials were present under the road base. No cultural materials were recovered. The dig-out in the area of NR eligible site 48YE243 would be monitored to ensure no new impact to the site.

New pullouts would be constructed in areas where survey and subsequent NR testing verified that no prehistoric or historic archeological sites eligible for the National Register would be impacted. The new pullouts would help decrease impact to archeological sites near the road caused by unauthorized parking. The direct physical impact to the archeological sites that lie within the road path would be the same or less than when the road was previously constructed. Archeological monitoring would help ensure that significant sites previously bisected by the Canyon Junction to Fishing Bridge Junction segment of road would not be adversely affected during the resurfacing.

An informant from the Kiowa Tribe of Nebraska, providing information for the compilation of an ethnographic overview and assessment for YNP (still in draft), identified the thermal waters associated with the Dragons Mouth-Mud Volcano area as having connection with a Kiowa creation myth. This undertaking would have no impact on the thermal areas located at or near the Dragon's Mouth/Mud Volcano area or the adjacent landscape.

The 1877 flight of the Nez Perce people through the park brought the tribe into the Hayden Valley area near Otter Creek. Tribal elders thought many of the Nez Perce crossed the Yellowstone River at, or near the Buffalo Ford/Nez Perce Ford area to access the Pelican Creek drainage to the east. The actual route taken is not known, but it is presumed by tribal members that their ancestors traveled along the Yellowstone River corridor.

Continuing consultation (10/1999, 4/2000, 10/2000, and 4/2001) with all affiliated tribes has provided information concerning this resurfacing undertaking and requested comment

## Environmental Consequences

from the tribes on any areas of concern they had. Those tribes not attending regularly scheduled consultations were sent copies of the consultation proceedings including information on this project, and again asked for comment on the impact of the undertaking on any known or unknown ethnographic resources. No comment has been received.

### SUMMARY OF NATIONAL REGISTER ELIGIBLE CULTURAL RESOURCES, EFFECT OF ALTERNATIVE A, AND COMPLIANCE NEEDED

<b>Site Description</b>	<b>Project Effect</b>	<b>Compliance Needed</b>
48YE446 Prehistoric lithic scatter with buried cultural deposits.	No adverse effect, sufficient parking in area. No new pullouts planned.	No further compliance needed.
48YE445 Prehistoric lithic surface scatter with buried Pelican Lake cultural deposits.	No additional impact to site, no adverse effect.	No further compliance needed.
48YE448 Prehistoric lithic surface scatter with buried Paleoindian cultural deposits.	No additional impact to site, no adverse effect.	No further compliance needed.
48YE415 Buried prehistoric Paleoindian cultural deposits.	No additional impact to site, no adverse effect.	No further compliance needed.
48YE659 Buried Middle Archaic cultural levels.	No additional impact to site, no adverse effect.	No further compliance needed.
48YE240 Buried site with hearth dating 3,210 years old.	No additional impact to site, no adverse effect.	No further compliance needed.
48YE243 Multi-component prehistoric and historic site with buried Paleoindian and Archaic levels and cabin ruins.	Sub-excavation and drainage repair needed in area of previous road construction disturbance. Work monitored to ensure no additional impact. No adverse effect.	Need WYSHPO concurrence of effect.
48YE241 Prehistoric site with buried cultural deposits yielding obsidian from Bear Gulch, Idaho.	No additional impact to site, no adverse effect.	No further compliance needed.

## Environmental Consequences

### SUMMARY OF NATIONAL REGISTER ELIGIBLE CULTURAL RESOURCES, EFFECT OF ALTERNATIVE A, AND COMPLIANCE NEEDED

<u>Site Description</u>	<u>Project Effect</u>	<u>Compliance Needed</u>
48YE545 Prehistoric lithic scatter with buried cultural deposits.	Site tested for NR eligibility. No additional impact to site, no adverse effect.	No further compliance needed.
48YE244 Prehistoric site with buried cultural deposits yielding tools from Pelican Lake, Middle Archaic, and Late Prehistoric Cultures	No additional impact to site, no adverse effect.	No further compliance needed.
48YE304 Prehistoric habitation and lithic workshop site with buried cultural deposits.	No additional impact to site, no adverse effect.	No further compliance needed.
48YE155 Historic Canyon transportation compound.	No additional impact from road resurfacing. Wetland mitigation would impact portion of site. Site re-documented, additional archival research conducted. WYSHPO concurred site is ineligible for NR.	No further compliance needed.
48YE23, Historic dump and Canyon incinerator site.	Site documented. WYSHPO concurred site not eligible for NR. Construction staging and stockpile use of previously leveled portion of site.	No further compliance needed.
48YE797 Historic Otter Creek Bridge.	No repairs to bridge planned, only resurfacing of bridge deck. No adverse effect.	No further compliance needed.
48YE520 Grand Loop Road Historic District including historic road features (masonry box culverts, dry-laid retaining walls, and culvert headwalls).	Resurfacing and repair of current alignment according to provisions of road programmatic agreement among NPS, SHPOs, and ACHP. No historic properties adversely affected.	Need WYSHPO and ACHP concurrence of effect of undertaking.

