U.S. Department of the Interior
National Park Service

Rehabilitation of Highway 62 West
Crater Lake National Park
Klamath County, Oregon

Summary

At Crater Lake National Park, the National Park Service proposes to rehabilitate and reconstruct the approximately 7.7-mile-long segment of Highway 62 West from the west boundary to Annie Springs Junction. The road segment is reaching the end of its 25-year design life. This action is needed to rehabilitate the deteriorated and inadequate road surface and address design deficiencies for improving visitor use and park operations, particularly snow removal.

This environmental assessment examines in detail three alternatives: alternative A (no action); alternative B (resurfacing, restoration, and rehabilitation); and alternative C (the National Park Service preferred alternative). The preferred alternative includes rehabilitation of the existing roadway surface and realigning the switchbacks, and obliterating two and part of a third turnouts.

The preferred alternative would have no or negligible impacts on wilderness values, floodplains, water quality, historic structures, archeological resources, Indian trust resources, scenic resources, wetlands, prime and unique farmlands, ecologically critical areas, environmental justice, socioeconomic environment, and lightscapes. Short-term, negligible to minor, adverse impacts on biotic communities, threatened and endangered species, soils and geology, air quality, traffic, and visitor use would result during road reconstruction activities. There would be short-term, negligible to minor impacts to soundscapes and noise. At one location, Pacific Crest trailhead, noise impacts would be very short term, adverse, and minor to moderate. Short-term, negligible, beneficial effects to safety would result during road reconstruction activities. Long-term adverse impacts to biotic communities, soils, and geology would be negligible or minor. Long-term beneficial effects to park maintenance operations, some biotic communities, visitor use, traffic, and safety would be negligible to minor.

Notes to Reviewers and Respondents

This environmental assessment is available on the Crater Lake National Park Internet Web site at http://www.nps.gov/crla/ and is being distributed for public and agency review and comment for a period of 30 days. Comments, in the form of e-mail and letters, must be post marked by the due date.

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 want us to withhold your name and address, you must state this prominently at the beginning of your comment.* We will make all submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please address comments to: Charles V. Lundy, Superintendent; Crater Lake National Park; Attn: Highway 62 West Road Project; Post Office Box 7; Crater Lake, OR 97604

E-mail: CRLA_Superintendent@nps.gov

SUMMARY

CONTENTS

ACRONYMS AND ABBREVIATIONS V

INTRODUCTION 1

PURPOSE AND NEED FOR ACTION 1

PARK PURPOSE, SIGNIFICANCE, AND MISSION 1

Park Purpose 1
Park Statement of Significance 1
Park Mission 4

THE PURPOSE OF PARK ROADS 4

Functional Classifications of Park Roads 6

FEDERAL LANDS HIGHWAY PROGRAM 7

SCOPING 7

ISSUES AND IMPACT TOPICS 8

Issues 8
Derivation of Impact Topics 8
Impact Topics Selected for Detailed Analysis 9
Impact Topics Dismissed From Detailed Analysis 12
Wizard III Quarry, Rogue River National Forest 15

ALTERNATIVES 19

INTRODUCTION 19

ALTERNATIVE A: NO-ACTION ALTERNATIVE 19

ALTERNATIVE B: RESURFACING, RESTORATION, AND REHABILITATION 19

Roadway 19
Proposed Turnouts 20
Whitehorse Creek Crossing 20
Switchbacks 20
Pacific Crest Trail Parking Lot 22

ALTERNATIVE C: PREFERRED ALTERNATIVE – RESURFACING, RESTORATION, REHABILITATION, AND REALIGNMENT 22

MITIGATION MEASURES COMMON TO ACTION ALTERNATIVES 22

General 22
Mitigation 22
Visitor Use, Traffic, and Highway Safety 25
Clearing and Grubbing 25
Revegetation 26
Cultural Resources 26
Air Quality 27
Noise and Soundscapes 27

ENVIRONMENTALLY PREFERRED ALTERNATIVE 27

Sustainability 28

PERMIT AND CONSULTATION REQUIREMENTS 28

ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED ANALYSIS 29

COMPARATIVE SUMMARY OF NO-ACTION AND ACTION ALTERNATIVES 33

COMPARATIVE SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS 34

COMPARATIVE SUMMARY OF POTENTIAL LONG-TERM IMPACTS 35

AFFECTED ENVIRONMENT 37

LOCATION AND GENERAL DESCRIPTION OF CRATER LAKE NATIONAL PARK 37

Highway 62 West Project Corridor 37
Park Visitation 38

BIOTIC COMMUNITIES 38

Vegetation 38
Wildlife 39

THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN 40

SOILS AND GEOLOGY 42

CULTURAL RESOURCES 42

VISITOR USE, TRAFFIC, AND HIGHWAY SAFETY 44

PARK OPERATIONS 45

AIR QUALITY 46

SOUNDSCAPES AND NOISE 47

ENVIRONMENTAL CONSEQUENCES 49

INTRODUCTION 49

METHODS FOR ASSESSING IMPACTS 49

Biotic Communities 49
Threatened and Endangered Species 50
Soils and Geology 50
Cultural Resources 50
Archeological Resources 51
Historic Structures / Buildings 52
Visitor Use, Traffic, and Highway Safety 53
Park Operations 53
Air Quality 53
Soundscapes and Noise Quality 54
Cumulative Impacts 55

IMPAIRMENT OF PARK RESOURCES AND VALUES 55

ENVIRONMENTAL CONSEQUENCES — ALTERNATIVE A: NO ACTION 56

Biotic Communities 56
Threatened And Endangered Species And Species of Concern 57
Soils and Geology 58
Cultural Resources 59
Visitor Use, Traffic, and Highway Safety 60
Park Operations 60
Air Quality 60
Soundscapes and Noise 61

ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE B: RESURFACING, RESTORATION, AND REHABILITATION 61

Biotic Communities 61
Threatened and Endangered Species, Species of Concern 62
Soils and Geology 63
Cultural Resources 64
Visitor Use, Traffic, and Highway Safety 65
Park Operations 66
Air Quality 67

Soundscapes and Noise 68

ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE C: PREFERRED ALTERNATIVE 69

Biotic Communities 69
Threatened and Endangered Species, Species of Concern 71
Soils and Geology 72
Cultural Resources 73
Visitor Use and Highway Safety 74
Park Operations 74
Air Quality 75
Soundscapes and Noise 75

REFERENCES 77

LEGAL CITATIONS 82

CONSULTATION AND COORDINATION 85

FEDERAL AGENCIES 85

STATE AND LOCAL AGENCIES OF OREGON 85

NATIVE AMERICAN TRIBES 85

PREPARERS 87

APPENDIXES

APPENDIX 1: NATIONAL PARK SERVICE PRESS RELEASE 89

APPENDIX 2: SCOPING AND CONSULTATION LETTERS 95

APPENDIX 3: ENVIRONMENTAL CLEARANCES FOR WIZARD III QUARRY 119

APPENDIX 4: THREATENED AND ENDANGERED SPECIES LISTS 127

APPENDIX 5: REQUEST FOR CONCURRENCE ON EFFECTS DETERMINATION FOR EFFECTS TO NORTHERN SPOTTED OWLS 137

LIST OF TABLES

Table 1. Comparative Summary of Alternatives 33
Table 2. Comparative Summary of Potential Environmental Impacts 34
Table 3. Comparative Summary of Potential Long-Term Impacts 35
Table 5. Federal Highway Administration Noise Abatement Criteria 54
Table 6. Heavy Equipment Noise Levels at 50 Feet 68

LIST OF FIGURES

Figure 1. Rehabilitate Highway 62 West Project Site [NPS-DSC\OCT 02\106\20131] 2
Figure 2. Rehabilitate Highway 62 West Project Features [NPS-DSC\OCT 02\106\20132] 3
Figure 3. Wizard III Quarry [NPS-DSC\OCTO2\106\20133] 17
Figure 4. Whitehorse Crossing Proposed Profile Reduction [NPS-DSC\OCT02\106\20134] 21
Figure 5. Pacific Crest Trail Access Drive Realignment [NPS-DSC\OCT02\106\20135] 23
Figure 6. Proposed Switchback Realignment [NPS-DSC\OCT02\106\20136] 24
Figure 7. Option 1 — Alternative Considered but Eliminated [NPS-DSC\OCT02\106\20137] 30
Figure 8. Option 1A — Alternative Considered but Eliminated [NPS-DSC\OCT02\106\20138] 31
Figure 9. Option 4 — Alternative Considered but Eliminated [NPS-DSC\OCT02\106\20139] 32

ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
ºC	Degrees Celsius
ºF	Degrees Fahrenheit
dB	Decibel
dBA	A-weighted decibel scale
dbh	Diameter Breast High
km	Kilometer
mph	Miles Per Hour
NEPA	National Environmental Policy Act of 1969, as amended
NPS	National Park Service
NRHP	National Register of Historic Places
SHPO	State Historic Preservation Office
U.S.	United States
USC	United States Code

INTRODUCTION

PURPOSE AND NEED FOR ACTION

The National Park Service (NPS) is proposing to rehabilitate Highway 62 West, realign two switchback curves, and improve Whitehorse Crossing within Crater Lake National Park, Klamath County, Oregon. This approximately 7.7-mile (approximately 12.5 kilometers [km]) road segment begins at the western boundary of the park to its terminus near Annie Springs Junction, the turn off for Annie Springs (south) entrance station (figures 1 and 2). This action is needed because the road segment is reaching the end of its 25-year design life, the pavement is cracking and potholing, and has inadequate surface and subsurface drainage. Additionally, the two switchback curves have operational design deficiencies impeding snow removal, and Whitehorse Crossing contains a blind curve creating a driving hazard.

An environmental assessment analyzes the proposed action and alternatives and their potential impacts on the environment. This environmental assessment has been prepared in accordance with the National Environmental Policy Act of 1969 as amended (NEPA), regulations of the Council on Environmental Quality (40 *Code of Federal Regulations* (CFR) 1508.9), and the National Park Service Director's Order – 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making.*

PARK PURPOSE, SIGNIFICANCE, AND MISSION

An essential part of the planning process is to understand the purpose, significance, and mission of the park for which this environmental assessment is being prepared.

Park Purpose

Crater Lake National Park was established in 1902 "…dedicated and apart forever as a public park or pleasure ground for the benefit and enjoyment of the people of the United States." In managing this park, the National Park Service is charged with "…preservation of the natural objects…the protection of the timber, and …the preservation of all kinds of game and fish." The National Park Service is committed to "…forever preserve the beauty of Crater Lake National Park; its unique ecological and cultural heritage; and to foster understanding and appreciation through enjoyment, education, and inspiration." The National Park Service Organic Act of 1916 directs that the fundamental purpose of all parks is "to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS 2002a).

Park Statement of Significance

- Crater Lake is one of the most famous lakes on earth, principally because of the beauty imparted by its large size, blue color, mountain setting, and ever-changing character.

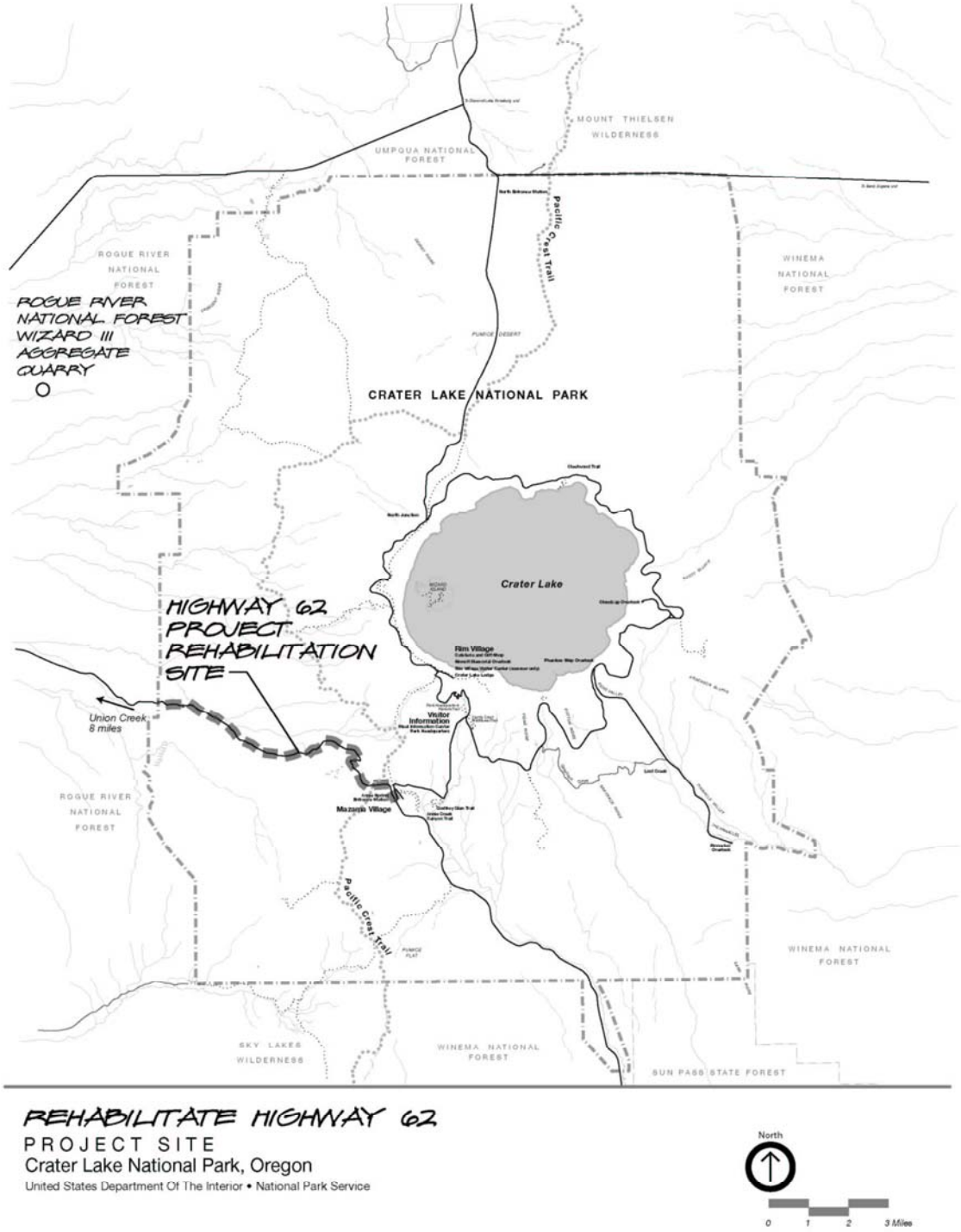

FIGURE 1. REHABILITATE HIGHWAY 62 WEST PROJECT SITE [NPS-DSC\OCT 02\106\20131]