## **Socioeconomic Environment**

### **General**

Possible disturbance to park visitors, park staff, concessioner employees, park residents, and businesses at the Canyon and Fishing Bridge areas from construction activities would be temporary and only continue during the life of the project. For most of the construction, traffic would be maintained so businesses within the park would not be significantly affected economically. However, traffic may "bunch up" due to one-way traffic control measures, and these situations may result in surges of customers arriving at some business establishments. Most businesses, residents, and visitors outside the park are so far removed from the construction area that it is not expected that they would be adversely affected by the activities associated with this road improvement project. Tourist spending is not expected to be adversely impacted.

Visitors traveling through construction areas would experience short-term inconveniences. Dust, fumes, noise, and rough roads would be expected. There would be some increased hazards because of construction work. Some staging areas may intrude on visitor experiences, as some of these would be located in pullouts along the road.

### **Canyon to Fishing Bridge Road Conditions and Use**

Visitors would encounter up to 30-minute (or possibly longer) traffic delays waiting for one-way traffic to clear. Delays from slow-moving traffic passing through active construction sites would occur. One-hour nighttime closures would help facilitate the work and reduce the total time necessary to complete construction. Inconvenience and public safety concerns would be reduced by a public information program warning of closures, delays, and road hazards.

Although some park visitors would be inconvenienced by construction activities in the short term, visitors may be able to adapt their behavior and travel plans to avoid possible inconveniences. Multiple highway projects may be underway at one time, however construction schedules would be adjusted to minimize inconvenience. Some closures would overlap (See the "Cumulative Effects" section). In some instances, delays would give visitors the opportunity to get out of their vehicles and enjoy the scenery and wildlife. A variety of information sources would be employed to inform visitors, staff, and businesses about construction activities. In the long run, all travelers would benefit from safer and more pleasant journeys made possibly by the proposed road improvements.

Roads in the park that were used for hauling road-building materials would experience large volumes of heavy truck traffic during the road overlay period. Visitor traffic would be affected by this use within the park.

Short-term benefits would include economic gains for businesses and individuals within the Greater Yellowstone Area. Direct benefits would flow from construction-related expenditures (the approximate cost of the project is \$4.5 million) such as purchase and transport of road-building materials and employment of construction workers. Some new construction-related, temporary jobs may be created within the regional economy due to this road project. These benefits would be affected by the location of the contractor's base of operations, sources of materials, and source of the labor supply. Indirect benefits would

## Environmental Consequences

occur in proportion to the amount of direct expenditures that occur within the region and the degree to which these funds are re-circulated within the regional economy.

Community businesses would benefit from expenditures within the local economy by the contractors and their employees. For instance, many construction employees might stay in local motels, as the rental housing market is insufficient to satisfy the demand. Some new jobs would be created within the local economy due to construction activities. These jobs and other construction-related spending by contractors and their employees would provide benefits to the local communities.

Long-term benefits for visitors would include improved safety for motorists. As a result of this overlay work, the potential for accidents and vehicle damage would be reduced.

The long-term quality of visitor experiences would also improve. Better design and additional vehicle pullouts would provide more and higher quality opportunities for viewing scenery and wildlife along this road segment.

The tourism segment of the regional economy would be made more secure by improvements to the road system within Yellowstone National Park. Park operations would improve because of reduced road maintenance costs, better access for park vehicles, and a safer roadway. Short-term costs to visitors and others would be more than offset by short- and long-term benefits.

## Cumulative Effects

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and proposed action alternative.

The analysis of the cumulative effects includes a discussion of current development plans within Yellowstone National Park and information about development plans for the lands surrounding the park within the Yellowstone ecosystem. Development plans in the immediate project area, central Yellowstone National Park, are primary factors in the analysis of cumulative impacts.

Although numerous construction and maintenance projects are planned for the Greater Yellowstone Area during the next 20+ years, the emphasis of these projects is to replace, repair, and rehabilitate existing facilities that are approaching the end of their useful service life. Where new facilities are needed, they would be concentrated in and adjacent to existing developed areas to minimize the creation of new, isolated developments. Although some commitment of previously undisturbed resources is inevitable, as are some adverse cumulative effects, many of the project efforts to be undertaken involve the removal of existing development and the revegetation of other human activity scars.

## Environmental Consequences

Several hectares of previously undisturbed land are currently identified for commitment in construction projects in the park. In addition, reclamation of past material, spoil sites, and road scarring may become possible through the Abandoned Mine Lands Program, a cooperative effort of the State of Wyoming and the National Park Service, and other restoration efforts (see "Beneficial Development Effects" below).

The time span of development projects is also critical. This analysis primarily covers the period 2001 through 2007 and beyond, as appropriate. The purpose of this discussion is to recognize the cumulative effects on resources, visitors, area residents, and staff of the Canyon Junction to Fishing Bridge road improvement project in concert with the effects of other activities in the vicinity of the project, within the park, and on nearby lands.

### **Roadway Projects**

The *Parkwide Road Improvement Plan* (NPS 1992) outlines a 20-year program of road reconstruction throughout the park to bring Yellowstone's principle park road system up to current National Park Service standards. Under this action, both the positive and negative impacts on natural, cultural, and socioeconomic resources associated with the original development of all the park roadways would persist. Positive effects include access to the park, enjoyment of its features, and financial expenditures both in and outside the park. Negative effects include the disturbance of bedrock, soils, and vegetation; loss, degradation, and fragmentation of habitat; temporary disturbance and displacement of some wildlife during construction; possible loss of historic and prehistoric resources; and waste production.

Reconstruction of the East Entrance Road began in summer 1994 and is expected to continue through 2004. Reconstruction of the Grand Loop Road between Madison and Biscuit Basin has been completed. The Northeast Entrance Road was resurfaced in 1997 and that is expected to extend the life of the road until it can be reconstructed in 2014-2020. A section of the West Thumb to Lake Junction segment of the Grand Loop Road was reconstructed with completion in 2000. Other future road projects include the Canyon Rim drives to be overlaid beginning in 2004. Reconstruction between Norris and Mammoth would start in 2006. Reconstruction of Mammoth to North Entrance is scheduled to start in 2007. A study would be completed prior to construction to determine if any changes in the location of this road would be needed. Start-up and completion dates for these projects are dependent on available funding.

The reconstruction of 12.4 kilometers (7.7 miles) of the Grand Loop Road between the Madison to Norris Junctions of Yellowstone National Park, work began in May 2001 and will continue through the fall of 2003. Completion of the first phase is slated for 2002.

The National Park Service proposes to resurface, restore, rehabilitate, and reconstruct the road and associated pullouts and parking areas, between Canyon Junction and Tower Junction, also known as the "Dunraven Road." This project is proposed to start in 2002 and continue through 2007, depending on funds. The proposal would be to reconstruct the entire 29.3 kilometers (18.4 miles) of road on the existing alignment to the same 7.2-meter (24-foot) width. A number of pullouts would be formalized; others would be obliterated.



## Environmental Consequences

The Federal Highway Administration (FHWA) awarded a contract for hauling 200,000 metric tons of material from Sylvan Pass to the Grebe Lake Pit near Canyon Village. Hauling began in June 2001 and continued through September 2001.

The park is currently reclaiming 8.9 km (5.5 miles) of an abandoned road known as the Turbid Lake Road. The Turbid Lake Road was part of Yellowstone National Park's East Entrance Road from 1902 until the road was reconstructed between 1928-1936. That reconstruction realigned a portion of the road to follow the shore of Yellowstone Lake. Reclamation work began in 1997 and will be completed in 2004. Prime grizzly bear habitat and wetlands would be restored.

### **Other Projects within the Park**

Other actions would be occurring in the park during the course of this action, adding to the overall cumulative impact within the Yellowstone ecosystem.

The Canyon Visitor Center is scheduled for rehabilitation starting in 2003 and lasting at least two years. An EA has been prepared to evaluate a contractor's RV area in the Canyon area. This may be constructed to more efficiently house contractor employees working on Federal Lands and Highway Programs and other projects. At Canyon Village employee housing would be replaced, as funds become available. Under the approved Canyon lodging plan, some obsolete guest cabins have been replaced and more will be replaced. Completion of an employee housing four-plex was accomplished in 2000.

In the Tower/Roosevelt area, concessioner cabins have been upgraded and replaced in conjunction with rehabilitation of Roosevelt Lodge. Employee housing will be replaced pending funding.

The Finding of No Significant Impact (FONSI) for the *Yellowstone Employee Housing Plan* (part of the service-wide housing initiative) was signed in December 1992. Construction of some housing units is proposed each year. In 11 developed areas, approximately 125 year-round and 347 seasonal housing units would be upgraded, replaced, or newly constructed if the plan was fully implemented. Current funding levels allow replacement or rehabilitation of a few housing units annually. Work at East Entrance is completed and one four-plex unit was constructed at West Entrance. Work began in Lake and in Tower in 1997 and was completed in 1998. The Mammoth Housing Plan was released in 1998. The concessioner is also upgrading employee housing at several developed areas. At Grant Village, housing to replace trailers may be constructed.

Development projects in the Mammoth Hot Springs area include continued housing rehabilitation, interior renovations of several buildings, and implementation of a visitor restroom facility in 2001 and 2002.

At Old Faithful a number of projects are ongoing or scheduled to implement the approved *Development Concept Plan, Old Faithful* (NPS 1985). Planning is completed and construction started to replace the aging sewage treatment plant. Construction of employee

## Environmental Consequences

housing (two, four-plex units) to replace deteriorated quarters began in 2001 and will continue as funding becomes available. Planning is currently underway for the 40,000-sq. foot facility to replace the current Old Faithful Visitor Center. If approved following the completion of an EA, the project is currently scheduled for construction in 2004.

A number of development projects are planned that would have effects in more than one area of the park:

If the proposed Fishing Bridge campsite replacement project were approved, 100 replacement campsites would be built at Canyon Village, with an additional 175 replacement sites at Norris. This project would eventually result in positive impacts on visitors and resources (see "Beneficial Development Effects" below) but at the cost of short- and long-term cumulative impacts through resource commitment, construction activities, and inconveniences to staff and visitors.

At Mammoth, the Administration Building is scheduled to have seismic strengthening and interior renovations started in 2002.

A Commercial Services Plan and EIS, will formulate and assess impacts of alternatives relating to the commercial services and facilities within and through out the park.

A Heritage and Research Center is currently in the planning and design stages, with construction proposed to start in late 2002 or early 2003.

At Norris the water and sewage systems are scheduled to be upgraded and/or replaced in 2002, and the Madison wastewater system in 2003.

To comply with the 1992 Leaking Underground Storage Tank Act (40 CFR 240, 281) many fuel oil tanks currently in use at residences throughout the park are being replaced after testing as a part of routine maintenance procedures.

### **Projects Outside the Park**

A number of projects outside the borders of the park have cumulative effects on the Yellowstone ecosystem.