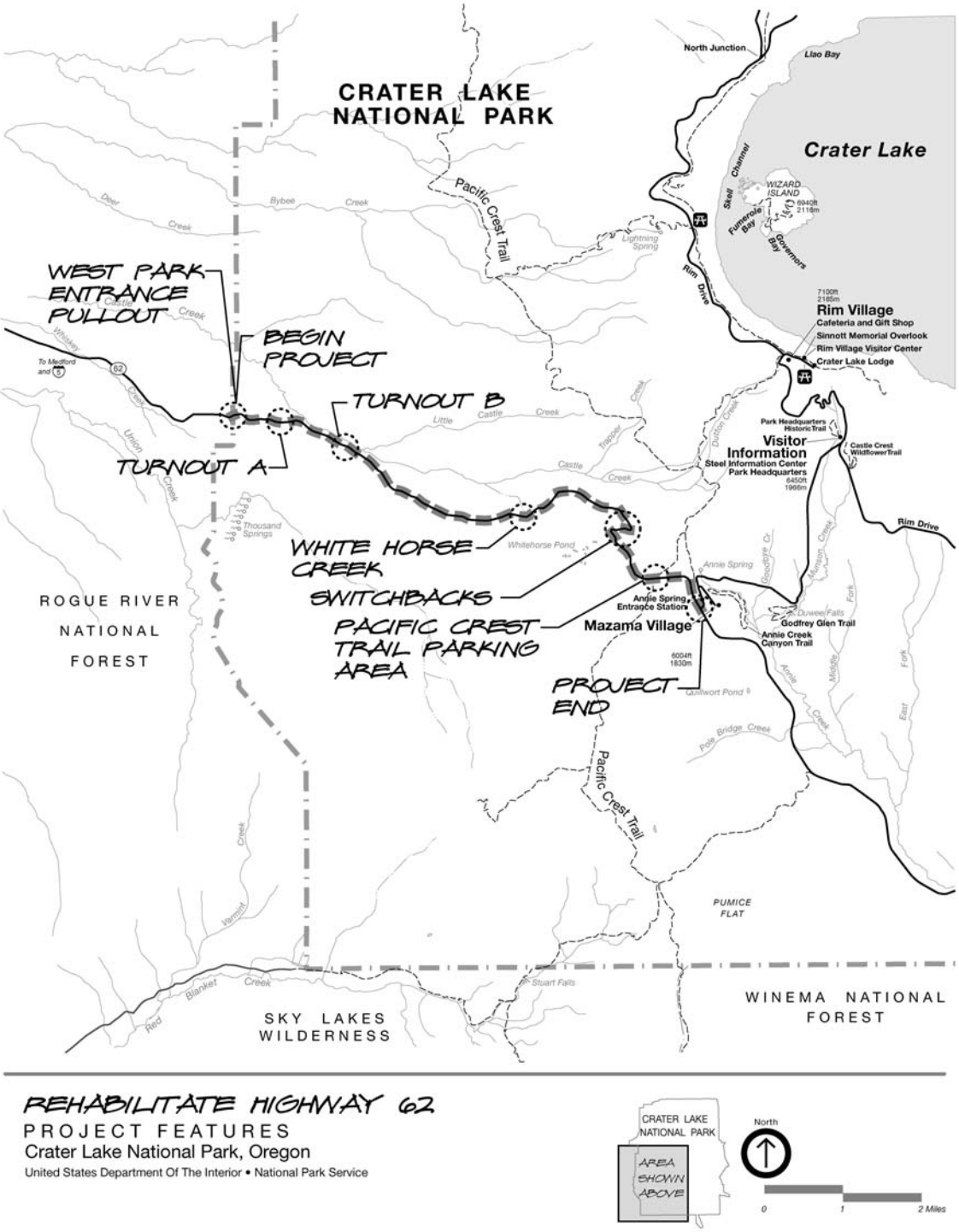

FIGURE 2. REHABILITATE HIGHWAY 62 WEST PROJECT FEATURES [NPS-DSC\OCT 02\106\20132]

- Crater Lake lies in a caldera that was left by the climactic eruption of Mount Mazama more than 7,700 years ago. The circular lake, which formed in the caldera, is considered by scientists to be a unique model for how small calderas evolve over geologic time. At a depth of 1,958 feet, Crater Lake is the seventh-deepest lake in the world, and holds the world record for clarity among lakes.
- In addition to the lake, the forests that surround Crater Lake remain unlogged and are largely preserved in their pristine condition. These mature forests harbor a variety of plant and animal life, which are characteristic of higher elevations in the Cascade Range. Because extensive alteration of forestland has taken place elsewhere in the Cascade Range, some of these plants and animals are rare. The park forests, combined with the surrounding forest landscape, provides a contiguous experience. Those forests within the park boundary add unique opportunities for solitary and wilderness experiences.
- Some of the nation's best examples of blending rustic architecture and other built features with a national park setting can be seen at Rim Village and at park headquarters in Munson Valley. Most of the structures at Rim Village and Munson Valley are listed on the National Register of Historic Places (NRHP).
- Crater Lake is of enduring importance to contemporary members of American Indian tribes because of its centrality to long-standing cultural traditions and resource harvesting activities, as well as its symbolic significance as a sacred site. The park is part of a larger cultural landscape that extends well beyond park boundaries.
- Crater Lake has been the object of scientific study for more than a century and is unique for the scientific research related to its pristine waters, associated geothermal activities, and unusual aquatic organisms.
- The unique natural and cultural resources of Crater Lake National Park provide exemplary opportunities for students and educators (NPS 2002a).

Park Mission

> *To forever preserve the beauty of Crater Lake National Park, its unique ecological and cultural heritage, and to foster understanding and appreciation through enjoyment, education, and inspiration (NPS 2000a).*

THE PURPOSE OF PARK ROADS

The purpose of a national park road is summarized in the "Park Road Design" memorandum dated 20 February 1986, from then National Park Service Director Mott:

> *"The purpose of park roads remains in sharp contrast to that of the Federal and State highway systems. Park roads are not intended to provide fast and convenient transportation; they are intended to enhance visitor experience while providing safe and efficient accommodation of park visitors and to serve essential management access needs."*

As stated in the 1984 *National Park Service Park Roads Standards*, among all public resources, those of the national park system are distinguished by their unique natural, cultural, scenic, and

recreational qualities; values that are dedicated and set aside by public law to be preserved for the benefit and enjoyment of people in such manner as will leave them unimpaired for future generations. Pragmatically, the protection, use, and enjoyment of park resources in a world of modern technology has necessitated the development of a system of public park roads; in most parks today, the basic means of providing for visitor and park administrative access is the park road system. For visitors, it is both a means and an end. It enables one visitor to reach a desired goal; for another, it is the goal. Thus, park roads are often an end unto themselves. Park roads also provide essential management access. Roads in national parks are unique in that park roads serve a distinctly different purpose from most other road and highway systems. Therefore, national park system road standards must also be unique.

The fundamental purpose of national parks—bringing humankind and the environment into closer harmony while balancing resource values and preservation—dictates that the quality of the park experience must be a primary consideration. Full use and enjoyment of a national park visit depends on its being a safe and leisurely experience. The distinctive character of park roads plays a basic role in setting this essential unhurried pace; generally, park roads are designed and planned for leisurely sightseeing. Additionally, park roads are designed with extreme care and sensitivity with respect to the natural, cultural, scenic, and recreational values through which they pass; unequivocally, sound planning and resource preservation practices dictate that park roads are laid lightly on the land and designed with extreme care. Where they exist, park roads are often narrow, winding, and hilly—but therein may lie their appeal.

Park roads are constructed only where necessary, and only as necessary, to provide access for the protection, use, and enjoyment of the natural, historical, cultural, scenic, and recreational resources, which constitute the national park system. Each segment of park roads relates to the resource traversed in a meaningful way and constitutes an enjoyable and informative experience in itself while providing the visitor with the utmost in visual quality, comfort, and safety. National park roads are fundamentally designed to maintain an overall continuing sense of intimacy blending with the countryside through which they pass. Where terrain and safety conditions permit and where such uses are advocated by the park's approved *Master Plan* or *General Management Plan*, opportunities are also provided for random stopping to enable visitors to more completely experience park resources.

Park roads are not intended or designed as continuations of the state and federal high-speed highway network, nor are they designed or designated to serve as connecting links to those systems. As such, park roads cannot accommodate all types of vehicles nor can they accommodate all levels of speed. While the travel industry continues to develop new kinds of vehicles, the National Park Service is not obliged to construct roads or to manage traffic so that all forms of modern transportation technology can be accommodated. Recent transportation trends have significantly affected the use of National Park Service roads. There have been substantial increases in the numbers of recreational vehicles, bicycles, tour buses, and smaller less powerful automobiles using park roads within the past few decades. The growth in popularity of recreational vehicles (which are characterized by greater dimensions, slower operation, and, frequently, inexperienced drivers) is a relatively recent phenomenon. The recreational vehicle (to include tour buses) represents a significant element in the traffic service and road design requirements on park roads. Design of park roads should reflect, to the extent possible where such vehicles are permitted, the fact that recreational vehicles have very different operational and safety characteristics than automobiles.

The growth in absolute numbers of recreational vehicles and tour busses on park roads has serious safety implications resulting from large numbers of long, wide vehicles operating on relatively narrow roads. The resultant increase in the number of repeated heavy-axle loadings is also detrimental to the service life of road pavements that were not originally designed for continuous use of such large, heavy vehicles.

When the condition of park roads is examined, a determination of the size and types of vehicles that can be safely accommodated is calculated and vehicle sizes and limits are sometimes established. In some instances, it is desirable for vehicles exceeding these limits to be restricted from a particular road or road segment, rather than reconstruct roads to higher standards. Such reconstruction may result in unacceptable consequences to park resources. Where vehicle restrictions are encouraged, appropriate alternatives include but are not limited to: restricting vehicle traffic beyond specific points; providing turn-arounds and parking areas for larger vehicles; reducing speed limits; and/or providing alternate transportation means.

Safeguarding visitor safety, providing quality recreation opportunities, and conducting sound planning and resource protection and management are paramount National Park Service goals. It is with these principles that National Park Service road standards have been developed to provide definitive guidelines for those involved in making decisions affecting traffic service and circulation of park visitors.

Functional Classifications of Park Roads

A park road system includes those roads within or providing access to a park or other unit of the national park system, which is administered by the National Park Service, or by the National Park Service in cooperation with other agencies. For purposes of functional classification, the routes that constitute a park road system are broadly grouped, based on use, into three principal categories: public use park roads; administrative park roads; and urban parkways and city streets. Each category has further subdivisions or classes based on the assignment of a functional classification to a park road. Road classification is not based on traffic volumes or speed, but on the intended use or function of that particular road or route.

Public Use Park Roads

All park roads that are intended principally for the use of visitors for access into and within a park are designated as a Public Use Park Road. This includes all roads that provide vehicular passage for visitors, or access to such representative park areas as to points of scenic or historic interest, campgrounds, picnic areas, trailheads, and similar features. County, state and U.S. numbered highways maintained by the National Park Service are included.

Administrative Park Roads

The Administrative Park Road category consists of all public and nonpublic roads intended to be used principally for administrative purposes necessary to carry out management objectives for the particular area. It includes roads servicing employee residential areas, maintenance areas, and other administrative developments as well as patrol roads, truck trails, and similar administrative roads.

Urban Parkways and City Streets

These facilities serve high volumes of park and nonpark-related traffic and are restricted, limited-access facilities in an urban area.

Functionally, because it provides access for visitor use and administrative needs, Highway 62 West in Crater Lake National Park is classified as a Public Use and Administrative Park Road.

Functionally, because it provides access for visitor use and administrative needs, Highway 62 West in Crater Lake National Park is classified as a Public Use and Administrative Park Road.

FEDERAL LANDS HIGHWAY PROGRAM

Approximately 30% of the land in the United States is under jurisdiction of the federal government. The Federal Lands Highway Program was created with the 1982 Surface Transportation Assistance Act. The primary purpose of the Federal Lands Highway Program is to provide funding for a coordinated program of public roads that serve the transportation needs of federal lands, which are not a state or local government responsibility. Federal Lands Highway Program roads serve recreational travel and tourism, protect and enhance natural resources, provide sustained economic development in rural areas, and provide needed transportation access for American Indians.

The Federal Highway Administration, through interagency agreements with federal land managing agencies including the National Park Service, administers a coordinated federal lands program consisting of forest highways, public lands highways, park roads and parkways, refuge roads, and reservation roads. This program provides funding for more than 90,000 miles of federally owned and public authority-owned roads, which serve federal lands. There are approximately 8,000 miles of park roads and parkways under jurisdiction of the National Park Service. Program funds may only be used on public roads under the jurisdiction of the National Park Service. General program responsibilities include:

- The National Park Service develops a priority program of projects within available funding.
- The program is jointly administered by the National Park Service and the Federal Highway Administration in accordance with interagency agreements.
- The Federal Highway Administration undertakes a majority of the design and construction and the National Park Service is responsible for planning, environment, and protection of park values.

This project, Rehabilitate Highway 62 West, would be funded through the Federal Lands Highway Program. The Federal Highway Administration, Western Federal Lands Highway Division, is a cooperating agency on the design of the project and the preparation of the environmental assessment.