The Wyoming Highway Department is reconstructing 40 kilometers (24.9 miles) of U.S. Highway 14/20 (Cody Highway) between the east entrance and the east boundary of Shoshone National Forest.

A Forest Highway project coordinated by the Federal Highway Administration and State of Montana would reconstruct portions of US 212, the Beartooth Highway. An initial portion of the project would be from the Northeast Entrance gate to the Montana/Wyoming state line. The project award date is expected to be in the fall of 2001. Work would start at that time or in the spring of 2002, and extend over an anticipated three seasons. A minor amount of work would also occur inside of the park boundary, between the boundary and the entrance gate that is located approximately 0.5 kilometers (0.3 miles) inside the park.

## Environmental Consequences

An additional project on this road would occur on the Shoshone National Forest in the State of Wyoming between milepost 25.6 and milepost 44.0, and is proposed to begin in 2004.

Grand Teton National Park is currently proposing the reconstruction of approximately 16.9 kilometers (10.5 miles) of the North Park Road from the southern boundary with Yellowstone National Park south through the John D. Rockefeller Jr. Memorial Parkway to the Lizard Creek Campground in Grand Teton National Park. The proposed reconstruction would be done in two separate stages. The first stage would be approximately 4.5 kilometers (2.8 miles) in length from the southern boundary of Yellowstone National Park south to the Snake River picnic grounds. This stage would likely be reconstructed in fall 2002 or spring 2003. The second stage would be approximately 12.4 kilometers (7.7 miles) in length from the Snake River picnic grounds to the Lizard Creek Campground. This stage would likely be reconstructed during the summer-fall 2003 and spring 2004.

Oil and gas leases exist outside the park boundaries, but currently no wells are in production. The only known potential oil or gas exploration near Yellowstone is the proposed Ruby Exploratory oil/gas well on the Line Creek Plateau, south of Red Lodge, Montana, and 53 kilometers (32.9 miles) east of the park.

### **Beneficial Development Effects**

A number of resource restoration and rehabilitation projects have been noted in the above discussions. These include restoration of abandoned quarries, roads, and gravel pits in several locations throughout the park. The park has obtained funds from the Abandoned Mine Lands Program to begin this work. Pertinent to this project, the Little Thumb and Dry Creeks pits and access roads were restored in 1997. Reclamation of the abandoned Turbid Lake road is underway. AML funds are currently being used to reclaim the Natural Bridge Quarry pit, Lone Star Geyser pit, and Sedge Creek pit. A segment of the Norris to Madison road will be realigned away from the riparian zone of the Gibbon River.

Power and telephone lines have been buried at Grant Village and from Mammoth to Roosevelt, and new telephone lines have been buried at many developed areas around the park. Some buried lines have been replaced with microwave systems. Burying lines provides visual benefits because of the removal of overhead lines from scenic areas. Restoration of the utility corridors also becomes possible once the poles and wires are removed.

Conversion of 5 kilometers (3.1 miles) of the Fountain Freight and side roads to trails, combined with wetland mitigation projects, has reduced the effects of the Madison to Biscuit Basin project, particularly on wildlife. The Fishing Bridge campground removal and other rehabilitation projects in the Fishing Bridge/Pelican Creek area are examples of projects that reduce the impacts of existing and proposed developments on grizzly bears. Similar projects would continue to restore areas that are no longer necessary for park management or intensive visitor use. All would certainly disturb nearby wildlife and other resources while they were being implemented, but their long-term goal would be to restore park resources such as wildlife habitat.

## Environmental Consequences

The National Park Service is also in the process of formulating a memorandum of understanding (MOU) with the U.S. Fish and Wildlife Service, Army Corps of Engineers, and the State of Wyoming to initiate wetland banking. This MOU would cover wetland actions in Yellowstone National Park, and would assist the Park Service in crediting wetland restoration projects against losses of wetlands in future construction projects. The MOU might not be in effect for this project. However, it would be beneficial in maintaining a positive net effect on wetlands during future projects.

### **Analysis Results**

The cumulative effects on most wildlife species of the various actions occurring or proposed in the park would generally be localized. Although these localized effects appear to be short-term in nature, the long-term effects are unknown. Certain wide-ranging wildlife species, such as the grizzly bear, could be affected by construction projects in widely dispersed locations. However, most construction projects would occur within current development zones and along roadways, areas which bears are aware of and tend to avoid. Stringent proposed mitigating measures should help improve the effects on these species.

Most of the projects are of a maintenance type (road rehabilitation, housing construction, and sewage treatment facilities), providing appropriate facilities for visitors and employees. The other projects involve rehabilitation and are a result of Yellowstone's commitment to restoring disturbed areas in the park to natural conditions as directed by NPS management policies.

In the reasonably foreseeable future, the potential exists for the projects described in this analysis, when added to the past and present projects occurring in the Greater Yellowstone Area, to cause some cumulative impacts through long-term loss of habitat from construction, wildlife avoidance of developed areas, and from incidental mortality.

Wildlife avoidance affects animals in two ways. There is a displacement effect when animals avoid otherwise suitable habitat because of human activities in the area. This results in a long-term loss of habitat. The other effect is an increase in animal density on the remaining habitat. Increased density can affect the ability of individual animals to survive.