SCOPING

Scoping is the effort to involve agencies and citizens in determining the nature and extent of issues to be addressed in this environmental assessment. Scoping determines important issues and eliminates issues that are not important; allocates assignments among the interdisciplinary team members and/or other participating agencies; identifies related projects and associated documents; identifies permits, surveys, consultations, etc. required by other agencies; and creates a schedule that allows adequate

time to prepare and distribute the environmental assessment for public review and comment before a final decision is made. Scoping includes any interested agency, or any agency with jurisdiction by law or expertise to obtain early input.

The staff of Crater Lake National Park, Federal Highway Administration, U.S. Forest Service, and resource professionals of the National Park Service, Denver Service Center, conducted internal scoping. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, determined the likely issues and impact topics, and identified the relationship of the proposed action to other planning efforts at the park.

A press release initiating public scoping and describing the proposed action was issued 26 June 2002 (appendix 1). Comments were solicited during a public scoping period. No comments were received. Letters were sent to tribes and agencies on 3 July 2002 (see "Consultation and Coordination" in appendix 2).

The undertakings described in this document are subject to section 106 of the National Historic Preservation Act, as amended in 1992 (16 *United States Code* (USC) 470 *et seq.*). The National Park Service conducted a survey for historic properties in July and August of 2002, and in a determination of eligibility, recommended the "Wagon Roads in Crater Lake (Western Half)" as eligible for listing in the National Register of Historic Places. The Oregon State Historic Preservation Office (SHPO) concurred on the determination of eligibility (see Appendix 2) and a copy of this environmental assessment will be sent to the Oregon SHPO in accordance with the Advisory Council on Historic Preservation regulations (36 CFR Part 800).

In accordance with section 7(c) of the Endangered Species Act of 1973, as amended (16 USC 1531 *et seq*.), it is the responsibility of the federal agency proposing the action, in this case the National Park Service, to determine whether the proposed action would adversely affect any listed species or designated critical habitat; this determination is documented in a letter to the U.S. Fish and Wildlife Service dated 23 August 2002 (see appendix 5).

ISSUES AND IMPACT TOPICS

Issues

Issues and concerns related to this proposal were identified from past planning efforts, input from park employees, the public, American Indian tribes, and state and federal agencies. The major issues relate to potential impacts to biotic communities; threatened and endangered species and species of concern; soils and geology; cultural resources; visitor use, traffic, and highway safety; park operations; air quality; and noise.

Derivation of Impact Topics

Specific impact topics were selected to focus discussion and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on

federal laws, regulations, and executive orders; 2001 *NPS Management Policies*; National Park Service knowledge of special or vulnerable resources, and scoping. A brief rationale for the selection of each impact topic is given below, as is the rationale for dismissing specific topics from further consideration.

Impact Topics Selected for Detailed Analysis

Biotic Communities

NEPA calls for an examination of the impacts on all components of affected ecosystems. National Park Service policy is to protect the components and processes of naturally occurring biotic communities, including the natural abundance, diversity, and ecological integrity of plants and animals (*NPS Management Policies* 2001a). The proposed action has the potential to affect biotic communities, so this impact topic is addressed in this environmental assessment.

Threatened and Endangered Species and Species of Concern

The Endangered Species Act (1973), as amended, 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. Several consultations have occurred between the National Park Service, Crater Lake National Park, and the U.S. Fish and Wildlife Service, Klamath Basin Field Office.

The U.S. Fish and Wildlife Service, Klamath Basin Field Office, provided updated species lists of federally threatened, endangered and proposed species that may be present on or in the vicinity of Crater Lake National Park (Klamath County). An updated list was received in April 2003 (see appendix 4). Based on the federal species list, there are six listed species and two candidate species that may occur in Klamath County, Oregon. Of these eight species, four species [shortnose sucker (*Chasmistes brevirostris*), Lost River sucker (*Deltistes luxatus*), Oregon spotted frog (*Rana pretiosa*), and yellow-billed cuckoo (*Coccyzus americanus*)] occur in habitats not found within the park or have not been observed in presence/absence surveys over the last eight years. A "No Effect" determination has been made for these species.

A meeting among Doug Laye and Leonard LeCaptain of the U.S. Fish and Wildlife Service, Klamath Basin Field Office, and Mac Brock, Chief, Resource Preservation and Research at Crater Lake National Park was held on 10 April 2003 to discuss the project's potential effects to the Canada lynx. The park has conducted three years of extensive surveys for Canada lynx (*Lynx canadensis*) in the park—no lynx have been detected. Within the project area there are patches of old growth stands that contribute to potential lynx habitat. However the patches associated with the project's road corridor and limited realignment would not be readily used and would probably be avoided by lynx due to the current and continued presence of traffic. Therefore, the U.S. Fish and Wildlife Service and National Park Service have determined that the project will have no effect on Canada lynx.

Three listed species are known or likely to reside within Crater Lake National Park. The species are:

- Bald Eagle (*Haliaeetus leucophalus*), federal threatened;
- Northern Spotted Owl (*Strix occidentalis caurina*), federal threatened; and
- Bull trout (*Salvelinus confluentus*), federal threatened.

The bald eagle is an occasional resident and may fly over the Highway 62 West corridor but would avoid vehicle and human activity. The bull trout is only located in the Sun and Lost Creeks outside of the project area. Therefore, the U.S. Fish and Wildlife Service and National Park Service have determined that the project will have no effect on the bald eagle or bull trout. The park determined that the proposed project "may affect" but was "not likely to adversely affect" the northern spotted owl. On 23 August 2002, Crater Lake National Park Superintendent, Charles Lundy, submitted a request for concurrence on the park's determination and the U.S. Fish and Wildlife Service concurred with that determination (5 September 2002) (see appendix 5).

Threatened and endangered species are addressed as an impact topic in this environmental assessment for the northern spotted owl—all other sensitive species have been dismissed from further discussion.

Soils and Geology

Because the proposed action involves ground-disturbing activities on previously undisturbed soil and further excavation of a quarry, soils and geology are addressed as impact topics in this environmental assessment.

Cultural Resources

The National Historic Preservation Act (16 USC 470 *et seq*.), NEPA, National Park Service Organic Act, *NPS Management Policies* (2001), Director's Order – 12: *Conservation Planning, Environmental Impact Analysis and Decision-making* (2001), and Director's Order – 28: *Cultural Resources Management Guideline* require the consideration of impacts on cultural resources either listed in, or eligible to be listed in, the NRHP. Cultural resources include archeological resources, cultural landscapes, historic structures and districts, and ethnographic resources. Although Crater Lake is known primarily as a natural park area, it does have significant cultural resources.

Historic Structures. A rock revetment wall, located in the area of the upper switchback curve, is a contributing structure to the "Wagon Roads in Crater Lake National Park (Western Half)" historic district. The National Park Service recommends and the Oregon SHPO concurred (see Appendix 2), that the historic district is eligible for listing in the NRHP. Therefore, historic structures are addressed under Cultural Resources in this environmental assessment.

Archeological Resources. In the vicinity of the project corridor are historic-period archeological sites, which include sites and isolated finds associated with segments of the Fort Klamath–Jacksonville wagon road. Highway 62 West passes over Whitehorse Creek in the vicinity of historic-period archeological sites. The park archeologist conducted a survey of this area in 2000.

In July and August 2002, a pedestrian survey, conducted by park cultural resource staff, employed 33-feet (10-meter) transect intervals at the proposed switchback realignment, at the Pacific Crest trailhead, the area around turnout B, and at the turnout to the west of Whitehorse Crossing. Meandering transects along each side of Highway 62 at Whitehorse Creek and the Old West Entrance were also employed. A portion of a 1911 road alignment was discovered roughly parallel Highway 62, east of the modern road in the switchback area.

As proposed in the preliminary design, the realignment of the switchbacks in the preferred alternative (alternative C) would avoid historic-period archeological resources, including the 1911 road, resulting in no impact to archeological resources in the switchback area. In other areas surveyed, all artifacts and features lie beyond the area of potential effect. A report documenting the results of the pedestrian

survey, together with an assessment of actions having an effect on cultural resources, was submitted to the Oregon SHPO on 9 September 2002.

The National Park Service would use archeological monitors, as necessary, in the project area to avoid disturbance of any as yet unknown cultural resources. Because archeological resources would be avoided through highway design, no impacts to archeological resources are anticipated. However, due to the proximity to known archeological resources, this topic is addressed under the Cultural Resources heading in this environmental assessment.

Visitor Use, Traffic, and Highway Safety

An estimated 445,000 people visited the park area in 2001. The proposed project is a major access route to the lake and is needed to improve driving conditions. All alternatives in this document have the potential to impact visitor use, traffic, and highway safety. Therefore, visitor use, traffic, and highway safety are addressed as impact topics in this environmental assessment.

Park Operations

Crater Lake National Park receives an average of 522 inches of snow each winter. Although the proposed project would not diminish the need for or level of snow removal, it would improve snow removal operations. The roadway is prone to potholing and a new road surface would minimize maintenance and repairs. Therefore, these activities under park operations are addressed as an impact topic in this environmental assessment.

Air Quality

The 1963 Clean Air Act, as amended (42 USC 7401 *et seq*.), requires federal land managers to protect park air quality, while the 2001 *NPS Management Policies* address the need to analyze air quality during park planning. Crater Lake National Park was designated Class I under the 1963 Clean Air Act, as amended. A Class I area is subject to the most stringent regulations of any designation.

Should any of the action alternatives be selected, local air quality would be temporarily affected by dust and vehicle emissions. Therefore, air quality is addressed as an impact topic.

Noise and Soundscapes

In accordance with *NPS Management Policies* (2001) and Director's Order – 47: *Sound Preservation and Noise Management*, an important part of the National Park Service mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. The frequencies, magnitudes, and duration of human-caused sound considered acceptable varies among National Park Service units, as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

Construction projects would be accomplished under the implementation of either alternative B or C. Equipment and vehicles involved in hauling, construction activities, and removal of existing switchbacks (alternative C) would generate the primary source of noise. Therefore, soundscapes and noise are addressed as an impact topic in this environmental assessment.

Impact Topics Dismissed From Detailed Analysis

Wilderness Values

The Wilderness Act of 1964 "established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as 'wilderness areas,' and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness." Among other mandates are the protection of wilderness areas and the preservation of their wilderness character. Wilderness characteristics are defined in the Wilderness Act as:

- The earth and its community of life are untrammeled by humans, where humans are visitors and do not remain.
- The area is undeveloped and retains its primeval character and influence, without permanent improvements or human habitation.
- The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable.
- The area is protected and managed so as to preserve its natural conditions.
- The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Park staff proposed wilderness boundaries in 1974, 1984, and 1994. The 1994 proposal, based on the 1984 Crater Lake Road Improvement Study, modified earlier 1974 and 1984 wilderness proposals and delineated clearer boundaries for areas excluded from the wilderness designation.

The 1994 wilderness proposal included all of the acreage in Crater Lake National Park with exclusions for road corridors, utility lines, and administrative sites. "The road corridor is defined as being 200 feet from centerline for all roads, adjacent viewpoints, or picnic areas regularly maintained for motorized access by visitors. This corridor will allow for regular maintenance and hazard tree management and excludes a total of 2,430 acres in the park from wilderness designation. Other exclusions from wilderness associated with the road corridor are a 600-foot radius from the intersection of where some currently maintained trails intersect with roads. This was made to permit needed future development at trailheads where visitor safety necessitates additional parking and signage."

The legislative process has not been completed for the Crater Lake National Park Wilderness Designation proposal. However, it is the policy of the National Park Service (2001 *NPS Management Policies*, Chapter 6: Wilderness Preservation and Management) to "take no action that would diminish the wilderness suitability of an area possessing wilderness characteristics until the legislative process has been completed. Until that time, management decisions pertaining to lands qualifying as wilderness will be made in expectation of eventual wilderness designation. This policy also applies to potential wilderness, requiring it to be managed as wilderness…"

Although some construction work on the road would be near the proposed wilderness boundary, proposed wilderness lands would be avoided during construction activities. In all alternatives, the road would remain in the area excluded from proposed wilderness designation (see figure 6). Prior to construction, the construction zone would be surveyed and construction tape, snow fencing, or some similar border material would be installed along the boundary. The border material would delineate the construction zone and no construction work, movement, or other activity would be allowed beyond the border material into proposed wilderness lands. There would be no long-term adverse consequences to

proposed federally designated wilderness lands or potential wilderness values or solitude should the proposal be selected. Therefore, wilderness values has been dismissed as an impact topic in this environmental assessment.

Ecologically Critical Areas, Wild and Scenic Rivers, Other Unique Natural Areas

Crater Lake National Park is an important natural area and has unique and fragile areas including Llao Rock, Pumice Desert, Desert Creek, Sphagnum Bog Research Natural Areas, Boundary Springs, Sand Creek Pinnacles, and Thousand Springs. The proposed action would not threaten the qualities and resources that make these areas or Crater Lake National Park special. There is proposed critical habitat for the bull trout. Proposed habitat for the bull trout is outside of the project area (Bowerman pers. comm. 2003). There are no existing or potential Wild and Scenic Rivers within the park. Therefore, Wild and Scenic Rivers was dismissed as an impact topic in this environmental assessment.

Floodplains, Water Quality, and Wetlands

Executive Order 11988 (*Floodplain Management*) requires an examination of impacts to floodplains and potential risk involved in placing facilities within floodplains. *NPS Management Policies*, Director's Order – 2: *Planning Guidelines*, and Director's Order – 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* provide guidelines for proposals in floodplains. The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. *NPS Management Policies* provide direction for the preservation, use, and quality of water in national parks. Executive Order 11990 (*Protection of Wetlands*) requires an examination of impacts to wetlands.

The construction limits are outside of floodplains and not near water bodies. Floodplains and water quality would not be affected by the proposed action. There are no jurisdictional or National Park Service-defined wetlands within the project area. Therefore, floodplains, water quality, and wetlands was dismissed as an impact topic in this environmental assessment.

Cultural Landscapes

As described by the National Park Service *Cultural Resource Management Guideline* (Director's Order – 28), a cultural landscape is: "...a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions." There are no cultural landscape features identified in the immediate area of the road corridor that could be affected by current project actions; therefore, cultural landscapes were dismissed as an impact topic in this environmental assessment.

Ethnographic Resources

The National Park Service defines ethnographic resources as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (Director's Order – 28: *Cultural Resource Management Guideline*, p.181). Because no ethnographic resources are known to exist in or in proximity to the project area (S.M. pers. comm. 2002), ethnographic resources were dismissed as an impact topic in this environmental assessment.

Indian Trust Resources

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

There are no Indian trust resources in Crater Lake National Park. The lands comprising Crater Lake National Park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, Wild and Indian trust resources was dismissed as an impact topic in this environmental assessment.

Museum Objects

The National Park Service defines a museum object as a material thing possessing functional, aesthetic, cultural, symbolic, and/or scientific value, usually moveable by nature or design (NPS Director's Order – 28: *Cultural Resource Management* 1998). Because there are no museum collections in the proposed project areas, museum objects was dismissed as an impact topic in this environmental assessment.

Prime and Unique Farmlands

In 1980, the Council on Environmental Quality directed that federal agencies assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's Natural Resources Conservation Service as prime or unique. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. There are no prime or unique farmlands associated with the project area; therefore, prime and unique farmlands was dismissed as an impact topic in this environmental assessment.

Environmental Justice

Executive Order 12898 (*General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*) requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. No alternative would 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 in this environmental assessment.

Lightscapes

In accordance with *NPS Management Policies* (2001), the National Park Service strives to preserve natural ambient landscapes, which are natural resources, and values that exist in the absence of human-caused light. Lightscapes would not be affected by the proposed action; therefore, lightscapes was dismissed as an impact topic in this environmental assessment.

Scenic Resources

In the evaluation of scenic quality, both the visual character and visual quality of a viewshed are considered. A viewshed comprises the limits of the visual environment associated with the proposed action. The park road has been in place for decades. The proposed action does not expand or change the road corridor, nor does it create any scenic vistas. During the construction period there would be effects due to the presence of construction equipment, but these effects would be short term and would occur within an existing developed road corridor having a negligible effect on park scenic values. Therefore, scenic resources was dismissed as an impact topic in this environmental assessment.

Socioeconomic Environment

The socioeconomic environment consists of local and regional businesses and residents, the local and regional economy, park concessions, and land use. The local economy and most business of the communities surrounding the park are based on professional services, construction, educational research, tourist sales and services, and recreation; the regional economy is strongly influenced by tourist activity.

Local and Regional Economy. Should the preferred alternative be implemented, short-term economic benefits from construction related expenditures and employment would include economic gains for some local and regional businesses and individuals.

Land Use. The project area is a transportation corridor. The park is bounded on the northeast, south, and east by the Winema National Forest; on the north by the Umpqua National Forest; and on the northwest, west, and southwest by the Rogue River National Forest and Sky Lakes Wilderness Area. In addition, the park adjoins Sun Pass State Forest and an 80-acre block of private land on the southeast corner. The preferred alternative would not change present and future parkland use, transportation patterns, or those uses of surrounding lands.

There would be short-term benefits to the local and regional economy and local and regional businesses should the preferred alternative be selected and implemented. There would be no effects to present or future land use. Therefore, socioeconomic environment was dismissed as an impact topic in this environmental assessment.

Wizard III Quarry, Rogue River National Forest

All fill and rock could be obtained from the existing 5.7-acre U.S. Forest Service Wizard III Quarry. The Wizard III Quarry is approximately 22 miles (driving distance) northwest of the project area in the Rogue River National Forest on Forest Road 6530 and 6535. The quarry has been used in the past as a rock source for U.S. Forest Service road construction. The quarry contains sufficient material for either of the action alternatives (K. Cook, FHWA 2002, pers. comm.). The construction contractor would also use the quarry site for batch mixing and as a staging area. Figure 3 shows the quarry and the excavation area that would be required for the action alternatives.

The quarry site is dominated by mountain hemlock forest. Use of the Wizard III Quarry would result in the removal of small stands of young ponderosa pine and Douglas-fir tree plantings from a previously logged forest community, resulting in a long-term, negligible, adverse effect. Expansion of the Wizard III Quarry would have no effect on threatened and endangered species (see appendix 3).

The forest archeologist has determined that this use is exempted from case-by-case study under the Programmatic Agreement (Northwest Forest Plan 1994, Appendix A) with the SHPO. Due to the

nature of the proposed action, surveys would not be required (Hays, U.S. Forest Service, pers. comm. 2002). This area has also been previously logged (see appendix 3).

An asphalt batch plant and rock crushing unit would be located at the Wizard III Quarry. The operation of the batch plant and rock-crushing unit require an Oregon air discharge permit. Emissions would be regulated and controlled through permit stipulations. Effects to air quality would be short-term, negligible, and adverse.

Volcanic rocks, mostly andesite with small amounts of breccia, would be excavated and crushed to smaller sizes and to aggregate at the Wizard III Quarry site. It is estimated that 15,000-cubic yards of aggregate would be necessary for alternative B, and an estimated 35,000-cubic yards of aggregate would be necessary for alternative C. Approximately, 2 acres (0.8 hectare) of surface area (previously unexcavated soils) would be affected during quarry excavation activities. Most of the aggregate would be excavated from areas previously mined, rendering the quarry deeper. Approximately, 1.6 acres (0.6 hectare) of surface area (previously unexcavated soils) would be affected during quarry excavation activities. This would constitute a negligible, long-term, adverse effect to soils and geology at the quarry.

Use of the area would be in full compliance with the Rogue River National Forest Land and Resource Management Plan (1990) as amended by the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and attached Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (Northwest Forest Plan 1994). Therefore, further analysis of effects to the Wizard III Quarry site are not included in this environmental assessment.

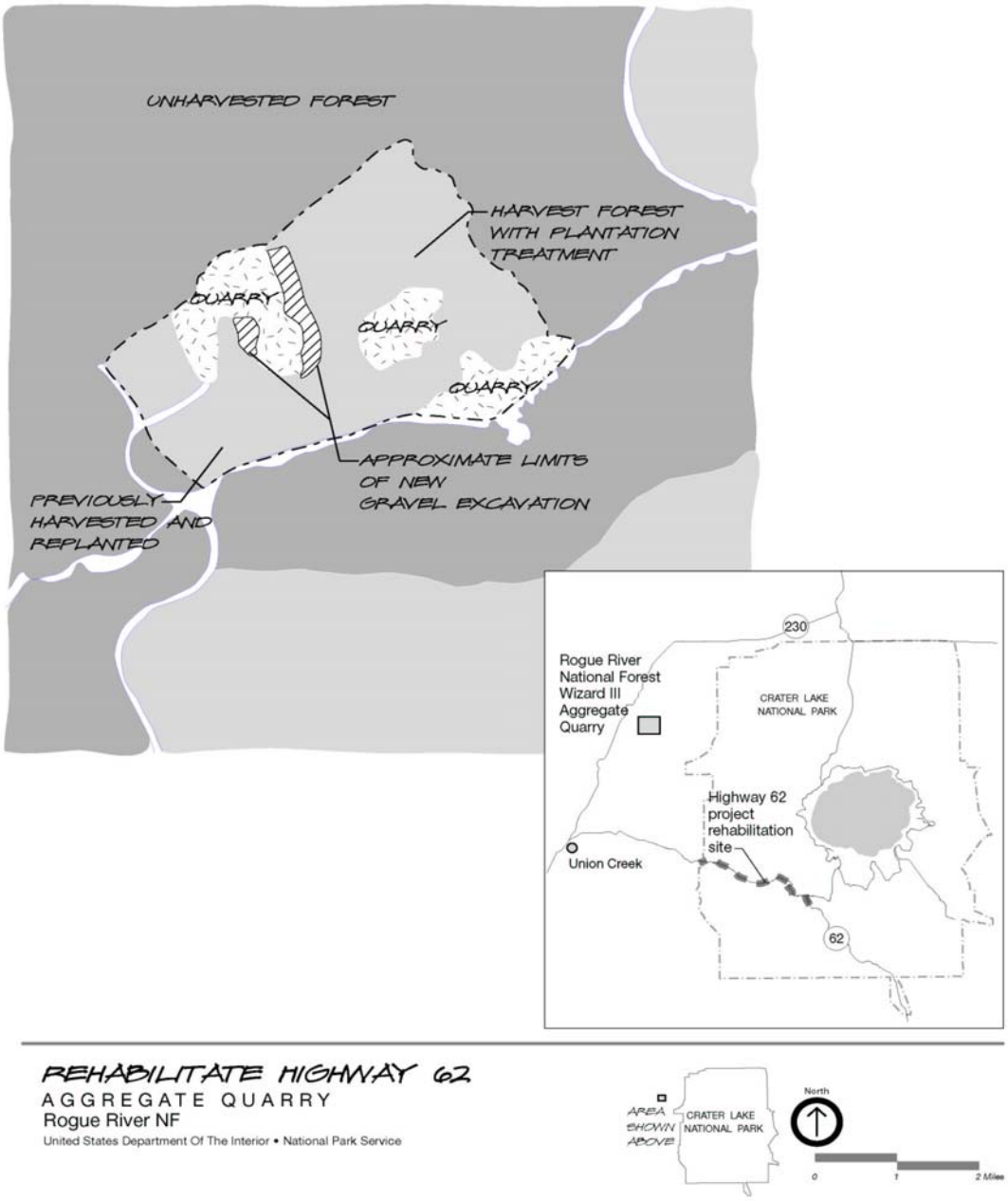

FIGURE 3. WIZARD III QUARRY [NPS-DSC\OCTO2\106\20133]

ALTERNATIVES

INTRODUCTION

This section describes a no-action and two action alternatives for roadway improvements at Crater Lake National Park. Alternatives were developed to provide an enjoyable and reliable roadway while preventing loss of natural and cultural resources and improving operational efficiency and sustainability.

ALTERNATIVE A: NO-ACTION ALTERNATIVE

The no-action alternative would be the continuation of existing conditions. The no-action alternative would leave Highway 62 West as it is today. Deficiencies include deteriorating pavement, inadequate drainage, and sharp curves with poor sight distances. The no-action alternative does not preclude short-term, minor activities (e.g., limited safety and drainage improvements or normal highway maintenance activities) that would be part of routine maintenance for continuing operations of the existing roadway.

Should the no-action alternative be selected, Crater Lake National Park would respond to future needs and conditions associated with the roadway without major actions or changes from the present course.

ALTERNATIVE B: RESURFACING, RESTORATION, AND REHABILITATION

Roadway

This alternative refers to resurfacing, restoration, and rehabilitation of the existing roadway starting at milepost 65.5, the western boundary of the park, and ending at milepost 73.2, just west of Annie Springs Junction. It is intended to improve poor pavement conditions, restore adequate drainage, and improve sight distances. New traffic control and informational signage would be installed. The road would be improved within the existing road alignment; no widening would take place. It would include recycling a portion of the existing roadway surface and base; laying, leveling, and compacting this material; and applying a 3-inch asphaltic concrete overlay. Subexcavation of unsuitable sub-grade material and backfill with free-draining sub-base would be performed, as necessary.

Guardrails would be maintained, replaced, or added as determined necessary for safety. Guardrails not needed would be removed and stored, if in good condition, by the park for reuse at another location. Culverts that are partially plugged would be cleaned to improve drainage. Cuts and fill slopes would be between 1.5:1 (1 foot vertical rise to 1.5 feet of horizontal run) and 2:1 (1 foot vertical rise to 2 feet of horizontal run).

Topsoil and forest duff from the project site would be salvaged and stored to restore areas of disturbance. The storage would be within the existing Highway 62 West corridor or at designated staging sites on previously disturbed ground.

Proposed Turnouts

Three existing turnouts would be modified to improve resource conditions or visitor use. Currently, at the western boundary (see figure 2), the turnout is only partially paved. The unpaved portion would be obliterated, re-ditched to improve runoff, and revegetated, thus reducing erosion problems at this site. The paved portion would be resurfaced with an asphalt overlay like the roadway.

The turnout at milepost 66.4 (labeled turnout A on figure 2; a kiosk is currently being installed and a vault toilet will be installed at a later date) would be rehabilitated. A small portion of the turnout, approximately 33 by 50 feet (10 by 15 meters) would be removed and revegetated. Removing the perpendicular park area of the turnout at the old West Entrance eliminates parking that is incompatible with the remainder of the turnout and improves circulation and egress.

A turnout on the south side of Highway 62 West at milepost 67 (labeled turnout B on figure 2) is seldom used and would be obliterated and revegetated. The turnout to the east on the north side of the road would be rehabilitated.

Whitehorse Creek Crossing

The road segment from milepost 69.5 to milepost 69.7 is referred to as Whitehorse Crossing. The road gains elevation over a small hill on the west side of a curve. For travelers heading east (toward the lake), the gain in elevation is enough to create a visual barrier of the upcoming (blind) curve. Park staff have reported accidents occurring in this area (Toso pers. comm. 2002). This alternative would reduce the profile of the hill (flatten the road) to increase sight distance, raise the super-elevation of the curve (raise the outside of the curve) to help keep vehicles in the roadway, improve the horizontal alignment for safety, and provide additional signage (figure 4).

Cut and fill slopes in this area would be 2:1. This would keep new disturbance to a minimum, avoid snags (dead trees used by wildlife species as habitat) and large trees, and prevent the placement of fill into the ephemeral Whitehorse Creek.

Switchbacks

The road segment from milepost 71.1 to milepost 71.5 contains two switchbacks. In this alternative, the roadway would be resurfaced and rehabilitated, and widened to the greatest extent possible within the existing alignment to assist with wider tracking vehicles. The road would remain in the existing alignment and within the previously disturbed area.