Fixed resources (cultural sites, vegetation, and some wildlife) have the highest chance of disturbance from the development of previously undisturbed land. However, park managers are aware of these possibilities and are taking steps to mitigate any negative cumulative impacts. These steps include data recovery plans for cultural resources as well as wetland and other natural habitat restoration on lands that are expected to be rehabilitated. These steps should lessen or completely cancel any negative impacts from this action when considered with the other projects in this analysis that would otherwise add to the cumulative effects on the Yellowstone ecosystem.

The cumulative effects of the various actions within the park on visitors would primarily be felt by visitors who stay a short time in one area. Their entire visit might be disrupted by construction activities. Employees and area residents could be inconvenienced for a

## Environmental Consequences

number of days or weeks by local construction projects; however, road reconstruction could inconvenience employees for several seasons.

### **Impairment Determination**

Because the actions described in this alternative do not severely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the memorial or to opportunities for enjoyment of the memorial; or (3) identified as a goal in the park's master plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

## **Alternative B: No Action**

### **Natural Resources**

#### **Geology, Topography and Soils**

There would be negligible direct adverse impacts on geology, topography and soils adjacent to the existing road expected due to ongoing maintenance activities. No impairment to these resources would result.

#### **Hydrothermal Resources**

There are a few thermal features located close to this section of road. The Sulphur Caldron and Mud Volcano hydrothermal features would not be affected by road maintenance activities along this road, and no impairment to these resources would result.

#### **Vegetation**

Negligible direct adverse impacts to vegetation along this road segment would occur with ongoing maintenance activities. No impairment to vegetation would result.

#### **Rare Plants**

Routine maintenance should not adversely impact any rare plant sites along this section of roadway. No impairment to rare plants would result.

#### **Wetlands and Other Waters of the United States**

Maintenance of the Hayden Valley road would not cause impacts to wetlands. There would be no impairment to wetland resources within the park.

#### **Air Quality**

There would be negligible adverse impacts on air quality and visibility in the park or region. Any effects from road maintenance activities would be short-term and limited to the duration of the activity. These effects would be the result of activities such as grading shoulders and sweeping road surfaces of dirt, dust or debris. No impairment of air quality would result from these maintenance activities.

#### **Wildlife**

##### **Overview**

The existing road and traffic probably cause some displacement of wildlife and reduction of roadside habitat use, but this is difficult to measure. Most animals that are not hunted appear to habituate or become tolerant of regularly occurring, predictable human presence. Traffic results in some inevitable road-kills, but recorded incidences are low. No more than negligible adverse long-term impacts on bird or mammal populations are expected from the existing road or traffic.

Under this alternative there would be future routine maintenance activities, that may cause short-term, negligible displacement to roadside wildlife.

## Environmental Consequences

### **Birds**

Routine maintenance actions would not cause adverse actions to birds found in the Hayden Valley road corridor. Peregrine falcons, although found to be within the confines of the study area, were not found to be nesting within the immediate proximity of the road. Therefore this species should not be affected by this No Action Alternative. There would not be an impairment to birds under this alternative.

### **Fisheries and Aquatic Resources**

Maintenance of this road segment would not cause adverse impacts to fisheries or other aquatic resources. Storm water runoff would not change over existing conditions, therefore, there would not be an impairment to fisheries or aquatic resources.

### **Amphibians and Reptiles**

As this alternative does not propose any resurfacing of the Hayden Valley road, shoreline characteristics of creeks and the Yellowstone River would not be altered. No improvements to shoreline habitats for amphibians and reptiles would occur. This alternative would have no new adverse effects to amphibians and reptiles at the locations listed in the "Affected Environment" chapter. There would be no impairment of these park resources.

### **Threatened and Endangered Species**

#### **Grizzly Bears**

The potential always exists for human/grizzly bear interactions that would directly affect bears, such as vehicle accidents or habituation to human food sources from illegal feeding or available garbage. However, vehicle-caused grizzly deaths have been rare in the entire park and along this road, and current policies and enforcement seem effective in preventing human/grizzly problems along the roadway. Maintenance and use of the existing road are not expected to adversely affect grizzly bears. There would be a finding of "no effect" to grizzly bears by this No Action Alternative. Therefore, there would not be an impairment to grizzly bears within the park.

#### **Lynx**

It is not anticipated that this alternative would have any effect on lynx. Although suitable habitat exists, there have been no sightings in the area since an unconfirmed report in 1981. Therefore, there would not be an impairment to lynx within the park.

#### **Bald Eagles**

Bald eagles are found in the general vicinity, but there are no known effects on these species from the existing road or traffic, and no future effects are anticipated. Therefore, there would not be an impairment to bald eagles as the result of routine road maintenance.

#### **Whooping Cranes**

Whooping cranes do not use the road corridor, so there would be no effects, or impairment to cranes.

#### **Gray Wolves**

Gray wolves are found in the general vicinity, but there are no known effects on these species from the existing road or traffic, and no effects are anticipated.

## **Cultural Resources**

### **Prehistoric and Historic Archeological Resources, Historic Roadway Resources, and Ethnographic Resources**

There would be limited repairs and or resurfacing work done under this alternative. There would be limited potential for disturbance to known or unknown historic, prehistoric, and ethnographic resources. None of this work would be performed in areas that have not already been disturbed from roadwork that constructed the present road. Some negative impacts to archeological resources from vehicle compaction, soil churning, de-vegetation, and consequent erosion would occur due to visitors using informal, undefined parking. Affiliated tribes have been consulted, and no specific concerns regarding ethnographic resources have been identified for the project area. Thus, there would be no effect on known ethnographic resources.