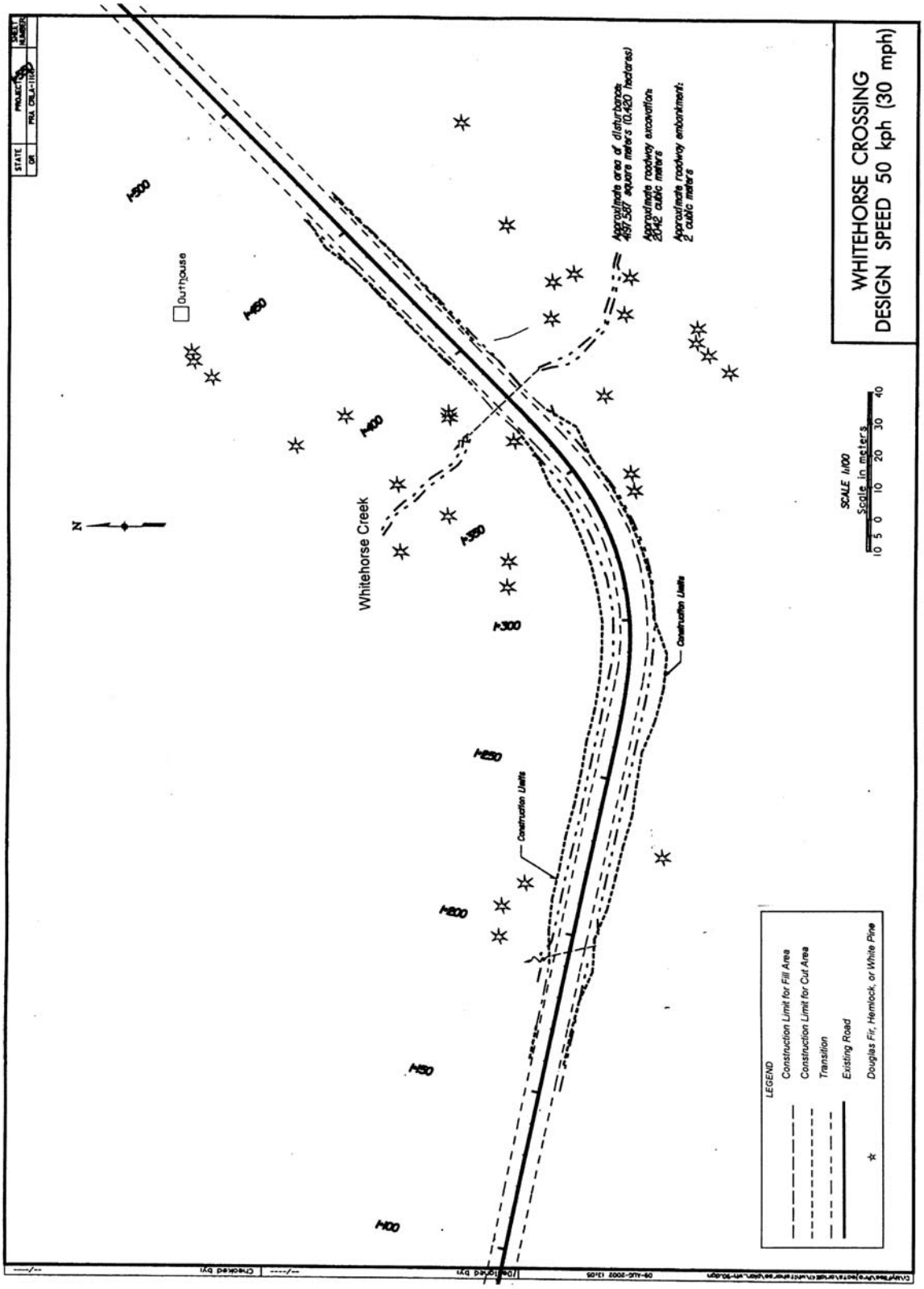

FIGURE 4. WHITEHORSE CROSSING PROPOSED PROFILE REDUCTION [NPS-DSC\OCT02\106\20134]

Pacific Crest Trail Parking Lot

The Pacific Crest Trail parking lot entry is located at milepost 72.5. This parking lot is designed for horse and stock access to the trail. The access drive to the parking lot is at an approximate 45-degree angle to the road, making it difficult for vehicles pulling trailers to enter and exit the lot onto and off of the 45-mph highway. Under this alternative, the access drive would be realigned to the west to create a perpendicular "T" intersection with Highway 62 West (figure 5). The parking lot and drive would be resurfaced and graded for drainage with a 4- to 6-inch aggregate cover. The abandoned portion of the access drive would be scarified and allowed to revegetate.

ALTERNATIVE C: PREFERRED ALTERNATIVE – RESURFACING, RESTORATION, REHABILITATION, AND REALIGNMENT

Under this alternative, the road would be improved as described in alternative B. Additionally, approximately 1.5 miles of roadway—the switchbacks—would be flattened (widen the turning radius), requiring construction on roadless land adjacent to the existing road. The tight radii of the switchbacks create operational difficulties for large vehicles, including snowplows and long recreational vehicles. The new alignment would widen the curves and lengthen sight distance (figure 6).

The road grade would be maintained at approximately 6.5%. The centerline of the lower curve would be moved approximately 164 feet (50 meters) to the west, and the centerline of the upper curve would shift approximately 150 feet (45 meters) to the east. The abandoned road alignment would be restored. Along the upper switchback (southern switchback) the slope would be steepened to 1.5:1 to avoid the revetment wall, otherwise the slope would remain at 2:1. Tree wells would be installed around six trees over 10-feet tall (Western pine (*P. monticola*) or Sugar pine (*P. lambertiana*)), at or near the toe of the fill slope to protect them.

MITIGATION MEASURES COMMON TO ACTION ALTERNATIVES

General

The Highway 62 West rehabilitation project would begin in May 2004, or as soon as the road is clear of snow. The construction season is generally May through October. It is anticipated that the project would take two seasons to complete, possibly three, including revegetation efforts. However, construction could be delayed by weather conditions, available funding, or other unexpected events.

Mitigation

Mitigation measures were analyzed as part of the action alternatives to rehabilitate Highway 62 West. Mitigation measures discussed below have been prepared to lessen or eliminate any potential adverse effects of alternatives B and C.

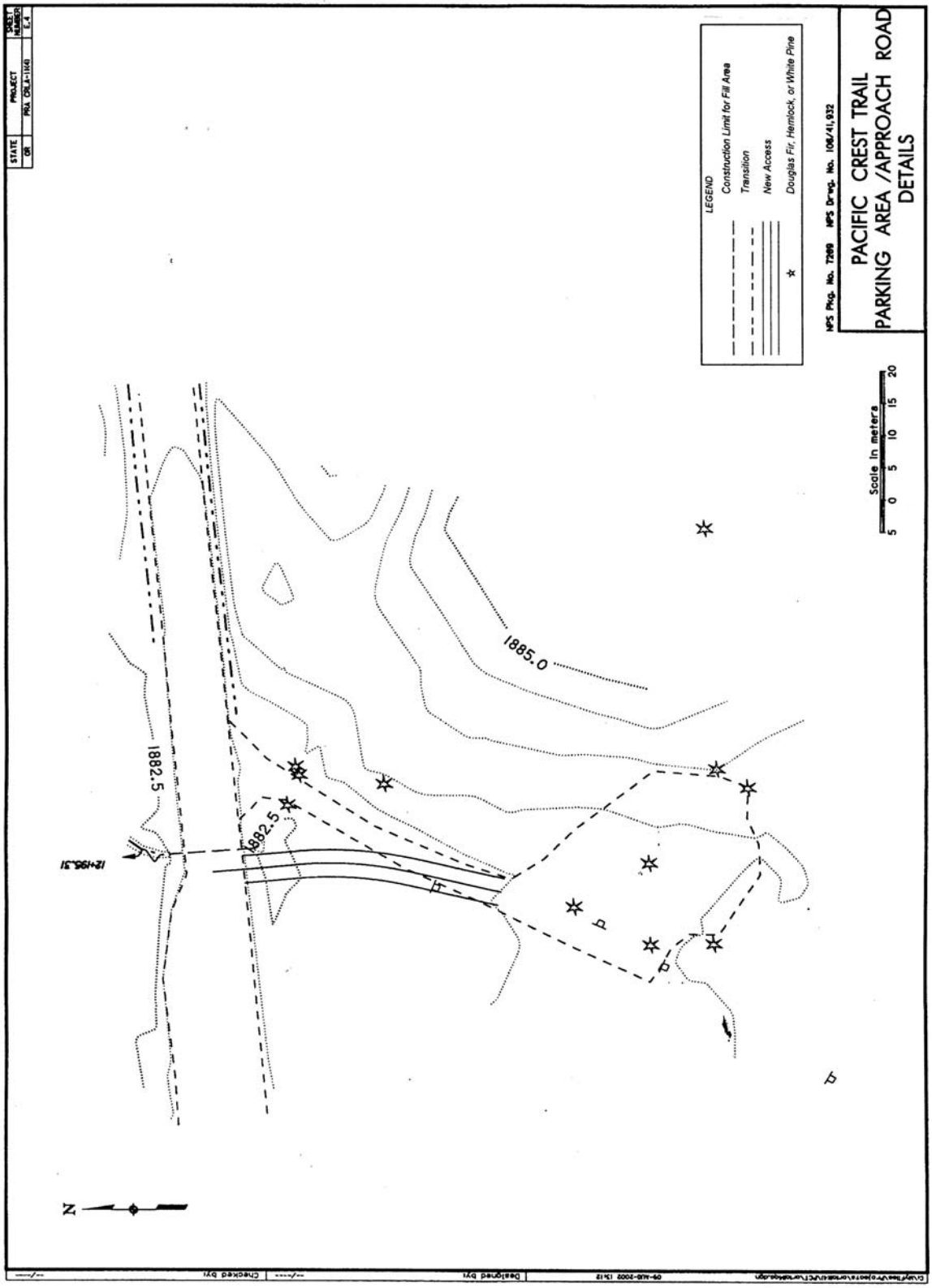

FIGURE 5. PACIFIC CREST TRAIL ACCESS DRIVE REALIGNMENT [NPS-DSC\OCT02\106\20135]

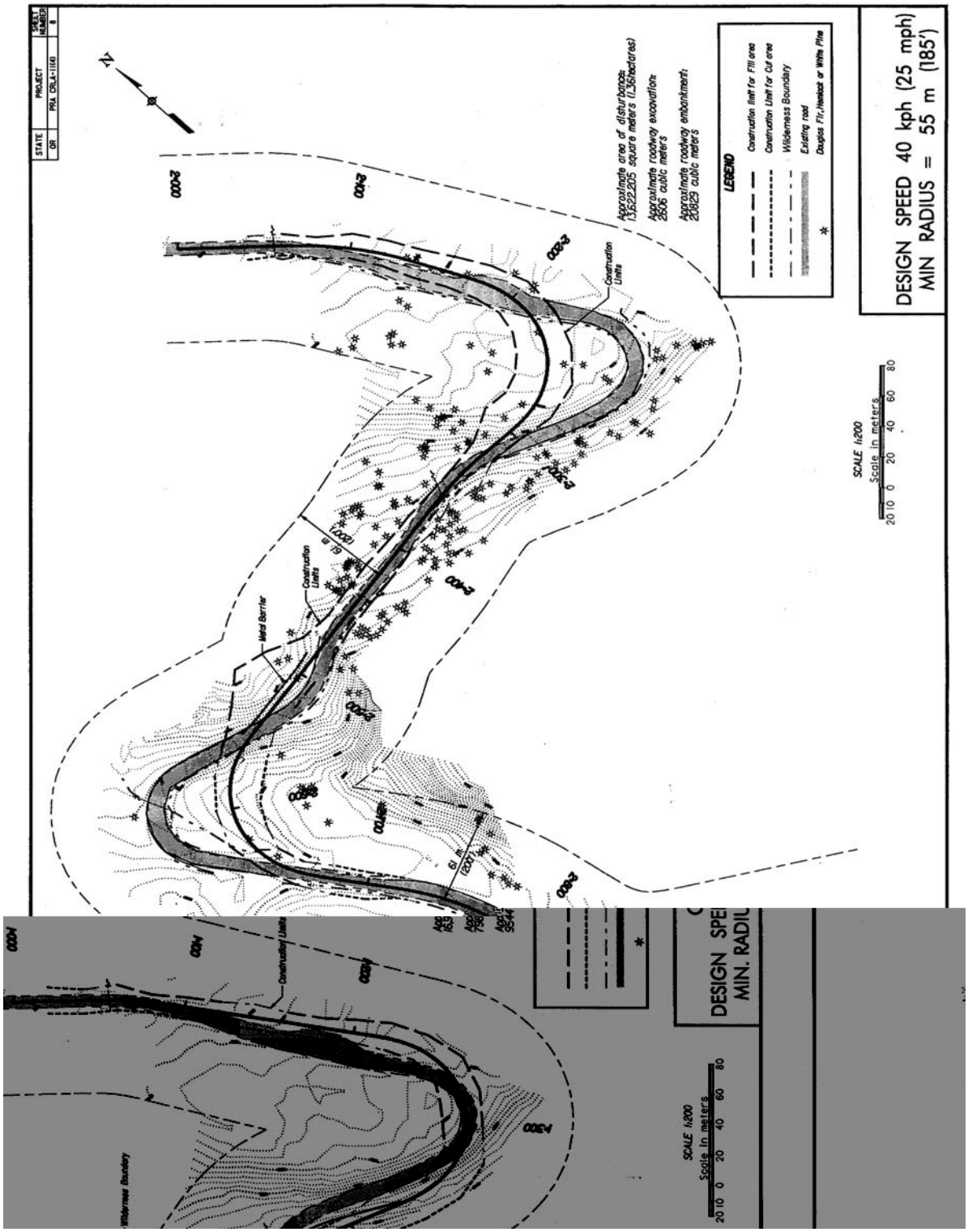

FIGURE 6. PROPOSED SWITCHBACK REALIGNMENT [NPS-DSC\OCT02\106\20136]