### **Cultural Landscape**

The Grand Loop Road is an integral part of the cultural landscape of Yellowstone National Park. In some areas, the landscape in the vicinity of the highway could have negligible adverse impacts from use of unauthorized pullouts and subsequent erosion and loss of plant materials. Ongoing park maintenance may help mitigate these effects.

## **Socioeconomic Environment**

### **General**

Under this alternative there would be no construction-related disturbance of visitor traffic or of businesses inside and outside the park. However, the positive economic effects from road reconstruction work would not accrue to the regional economy.

Without road improvements visitors and staff would continue to be subjected to failing roadways and poor safety characteristics, including rough road surfaces and inferior pullouts. Continual, expensive, and yet inadequate maintenance activities would be required to keep the road open. These maintenance activities would negatively affect the visitor experience on an unpredictable basis. Accidents attributable to these conditions would increase and perhaps have more serious consequences. Driving and recreational experiences would be diminished by the deteriorating condition of the roads in the project area. Visitor inconveniences and complaints would increase. Recreational activities along the existing roads would remain unchanged.

### **Parkwide Roads**

Park operations would continue to be adversely affected by the deteriorating road system. The road is expensive to maintain in its present state. High levels of traffic and increasing numbers of heavy vehicles (e.g., buses) would continue to damage the road surface and base material. Excessive flexing of base and pavement structures, as well as the natural process of freezing and thawing would exacerbate problems. Normal road maintenance would be required more frequently, and these activities would become more expensive and less effective as the present road surface and base deteriorate. Increased maintenance expenses for this road segment would continue to drain resources (funds, material, and personnel) from other park operations.



## Environmental Consequences

In some roadway sections, regular road maintenance would not be up to the task because the road would have become altered to the point where substantial improvement would be necessary. As the road continues to be negatively impacted, restrictions on the number, size, and/or type of vehicles may be necessary in the long-term. Eventually, maintenance could no longer prevent road failure. Continuing deterioration would result in road closures for safety reasons. Emergency road closures would cause unacceptable disruption of park operations and visitor travel plans. Lengthy closures might affect the local/regional tourism-related economy.

In summary, continuing the current situation in the project area would not improve visitor experiences and would expose visitors, staff, and their property to increasing risk of injury and damage. Although the cost of road improvements would be avoided in the short-term, those savings would be achieved at the threat of moderate to major damage to life and property and much greater operational expenditures in the long run. On-going maintenance and safety problems would not be resolved.

### **Canyon to Fishing Bridge Road Conditions and Use**

Under the No Action Alternative there would be only minor surface patches and pothole patching activities of the Hayden Valley road before the reconstruction scheduled for 2014. There would be no pavement placed to formalize gravel pullouts that are currently being used by travelers. Maintenance of the existing roadway and ditches would not be likely to disturb soils, vegetation, or geologic features on the slopes beyond ditches. However there would also be continued degradation of resources from visitors using informal/undefined pullouts along the roadway and from uncorrected erosion problems. These ongoing impacts would be minor in the short-term, but moderate in the long-term.

### **Cumulative Effects**

This Alternative B would have less cumulative effect upon park resources and resources of the Greater Yellowstone Ecosystem than those effects described for the Action Alternative A.

Cumulative effects would be generated from those projects listed under Alternative A, along with maintenance actions that would be required under this Alternative B.

Cumulative effects from maintenance of the Hayden Valley road could include visitor delays, short-term displacement of animals, and further drain on park operating funds. Ongoing maintenance of the road would continue to result in the use of aggregate sources, possibly from existing sites needing reclamation within the park, as well as the disturbance of roadside soil and vegetation.

### **Impairment Determination**

Because the actions described in this alternative do not severely affect a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Yellowstone National Park; (2) key to the natural or cultural integrity of the memorial or to opportunities for enjoyment of the memorial; or (3)

## Environmental Consequences

identified as a goal in the park's master plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

### **Compliance Status**

Nomination forms for the Grand Loop Road Historic District (including the Canyon Junction to Fishing Bridge Junction segment) have been drafted for formal nomination to the National Register of Historic Places. Because roadway districts, including historic elements such as culverts and retaining walls, are eligible for the National Register, compliance with Section 110 and Section 106 of the National Historic Preservation Act is necessary. Section 106 compliance procedures for all of the Yellowstone road improvement projects began in 1992 with the publication and public review of the *Parkwide Road Improvement Plan* (NPS 1992). In 1993, the signing of the programmatic agreement (NPS 1993d) among the Advisory Council on Historic Preservation, the National Park Service, and the Wyoming and Montana State Historic Preservation Officers provided direction for protection and preservation of cultural resources during the parkwide road system reconstruction.

All historic and prehistoric archeological sites within the area of potential impact or the road resurfacing have been inventoried, documented, and tested. NPS recommendations for National Register eligibility for all historic road structures and features, and all historic and prehistoric archeological sites bisected by the current alignment and adjacent to the current alignment, were sent to the Wyoming SHPO for concurrence of eligibility. The historic properties inventory, site documentation, and NR eligibility determination requirements as described in the 1993 programmatic agreement have been completed.

Sections of this environmental assessment itemize cultural resource inventories and the documentation done in support of this undertaking. The environmental assessment also contains a listing of further compliance needed, including the assessment of effect of the undertaking on the historic properties. The environmental assessment will be sent to the Advisory Council on Historic Preservation and the Wyoming State Historic Preservation Officer for their review and comment. Project designs and descriptions of the resurfacing, repair, and rehabilitation of the Canyon Junction to Fishing Bridge Junction road will be submitted to the Wyoming SHPO and the ACHP for review and comment on effect.

Plans and descriptions for the resurfacing of this segment of road were discussed with the 24 Native American Tribes affiliated with Yellowstone National Park at regularly scheduled consultations in April 2000, October 2000, and April 2001. Requests for comment on the resurfacing and repair of this segment of road were sent to all affiliated tribes not attending the consultation. No ethnographic concerns have yet been identified within the area of potential effect of the undertaking.

Park roads are excepted from compliance with Executive Order 11988, "Floodplain Management," under NPS final implementation procedures as outlined in Special Directive 93-4, "Floodplain Management Guideline," July 1, 1993.

## **APPENDIX A: Vegetation Management for Construction in Yellowstone National Park**

Revegetation efforts within the park have focused on careful management of topsoil as the only available growing medium and seed source. This is based on a park policy that seed obtained from sources outside the park would contaminate the park gene pools. Although it is a conservative method, the topsoil management approach has worked well.

The park has an interagency agreement with the Bridger Plant Material Center to assist in the formation of a park seed bank. The park has also tested mulches and can make this information available upon request.

All construction work within the park involving ground disturbance will meet the following criteria for revegetation accepted by the park.

1. All construction will be limited to that area necessary to complete required work. No activity, including vehicle or material use or storage, will be allowed outside the predetermined zone. If vehicles are to be traveling through an area numerous times, the same tracks will be used to prevent compaction in other areas. Compacted zones will be treated (raking, aerating, and replacement of topsoil) to assist revegetation. Topsoil will not be driven on at any time.
2. Excavation and improvement will be handled in manageable sections that reflect changes in the soil and vegetation. Trenching routes and disturbance zones will be flagged and approved by the park. All flagging and debris will be removed from the area after work is completed.
3. Sections will be rehabilitated as soon as possible. Topsoil will not be stockpiled over the winter or for longer than three months in sagebrush/rabbitbrush zones or longer than six months in grass-dominated zones. Any deviation must be approved by the park.
4. Topsoil refers to the uppermost soil horizon; it is usually found in the top 5 to 15 centimeters (2 to 6 inches). Topsoil will be removed and replaced from the same area. Care will be taken to ensure that topsoil and fill material are not mixed and are stockpiled in separate areas (e.g., topsoil to the right of the trench and fill to the left).
5. Vegetation over 0.9 meters (three feet) in height will be removed before the removal of topsoil and in a manner that least disturbs the topsoil. Topsoil will not be driven on, gouged, or compacted as vegetation is removed. Topsoil will be removed before stumps are pushed. Any deviation from this process must be approved by the park.
6. After large trees are removed, topsoil will be removed from an area in a single cut, including any vegetation that is 0.9 meters (three feet) tall and under. Grubbing is not permitted.
7. Irregular land surfaces are recommended for a natural effect. Some rock outcropping and boulders may be left in place to create natural pockets for revegetation (see number 11).

## Appendix A

Deadfall snags may be stockpiled for later use on slopes that are very steep to provide catch points for soil.

8. Topsoil will not be used as bedding material. Separate bedding material will be obtained from sources approved by the park.
9. Topsoil will be replaced on-site in a mixture of topsoil and vegetation associated with the topsoil and will be reworked over the site in a manner that preserves the seed source while spreading the soil over the area.
10. No topsoil will be imported from outside the park or moved internally within the park unless approved by the park. Any imported fill will be checked for exotic plants.
11. Trees and shrubs will be avoided if possible during trenching or excavation. Any trees removed during construction will be removed from the site unless specified by the park.
12. If replacement seed is required for revegetation in an area, the park will provide seed at cost to the contractor. Advance notice of six months to one year is required on projects exceeding 93 square meters (1,000 square feet).
13. Boulders unearthed during construction may be reburied or left exposed (with lower third buried) depending upon the location and extent of rock naturally occurring in the area.
14. If a trench is required, the surface of the trench will be left mounded to allow for settling along the line.
15. If mulch is required in sensitive areas due to visibility or exotic plant infestation, the park will specify the type and depth of mulch to be used. Nitrogen may be added in small quantities to any wood product used on slopes to balance nitrogen lost through decomposition.
16. No fertilizer will be used in any revegetation work unless requested by the park.
17. If relocated due to road reconstruction, junction boxes or cans will be placed in the field and approved by the park. Locations should be well screened by vegetation, topography, or large boulders.
18. All access to the site and stockpiling or staging areas will be identified by the contractor and approved by the park. These areas will be revegetated using approved techniques upon completion of the project.
19. All debris will be removed from the site to an approved pit or hauled away as approved by the park.
20. Final review and inspection will be made by the park before the work is accepted.