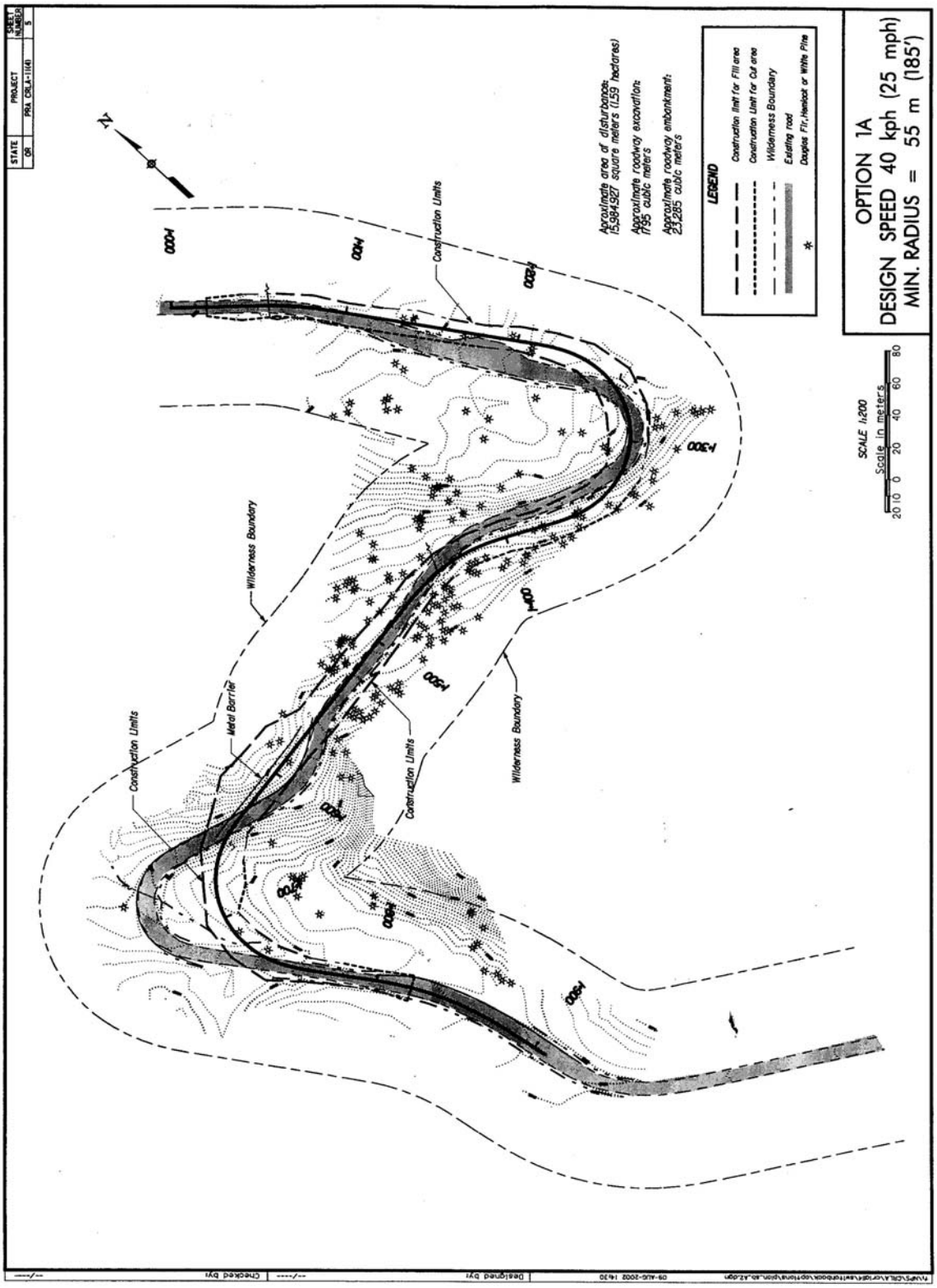

FIGURE 8. OPTION 1A — ALTERNATIVE CONSIDERED BUT ELIMINATED [NPS-DSC\OCT02\106\20138]

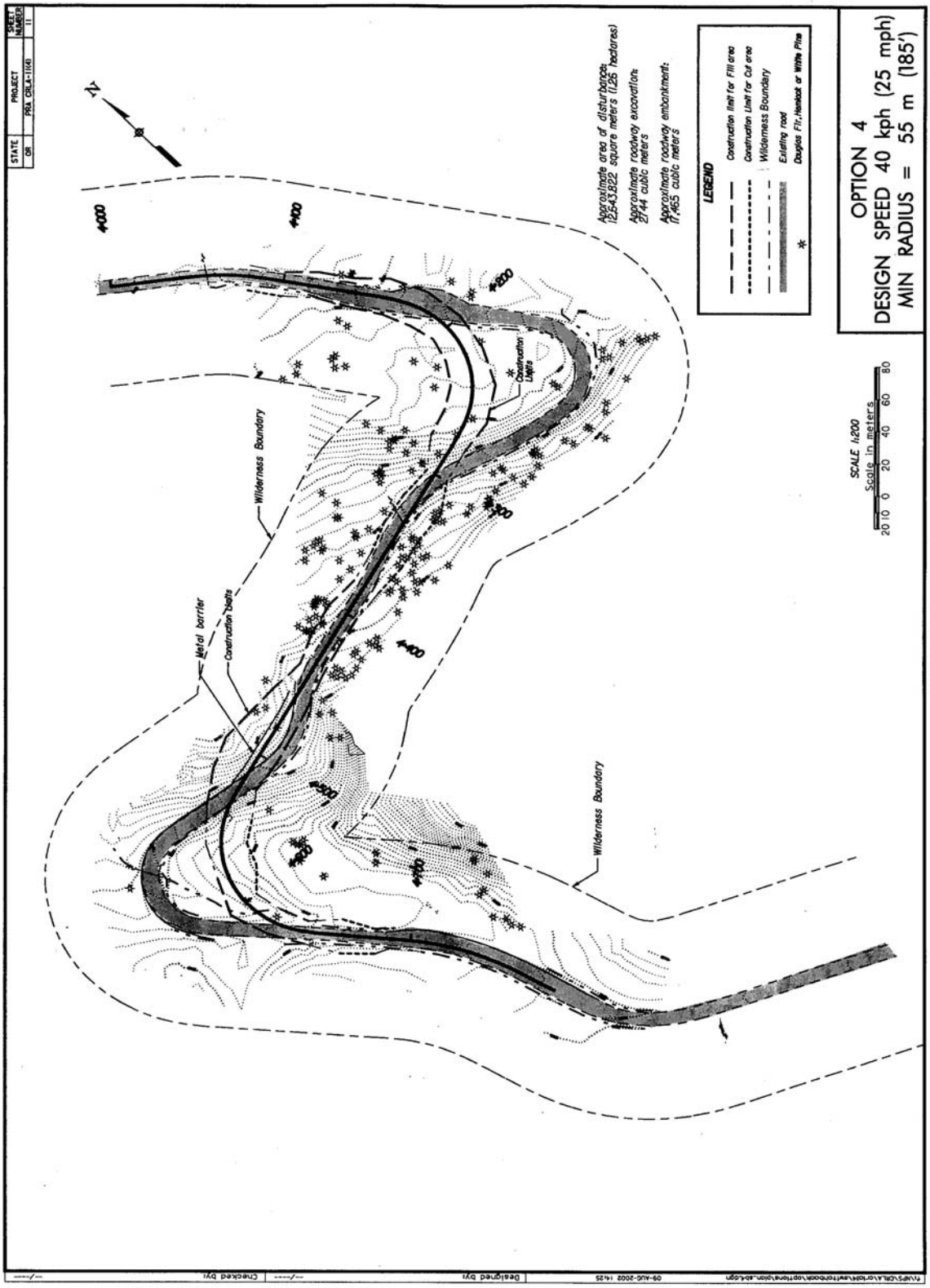

FIGURE 9. OPTION 4 — ALTERNATIVE CONSIDERED BUT ELIMINATED [NPS-DSC\OCT02\106\20139]

COMPARATIVE SUMMARY OF NO-ACTION AND ACTION ALTERNATIVES

TABLE 1. COMPARATIVE SUMMARY OF ALTERNATIVES

Alternative A: No Action	Alternative B: Resurfacing, Restoration, and Rehabilitation	Alternative C: Preferred Alternative – Resurfacing, Restoration, Rehabilitation, and Realignment
There would be no improvements to Highway 62 West. Park managers would respond to future roadway needs without major actions or changes from the present course. This alternative does not meet the purpose and need for the project	The existing Highway 62 West would be rehabilitated between the west park boundary and near Annie Springs Junction to improve pavement, repair deteriorated and inadequate drainage facilities, and reduce accidents. The roadway would remain within the existing road bench with two 11-ft. paved travel lanes plus two 2-ft. paved shoulders. The access drive to the Pacific Crest Trail parking lot would be re-aligned perpendicular to the highway. The hill to the west of Whitehorse Crossing would be flattened to improve sight distance. The curves at the switchback would be widened to improve tracking for long-wheel-based vehicles. Guardrails would be added in some locations. One turnout and a portion of another turnout would be removed. Culverts would be cleaned. The Wizard III Quarry in Rogue River National Forest could be used for needed aggregate materials. This alternative does not address all operational deficiencies or sufficiently improve snow removal operations as defined in the purpose and need.	The existing Highway 62 West would be rehabilitated between the west park boundary and near Annie Springs Junction to improve pavement, repair deteriorated and inadequate drainage facilities, and reduce accidents. The roadway would remain within the existing road bench with two 11-ft. paved travel lanes plus two 2-ft. paved shoulders. The switchbacks, approximately 1.5 miles of roadway, would be moved onto a new alignment to increase the turning radius. The access drive to the Pacific Crest Trail parking lot would be realigned perpendicular to the highway. The hill to the west of Whitehorse Crossing would be flattened to improve sight distance. Guardrails would be added in some locations. One turnout and a portion of another turnout would be removed. Culverts would be cleaned. The Wizard III Quarry in Rogue River National Forest could be used for needed aggregate materials. This alternative does address operational deficiencies and provides the best improvements for snow removal operations, therefore, meets the purpose and need for the project.

COMPARATIVE SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

TABLE 2. COMPARATIVE SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

Impact Topic	Alternative A: No Action	Alternative B: Resurfacing, Restoration, and Rehabilitation	Alternative C: Resurfacing, Restoration, Rehabilitation, and Realignment (Preferred Alternative)
Biotic Communities	No change in impacts to biotic communities	Alternative B would have a short-term, negligible to minor, adverse effect on biotic communities during construction. A long-term, negligible, adverse impact on roadside vegetation and wildlife would continue. A long-term, negligible, beneficial effect would occur where habitat is restored.	Alternative C would have a short-term, minor, adverse effect on biotic communities during construction. A long-term, negligible, adverse effect on biotic communities, and a long-term, negligible, beneficial effect where habitat is restored.
Threatened and Endangered Species	No change in impacts to threatened and endangered species	Alternative B may affect but would not adversely affect the northern spotted owls occupying the activity center approximately 900 meters north of Highway 62 West.	Alternative C may affect but would not adversely affect the northern spotted owls occupying the activity center approximately 900 meters north of Highway 62 West.
Soils and Geology	No change in impacts to soils and geology	Soils impacts from road reconstruction would be long term, localized, adverse, and negligible in intensity. There would be no impacts to geology.	Geology impacts from road reconstruction would be long term, localized, adverse, and negligible to minor in intensity.
Cultural Resources - *Archeological Resources*	No disturbance and no impact on previously recorded archeological resources	No disturbance and no impact on previously recorded archeological resources	No disturbance and no impact on previously recorded archeological resources
Cultural Resources - *Historic Structures*	No disturbance and no impact to historic structures	No disturbance and no impact to historic structures	No disturbance and no impact to historic structures
Visitor Use, Traffic, and Highway Safety	No change in impacts to visitor use and highway safety	Alternative B would have short-term, negligible to minor, adverse impacts on traffic and visitor use, and short-term, negligible, beneficial effect on safety. Alternative B would have a long-term, negligible, beneficial effect on visitor use, traffic, and safety.	Alternative C would have short-term, minor, adverse impacts on traffic and visitor use, and short-term, negligible, beneficial effect on safety. Alternative C would have a long-term, minor beneficial effect on visitor use, traffic, and safety.
Park Operations	No change in impacts to park operations	Long-term and negligible beneficial effects on park operations, particularly snow removal operations resulting from an improved road surface.	Long-term and minor beneficial effects on park operations, particularly snow removal operations resulting from an improved road surface and flattened curves.
Air Quality	No impacts to air quality	Air quality impacts from dust and construction equipment emissions would be short term, adverse, and negligible. There would be no long-term impacts.	Air quality impacts from dust and construction equipment emissions would be short term, adverse, and negligible. There would be no long-term impacts.
Soundscapes and Noise	No impacts to soundscapes and noise	Soundscape and noise quality impacts from construction equipment would be short term, adverse, and negligible to minor along the project corridor, and minor to moderate at the Pacific Crest Trail and Highway 62 West intersection	Soundscape and noise quality impacts from construction equipment would be short term, adverse, and negligible to minor along the project corridor, and very short term, adverse, and minor to moderate at the Pacific Crest Trail and Highway 62 West intersection

COMPARATIVE SUMMARY OF POTENTIAL LONG-TERM IMPACTS

TABLE 3. COMPARATIVE SUMMARY OF POTENTIAL LONG-TERM IMPACTS

Impact Topic	Alternative A: No Action	Alternative B: Resurfacing, Restoration, and Rehabilitation	Alternative C: Resurfacing, Restoration, Rehabilitation, and Realignment
Biotic Communities	No change from present conditions	Negligible, adverse impact on roadside vegetation and wildlife would continue Negligible, beneficial effects would occur where habitat is restored	Minor, adverse Minor, beneficial effects where habitat is restored
Soils and Geology	No change from present conditions	Localized, adverse, and negligible	Localized, adverse, and negligible to minor
Visitor Use and Highway Safety	No change from present conditions, current condition constitutes a long-term, minor, adverse impact	Negligible beneficial	Minor beneficial
Park Operations	No change, current condition constitutes a long-term, minor, adverse impact	Negligible beneficial	Minor beneficial

AFFECTED ENVIRONMENT

Detailed information on resources of Crater Lake National Park can be found in Crater Lake National Park's *1994 Winter Use Plan, Draft Fire Management Plan, 1999 Visitor Services Plan*, and other management and planning documents. A concise description of the park and of park resources potentially affected by the Highway 62 West rehabilitation project follows.

LOCATION AND GENERAL DESCRIPTION OF CRATER LAKE NATIONAL PARK

Crater Lake National Park is located in the Southern Cascades, approximately 60 miles northwest of Klamath Falls and 70 miles northeast of Medford, Oregon. Crater Lake National Park is approximately 183,000 acres (286-square miles) encompassing Crater Lake, which is 13,760 acres. The park was established in 1902 to ensure the preservation of the lake and its natural surroundings. Crater Lake lies inside a caldera, or volcanic basin, created about 7,700 years ago when the 12,000-foot (3,658 meter) elevation Mount Mazama collapsed following a major eruption. The lake is 1,943 feet (592 meters) deep at its deepest point, the deepest lake in the United States and the seventh-deepest in the world. It is fed almost entirely by snowfall, which makes it one of the clearest lakes in the world.

Crater Lake National Park is surrounded by managed timberlands. The park is bounded on the northeast, south, and east by the Winema National Forest; on the north by the Umpqua National Forest; and on the northwest, west, and southwest by the Rogue River National Forest and the Sky Lakes Wilderness Area. In addition, the park adjoins Sun Pass State Forest and an 80-acre block of private land on the southeast corner.

Crater Lake National Park receives an average of 69 inches (175 cm) of precipitation a year and is known for its long winters and heavy snowfalls. The average seasonal accumulation of snow is 544 inches. The winter of 1932–33 provided 878 inches of snow, the highest recorded total to date. Snow on the ground of 14-foot depth is common by late winter. The greatest recorded accumulated snow depth in the park was 252 inches on 3 April 1983. Temperatures from January to March average 19 degrees Fahrenheit (°F) (-7°C) at night and 36°F (2°C) during the day. Temperatures from July to September average 40°F (4°C) at night and 70°F (21°C) during the day.

Highway 62 West Project Corridor

The segment of Highway 62 West from the west boundary at the Jackson County line to Annie Springs Junction was constructed in 1978. The roadway travels upgrade from the west boundary, has numerous curves, and two switchbacks. The majority of the road (7.3 miles) is nearly level to a 3.5% grade; the switchbacks lie on an approximately 6% grade. The roadway is two paved lanes with centerline and shoulder lines, and varies from 24- to 28-feet in width.

The project corridor is defined as approximately 8 miles (12.9 kilometers) in length and 46-feet (14 meters) in width, including travel lanes and shoulders, clear zone for ditches, slopes, and visibility corridor. The project corridor occupies 45 acres (18 hectares).

The road is located in dense forest, and small trees (mostly lodgepole pine) are encroaching in the corridor by sprouting in the road shoulders. The centerline of the road is 200 feet from the proposed wilderness designated boundaries.

Two segments of the road are considered dangerous by park staff: Whitehorse Crossing and the switchbacks. Whitehorse Crossing includes a blind curve and the turning radii of the switchbacks are very narrow.

Park Visitation

In southern Oregon, the park has historically been the leading visitor draw with an annual visitation of close to 500,000. In fiscal year 2001, total visitation was 444,583. In 1996, park visitation was in excess of 525,000. The park is principally a day-use area with the majority of visitors (75%) present between Memorial Day and Labor Day. Day use accounts for 80% of visitation, with two-thirds of the day users spending less than four hours in the park (*Visitor Use Plan*).

The lake and rim slopes are the primary resources of the park with viewing the lake as the primary activity. During the summer months, the National Park Service offers guided walks, talks, campfire programs, and junior ranger programs. Interpretive boat tours are offered in cooperation with the Crater Lake Lodge Company. A concessions company provides lodging, gifts, gas, camping, and food service in the park during the summer. Food service and gifts are available during the winter. Full services are also available in local communities year-round. The primary winter use activity at the park is also passive viewing of the lake. Other activities include cross-country skiing, snowshoeing, and snowmobiling (*Winter Use Plan*). Visitation for the park has remained stable for the past 20 years, ranging from a low of 419,914 to a high of 525,441.

Winter use represents about 25% of total annual visitation. The total number of winter use park visitors increased an average of 3.5% in the early 1990s, and was projected to continue to increase by 1% to 3% through 2005 (*Winter Use Plan*).

BIOTIC COMMUNITIES

This section describes the existing biotic environment adjacent to the Highway 62 West corridor and includes vegetation and wildlife (birds, mammals, reptiles, amphibians, and fish).

Vegetation

The Highway 62 West corridor occupies lodgepole pine (*Pinus contorta var. murrayana*) and mountain hemlock (*Tsuga mertensiana*) dominated forests of the Cascade Mixed Forest – Coniferous Forest – Alpine Meadow Section of the Marine Regime Mountains Division; Sierra Cascade Forest Province (Crater Lake National Park–FMP 2002a; NatureServe 2002a, b; Bailey 1998). Two forest communities consisting of the Lodgepole Pine Forest Alliance and the Mountain Hemlock Forest Alliance are present, along with mixed stands that are considered ecotones. The lodgepole pine forest dominates the western and eastern portions of the Highway 62 West corridor (approximately 40% of the corridor) and the mountain hemlock forest dominates the switchbacks and the area adjacent to Whitehorse Creek (approximately 60% of the corridor).

Wildlife

Crater Lake National Park listed 151 species of birds, 54 species of mammals, 8 species of amphibians, 4 species of reptiles, and 5 species of fish as occurring or potentially occurring within the park (NPS, Crater Lake National Park 2002a).

Birds

Of the 151 species of birds identified in the park, 25 species are considered common or abundant. Seasonally common raptors include the red-tailed hawk (*Buteo jamaicencis*) and American kestrel (*Falco sparverius*), and the resident great horned owl (*Bubo virginianus*). Other bird species present in the park year-round include the blue grouse (*Dendragapus obscurus*), hairy woodpecker (*Picoides villosus*), gray jay (*Perisoreus canadensis*), common raven (*Corvus corax*), Clark's nutcracker (*Nucifraga columbiana*), mountain chickadee (*Parus gambeli*), brown creeper (*Certhia americana*), red-breasted nuthatch (*Sitta canadensis*), and dark-eyed junco (*Junco hyemalis*).

Seasonally common or abundant bird species include the rufous hummingbird (*Selasphorus rufus*), northern flicker (*Colaptes auratus*), cordilleran flycatcher (*Empidonax occidentalis*), olive-sided flycatcher (*Contopus borealis*), Stellar's jay (*Cyanocitta stelleri*), American robin (*Turdus migratorius*), hermit thrush (*Catharus guttatus*), Swainson's thrush (*Catharus ustulatus*), western bluebird (*Sialia mexicana*), mountain bluebird (*Sialia currucoides*), golden-crowned kinglet (*Regulus satrapa*), yellow-rumped warbler (*Dendroica coronata*), western tananger (*Piranga ludoviciana*), Cassin's finch (*Carpodacus cassinii*), pine siskin (*Carduelis pinus*), chipping sparrow (*Spizella passerina*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Mammals

Fifty-four mammal species were identified in the park, of these 19 species are year-round residents that are also considered common or abundant. Large mammals that are considered seasonally common to year-round residents include the Roosevelt elk (*Cervus canadensis rooseveltii*), black-tailed deer (*Odocoileus hemionus columbianus*), mule deer (*Odocoileus hemionus*), and black bear (*Ursus americanus*). Common small mammals and year-round residents that may be expected to occur along the Highway 62 West corridor include the golden-mantled ground squirrel (*Spermophilus lateralis*), Townsend chipmunk (*Tamias townsendii*), yellow pine chipmunk (*Tamias amoenus*), Douglas squirrel (*Tamiasciurus douglassii*), northern flying squirrel (*Glaucomys sabrinus*), Sierra pocket gopher (*Thomomys talpoides*), and deer mouse (*Peromyscus maniculatus*). Other common mammals that are likely to be present in the vicinity of the highway include the porcupine (*Erithizon dorsatum*), snowshoe hare (*Lepus americanus*), American marten (*Martes americana*), long-tailed weasel (*Mustela frenata*), badger (*Taxidea taxus*), coyote (*Canis latrans*), and red fox (*Vulpes vulpes*).

Amphibians, Reptiles, and Fish

Amphibian species that are common within the park and could occur within the Highway 62 West corridor include the long-toed salamander (*Ambystoma macrodactylum*), boreal toad (*Bufo boreas boreas*), and Pacific treefrog (*Hyla regilla*) (NPS, Crater Lake National Park 2002a). Reptile species are unlikely to be present within this corridor due to elevation and minimal habitat. Four species of trout, e.g., bull (*Salvelinus confluentus*), eastern brook (*S. fontinalis*), rainbow (*Oncorhynchus mykiss*), German brown (*Salmo trutta*), and the kokanee salmon (*O. nerka*) are present within waters of the park; however, no fishery habitat occurs within the Highway 62 West corridor.

THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN

This section describes the threatened and endangered species (including species of concern and designated critical habitat) that may be affected by the proposed action to rehabilitate Highway 62 West in Crater Lake National Park.

Under the Endangered Species Act of 1973, as amended, an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range.

The U.S. Fish and Wildlife Service has provided a current list of threatened and endangered species, species of concern, and designated critical habitats that may be affected by the proposed action to rehabilitate Highway 62 West in Crater Lake National Park (appendix 4) (USFWS 2002a). The National Park Service uses this list, along with relevant biological studies, literature reviews, views of species experts, and site inspections to determine if the proposed project may affect listed or proposed species, or proposed or designated critical habitat. In addition to the U.S. Fish and Wildlife Service list that contains eight species, Crater Lake National Park routinely addresses additional rare species, including those listed by the Oregon Fish and Wildlife Department. A table of endangered and threatened species, as well as species of concern identified by the U.S. Fish and Wildlife Service and the Oregon Fish and Wildlife Department, is provided in appendix 4.

According to the Oregon Natural Heritage Program, there are no occurrence records (e.g., electronic records of species, sub-species, varieties, hybrids, and/or natural communities) of federal or Oregon endangered, threatened, sensitive, or rare wildlife and plant species in the vicinity of Highway 62 West (T31S R5E Sections 11, 12, 13, 14) (Murray pers. comm. 2002a).

Following analysis of potential habitat and species present in the park, the northern spotted owl (*Strix occidentalis caurina*) is the wildlife species state and/or federally listed as threatened that is discussed in more detail below and assessed for impacts related to Highway 62 West rehabilitation. In addition, the U.S. Fish and Wildlife Service stated that critical habitat for the northern spotted owl may occur on Crater Lake National Park (USFWS 2002a).

Northern spotted owls in Oregon were reported to number 1,977 pairs during an early 1990s survey (Thomas et al. 1993 in NatureServe 2002j). Potential suitable habitat is found in patches within Crater Lake National Park, with a higher density of patches (including some of large size) southwest of a diagonal line running from the northwest corner to the southeast corner of the park (Tuss 1998). Ten years of northern spotted owl survey records have documented presence and resulted in recordation of 18 nesting and activity centers within the park (Crater Lake National Park 2002a).

The Highway 62 West corridor passes through northern spotted owl habitat; the nearest activity center is located approximately 900 meters north (slightly over 0.5 mile) of the western project terminus (Crater Lake National Park 2002b). This location would place the activity center north of Castle Creek and well-screened from the corridor in dense mountain hemlock forest habitat. This

location is known as the Castle Creek site and its associated activity center is located north of Castle Creek and is well-screened from the Highway 62 West corridor in dense mountain hemlock forest habitat.

The Castle Creek site supports one pair of northern spotted owls and the site has been occupied from 1992–95 and 2001–02, at a minimum (NPS, CRLA 2002b). Northern spotted owls have nested at this site and produced juveniles in 1994 and in 2002. Both adults have been banded, the female in 2001 and the male in 2002. One juvenile owl was observed at the Castle Creek site as late as 1 July 2002; however, by 15 July 2002, the juvenile and adult female owl could not be detected. Both a female goshawk (*Accipiter gentilis*) and a barred owl (*Strix varia*), potential predators, were observed/heard in the vicinity of the nest tree (NPS, CRLA 2002b). The adult male was observed during August 2002, approximately 125 meters north of Highway 62 West and approximately 1 kilometer south of the nest tree. It would not accept a mouse offered by biologists, indicating that it was likely not feeding a juvenile owl.

The male northern spotted owl was last detected 6 August 2002, near Highway 62. The following morning a pile of adult northern spotted owl feathers was located and a goshawk was observed nearby. It has been speculated that the juvenile and adult male from the Castle Creek site are dead, and the fate of the female is unknown (NPS, CRLA 2002). The presence of the adult male near Highway 62 West was thought to be the result of displacement from the nest tree by the barred owl and/or the goshawk.

The park is considered at the eastern edge of the northern spotted owl range; however, habitat, sightings, and nesting has occurred within park boundaries (Crater Lake National Park, FMP 2002a). Approximately 32,260 acres of suitable northern spotted owl habitat has been identified in the park, and all known northern spotted owl activity centers occur in areas identified as suitable habitat. Stonum (1993 in NPS–Crater Lake National Park 2002) reported that 29 individual northern spotted owls were documented within the park following a 1992 survey of potential habitat. Tuss (1998) reported that 18 different northern spotted owls or pairs of owls were located in the park from 1994–1996. The typical timing for surveys in Oregon is from February to June (Laye pers. comm. 2002), and surveys are typically conducted during two successive years. Additional northern spotted owl surveys will be conducted at Castle Creek during 2002 to determine status. However, conclusive evidence is unlikely to be found this season and the 2003 nesting season will provide the best opportunity to prepare conclusions about the Castle Creek site northern spotted owl pair. These surveys will be resumed during May 2003, and will report any nesting or significant activity to the U.S. Fish and Wildlife Service (NPS-CRLA 2002a, USFWS 2002b).

Northern spotted owls occupy forests with moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees; a high incidence of large trees with large cavities, broken tops, and other indications of decadence; numerous large snags; heavy accumulations of logs and other woody debris on the forest floor; and considerable open space within and beneath the canopy (Thomas et al. 1990 in NatureServe 2002j). Generally, such habitat conditions are found in old-growth stands (at least 150 to 200 years old), but sometimes occur in younger forests that include patches of older growth. Within Oregon, coniferous forests begin to develop conditions suitable for northern spotted owls about 80 to 120 years following clearcutting (NatureServe 2002j). In southwestern Oregon, the northern spotted owl consistently selected old-growth forest habitat for foraging and roosting (Carey et al. 1992 in NatureServe 2002j).