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Greg Cody, Branch of Compliance, Denver Service Center

#### **Federal Highway Administration, Western Federal Lands Division - Cooperating Agency**

Dick Gatten, Project Manager  
Grant Lindsey, Designer  
Craig Dewey, Geotechnical Engineer

#### **Persons, Organizations, and Agencies Contacted:**

This Environmental Assessment is being sent to approximately 240 individuals, agencies and groups soliciting comments on the problems, issues, and alternatives addressed. A press release was issued on October 17, 2001 and the Environmental Assessment is posted on Yellowstone National Park's web page, <http://www.nps.gov/yell/technical/planning>

#### **Agencies/Libraries That Will Receive This Environmental Assessment:**

US Fish and Wildlife Service - Cheyenne, WY  
Wyoming Office of Federal Land Policy  
Wyoming State Historic Preservation Office  
Billings, MT Public Library  
Bozeman, MT Public Library  
Cody, WY Public Library  
Jackson, WY Public Library  
Yellowstone National Park Research Library

**Agencies, Organizations, And Tribes That Will Be Notified Of This Environmental Assessment:**

<p>Beaverhead National Forest                  Big Hole National Battlefield                  Bridger-Teton National Forest                  Custer National Forest                  Environmental Protection Agency, Region 8 - Denver                  Gallatin National Forest                  Glacier National Park                  Grand Teton National Park                  Grant-Kohrs Ranch NHS                  Idaho Department of Commerce                  Idaho Department of Parks and Recreation                  Idaho Fish and Game Department                  Idaho State Historic Preservation Office                  Little Bighorn Battlefield NM                  Montana Department of Commerce                  Montana Department of Fish Wildlife and Parks                  Montana Intergovernment Review Clearinghouse                  Natural Resource Conservation Service - Bozeman and Cody                  Shoshone National Forest                  Targhee National Forest                  Teton County Certified Local Government                  Town of West Yellowstone                  US Army Corps of Engineers                  Western Federal Lands Highway Division                  Wyoming Department of Transportation                  Wyoming Game and Fish Department                  Wyoming State Clearinghouse                  Wyoming State Lands and Investments                  Wyoming State Library                  Wyoming Travel Commission                  ACHP Western Office of Project Review                  Alliance for Wild Rockies                  American Fisheries Society                  American Wildlands                  AMFAC                  Bear Creek Council                  Beartooth Alliance                  Billings Chamber of Commerce                  Bozeman Area Chamber of Commerce                  Buffalo Bill Historical Center                  Center for Urban Affairs                  Cheyenne High Plains Audubon                  Citizens for Teton Valley                  Cody Chamber of Commerce                  Cooke City/Silver Gate Chamber of Commerce                  Defenders of the Rockies</p>	<p>Defenders of Wildlife                  Fremont County Audubon Society                  Gallatin County Commissioners                  Gardiner Chamber of Commerce                  Great Bear Foundation                  Greater Yellowstone Association of Conservation Districts                  Greater Yellowstone Coalition                  Hamilton Stores, INC                  Idaho Falls Chamber of Commerce                  Idaho Wildlife Federation                  Jackson Hole Alliance for Responsible Planning                  Jackson Hole Chamber of Commerce                  Lander Chamber of Commerce                  Livingston Chamber of Commerce                  Montana Audubon Council                  Montana State University                  Montana State Preservation Office                  Montana Wildlife Federation                  National Audubon Society                  National Parks and Conservation Association                  Nature Conservancy - Idaho Chapter                  Nature Conservancy - Montana Chapter                  Nature Conservancy - Wyoming Chapter                  National Wildlife Federation                  Northern Plains Resource Council                  Northern Rockies Conservation Cooperative                  Northwestern University                  Park County (MT) Commissioners                  Park County (WY) Commissioners                  Park County Environmental Council                  Pinedale Chamber of Commerce                  Red Lodge Chamber of Commerce                  Riverton Chamber of Commerce                  Sacajawea Audubon Society                  Sierra Club Idaho Chapter                  Sierra Club Northern Plains Regional Office                  Sierra Club Teton Group                  Sierra Club Utah Chapter                  Snake River Audubon Society                  Star Valley Development Association                  Stone Fly Society                  Teton County Commissioners                  Teton County Historic Preservation Board                  University of Colorado                  University of Wyoming                  Upper Missouri Breaks Audubon Society                  Utah Audubon Society</p>
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Consultation and Coordination

<p>Utah Wilderness Association          Utah Wildlife Federation          West Yellowstone Chamber of Commerce          Wild Forever          Wilderness Society          Wyoming Wildlife Federation          Wyoming Association of Professional Historians          Wyoming Heritage Society          Wyoming Outdoor Council          Yellowstone Association          Yellowstone Park Foundation          Yellowstone Valley Audubon Society          Northern Arapaho Tribe          Blackfeet Tribe          Northern Cheyenne Tribe          Coeur d'Alene Tribe          Confederated Tribes of Salish and Kootenai          Crow Tribe          Crow Tribe/Apsaalooke Nation</p>	<p>Kiowa Tribe          Nez Perce Tribe of Lapwai          Nez Perce Tribe of Nespelem          Nez Perce Tribe of Colville          Eastern Shoshone Tribe          Shoshone-Bannock Tribes          Assiniboine and Sioux Tribes of Fort Peck          Gros Ventre and Assiniboine Tribes          Cheyenne River Sioux Tribe          Crow Creek Sioux Tribe          Flandreau Santee Sioux Tribe          Lower Brule Sioux Tribe          Oglala Sioux Tribe          Rosebud Sioux Tribe          Standing Rock Sioux Tribe          Spirit Lake Sioux Tribe          Sisseton-Wahpeton Sioux Tribe          Yankton Sioux Tribe</p>
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