Common prey for the northern spotted owl consists of small mammals, particularly nocturnal arboreal, or semi-arboreal species and includes flying squirrels, lagomorphs, and deer mice (NatureServe 2002j). Northern spotted owls typically roost during the day and hunt at dusk and at night.

Nesting occurs on broken treetops, ledges of cliffs, natural tree cavities, stick platforms in a tree, caves, and often in abandoned hawk or mammal nests. Nest sites are located where the proportion of old growth and mature forest habitat is great. Pairs tend to occupy the same nesting territories in successive years if the habitat remains suitable (NatureServe 2002j). Northern spotted owl pair territories may range from as small as 530 km^2 in old mixed conifer forest to 2,900 km^2 in old Douglas-fir forest (Carey et al. 1992 in NatureServe 2002j). They may move nest sites frequently within the territory (Laye pers. comm. 2002). Breeding and egg laying occur in early April in Oregon and the typical clutch size is two. The female incubates the eggs for about 30 days, and during this time is fed by the male. Young owls leave the nest at about five weeks old and fledge at about six weeks old. They become independent from the adults by about October. Northern spotted owls first breed at two to three years of age and may not breed every year (NatureServe 2002j).

Northern spotted owl pairs and individuals have been negatively affected by activities resulting in habitat loss or fragmentation. These can include natural disturbances such as intense fires, but are most often caused by logging mature and old growth forest stands. Recently, the barred owl has expanded its range into the Pacific Northwest and could possibly compete with or displace the northern spotted owl (very rare occurrences of hybridization have also been detected) (Hamer et al. 1994 in NatureServe 2002j).

A conservation strategy has been described that defines habitat conservation areas containing a minimum of 20 pairs of northern spotted owls. Further, sound management practices should include efforts to control factors that adversely affect survival of adult females (NatureServe 2002j). Where old growth is lacking, silvicultural manipulation of vegetation and creative snag or den tree management could be used to accelerate the development of northern spotted owl habitat.

SOILS AND GEOLOGY

This section describes the existing soils and geology along the project corridor.

The geology of the Highway 62 West corridor is volcanic, largely resulting from activity associated with the Mt. Mazama eruptions. This volcano released andesitic lava and ash flows that were later covered by ash, pumice, and cinders from subsequent eruptions (Warfield et al. 1999). Much of the Highway 62 West corridor geology represents ashfall and ashflow deposits with some residuum and colluvium present (NRCS 2002).

CULTURAL RESOURCES

This section provides a brief summary of the historic context of the project area and the known cultural resources within it.

The earliest constructed route in the vicinity of Highway 62 was built by the United States Army in 1865 to connect Fort Klamath with the Rogue River Valley. The military used and maintained this road for a period of about 30 years. Following the abandonment of Fort Klamath in 1890, maintenance of the route fell to the care of private citizens who were interested in keeping the route open to reach livestock markets and railroad access in the Rogue Valley. After the creation of Crater Lake National Park in 1902, William F. Arant (first park superintendent) recommended improvements to park roads. Soon after his arrival on duty, Superintendent Arant surveyed and located the entrance road to the park following the general alignment of the Fort Klamath-Jacksonville wagon road. The following year, improvements to the wagon road, in the form of bridges, leveling the grade, and straightening a number of short turns were made. (NPS Unrau, *Administrative History, Crater Lake*, 1991). In 1906, work was begun on a realignment of the upper portion of the wagon road within the park near Annie Springs Junction to improve the road grade and construct a new road surface.

Upon completion of the new road segments, stretches of the old wagon road were no longer maintained. Around 1910, park roads became the responsibility of the U.S. Army Corps of Engineers. The Army Corps conducted a comprehensive survey of park roads in 1911. The road system proposed by the engineers included realignment of major sections of the old Fort Klamath-Jacksonville wagon road within the park. By this time the wagon road had become little more than a narrow, rutted track cut through the trees and brush and eroded into the soft volcanic soils by as much as 2 to 3 feet. Over the next five years, the U.S. Army Corps of Engineers carried out some improvements to park roads consisting mainly of rough grading. In 1919, the Army Corps turned responsibility for road construction and maintenance over to the National Park Service, and in the 1920s, improvements, including realignment and widening of park roads occurred. Large segments of the west entrance road were relocated away from the original alignment of the Fort Klamath-Jacksonville wagon road. In 1925, "…6.8 miles of the Medford (West) entrance were realigned, grades and curvatures reduced, and two bridges replaced with fills" (NPS Unrau, *Administrative History, Crater Lake*, 1991). Due to the realignment of the park's west entrance road away from the old wagon road, segments of the Fort Klamath-Jacksonville wagon road remain intact. The National Park Service recommends, and the Oregon SHPO concurred on 16 June 2003, that the Fort Klamath-Jacksonville wagon road is eligible for the NRHP.

In 1926, National Park Service engineers revised the road program for the park and coordinated their activities with the Bureau of Public Roads, which took over the responsibility of road construction in the park. In 1926, as a part of this road program, both the west and south entrance roads were surfaced with crushed rock macadam treated with light road oil (NPS, Unrau 1991). In 1927, Crater Lake National Park moved forward with plans for the development of the rim area, and in the 1930s, as a result of the worsening depression economy, government public works programs grew at the park and became an integral part of the park's development program. As a part of these government public works programs, the formation of the Civilian Conservation Corps in 1933, increased funding and provided manpower for park construction, development, and improvement projects. Civilian Conservation Corps-era projects at Crater Lake National Park that are eligible for or listed on the NRHP are located primarily at Munson Valley, Rim Village, and Rim Drive, and are well outside of the area of potential effect. The many repairs and realignments of Highway 62 West entrance road have altered its association with the Fort Klamath-Jacksonville wagon road. Highway 62 West entrance does not occupy the old alignment of the Fort Klamath-Jacksonville wagon road. Highway 62 West does not retain integrity of association, materials, or workmanship with the old wagon road, and the National Park Service recommends, and the Oregon SHPO concurred on 16 June 2003 (see Appendix 2), that the west entrance road is not eligible for the NRHP.

Highway 62 West passes through two historic-period camps at Whitehorse Crossing (site numbers CRLA 00-12-H and CRLA-00-02). This area was surveyed for cultural resources by the park cultural

resources staff in July 2000, and the locations of isolated archeological artifacts and the boundaries of these sites were documented and recorded.

Park cultural resources staff also conducted a pedestrian survey of the area proposed for realignment of the switchback segment of Highway 62 West on 20, 27, 28 July and 3 August 2002. Six areas along the project corridor were surveyed including the switchback realignment area, the Pacific Crest trailhead parking lot, the area around turnout B, a turnout to the west of Whitehorse Crossing, Whitehorse Crossing, and turnout A (the Old West Entrance). No new cultural resources were recorded at the Pacific Crest trailhead parking lot, the area around turnout B, a turnout to the west of Whitehorse Crossing, or Whitehorse Crossing. At turnout A, a previously recorded site, CRLA 00-9-H, was observed and lies just outside of the area of potential effect; however, no new resources were recorded. At the switchback area, a segment of the 1911 road segment and a retaining wall were discovered. A second road segment was also discovered and an isolated find (CRLA-02-01-IF-H) was recorded.

A report (CRLA, August 2002) documenting the results of the survey and recommendations for the proposed action has been submitted to the Oregon SHPO. Eligibility determinations have been made on the wall (as a contributing element to the wagon roads in Crater Lake National Park Historic District) and the Highway 62 West corridor. Park cultural resource experts consider the wall a contributing element to the NRHP wagon road historic district and the road corridor ineligible. Documentation regarding these determinations has been forwarded to the Oregon SHPO (23 January 2003).

VISITOR USE, TRAFFIC, AND HIGHWAY SAFETY

This section describes visitor use, traffic, and road safety conditions on the section of Highway 62 West that is within the proposed project area.

The park has approximately 79 miles of roads, of which 74 miles are paved. The Rim Road is 33-miles long. In the Visitor Study (NPS 2002a), visitors reported that the most used visitor services and facilities were the roads (used by 93% of survey respondents). Seventy-seven percent of visitors surveyed indicated that the roads were very important.

Traffic data collection was conducted in October 2001, to support preparation of the *General Management Plan* (Robert Peccia and Associates 2001). The data indicate that the summer seasonal average daily traffic on Highway 62 West was approximately 1,130 vehicles, while during the winter months, the average daily traffic is 300 vehicles. Also, according to the preliminary data, approximately 88% of the vehicles were cars and trucks, and 2% of the vehicles were pulling trailers.

Accidents occur generally along two segments of the Highway 62 West project corridor (Toso pers. comm. 2002). One segment is referred to as Whitehorse Crossing (milepost 69.5 to milepost 69.7),

and the other is a section of road that contains two relatively severe switchbacks (milepost 71.1 to milepost 71.7). As stated earlier, the road in the Whitehorse Crossing segment gains elevation over a small hill on the west side of a curve, creating a visual barrier to the upcoming (blind) curve. Visitors occasionally fail to reduce to an appropriate vehicle speed. This occasionally results in single vehicle accidents, some of which involve vehicle roll-over.

The two switchbacks along the second segment of road (milepost 71.1 to milepost 71.7) contain the narrowest turning radii of the portion of Highway 62 West that is within the proposed project area. Caution signs are posted at the switchbacks for tight curves. The majority of accidents on this segment are single vehicle accidents that result from loss of control while attempting to negotiate the switchbacks during snowy conditions, usually resulting in vehicle contact with the guardrail and/or snowbank. These types of accidents are seldom reported; however, dents in the guardrails, imprints in the snowbanks, and remnants of automobile bumpers, grills, and lights observed in the area suggests that these types of accidents occur fairly frequently (Toso pers. comm. 2002). Other accidents associated with these switchbacks include two-vehicle head-on collisions and side-swipes resulting from loss of vehicle control. Although major accidents of this type are relatively infrequent, some of these accidents have resulted in personal injuries and serious damage to the vehicles involved (park accident reports 1996–1999).

The quality of the visitor driving experience is affected by the condition of the roadway. The road surface is cracked and potholed due to deterioration and age resulting in a bumpy, rough driving experience.

The quality of the visitor driving experience is also affected by traffic flow. Currently, inconsistent turnout parking designs (some are parallel parking, others are pull-in parking) can lead to circulation confusion when entering and exiting turnouts. The angle of the entrance into the Pacific Crest Trail parking lot makes entrance and egress difficult for drivers, particularly those towing trailers, and limits sight distances for on-coming traffic. The tight radii of the switchback forces long vehicles (buses, recreational vehicles, and towing vehicles) to slow speeds to navigate the turns.

The park has approximately 90 miles of maintained trails, including 33 miles of the Pacific Crest Trail. The other visitor uses within the project corridor include hiking and horseback riding along the Pacific Crest Trail (which crosses the roadway near the east terminus of the project), and scenic and wildlife viewing at roadside turnouts. In the Visitor Study conducted in 2001, 4% of visitors hiked the Pacific Crest Trail, although it is not documented on which trail segments. Within the park, the trail is accessible approximately 105 days a season (mid-June to early October). It is estimated that there are approximately 920 overnight users a season with the majority of use occurring in July and August. On any given day, approximately three parties of hikers (primarily day use) enter the backcountry via the trailhead parking on Highway 62 West (Brennan pers. comm. September 2002).

PARK OPERATIONS

This section describes existing park maintenance operations as it relates to the proposed action.

The principal maintenance procedure taken on Highway 62 West is snow removal. Snow removal on park roads represents 70% of the annual road maintenance budget (Toso pers. comm. 2002). The park employs seven full-time employees, including a foreman for snow removal operations. The park uses two primary pieces of snow removal equipment—the push plow and the rotary plow. The push plow pushes snow off to the side and the rotary blows the snow up and over the banks. The rotary plow is

generally not needed until later in the winter season when snow begins to build up along the sides of the roads. The push plow is faster than the rotary, but does need to maintain speed to push and lift the snow from the roadway. The push plow can be used singularly; however, the rotary is used in tandem with the push plow.

Due to the tightness of the turns in the switchbacks, the push plow often cannot maintain the necessary speed to push and lift snow off the road. As the snow plow operator attempts to push the snow off the road, the resistance from the snow pushes the plow, on occasion, forcing it into the other lane and on-coming vehicles, thus creating a safety hazard. In many cases, snow plow operators must use multiple approaches along this road segment to fully clear the road or use the rotary plow more frequently and earlier in or later into the season resulting in inefficiencies in snow removal through the switchbacks (Toso pers. comm. 2002).

Crater Lake National Park staff currently conducts minimal maintenance activities (only pothole repair) on Highway 62 West (Toso pers. comm. 2002). Additional maintenance activities are not conducted due to poor condition of the road surface, rendering these actions a wasteful use of funds.

AIR QUALITY

This section describes air quality within the park.

Crater Lake National Park is known for its clean air and spectacular vistas. The quality of air plays a vital role in visitor enjoyment, in the preservation of cultural resources, and in the perpetuation of natural systems. Crater Lake National Park has near pristine air quality and is classified as a Class I area as defined in the Federal Clean Air Act. Class I areas are those for which maintenance of air quality is critical for protection of the resource. One factor that contributes to the clean air in Crater Lake National Park is that there are no noteworthy upwind stationary emission sources. Industrial emissions from the Medford and Klamath Falls areas are typically carried south/southwest by the prevailing winds (Winter Use Plan).

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 1963 Clean Air Act. Further, the 1963 Clean Air Act provides that the federal land manager (the assistant secretary for fish and wildlife and parks and the park superintendent) have an affirmative responsibility to protect park air quality-related values (including visibility, plants, animals, soils, water quality, cultural and historic resources and objects, and visitor health) from adverse air pollution impacts. Section 118 of the 1963 Clean Air Act requires the park to meet all federal, state, and local air pollution standards.

Section 176(c) of the 1963 Clean Air Act requires all federal activities and projects to conform to state air quality implementation plans to attain and maintain national ambient air quality standards.

SOUNDSCAPES AND NOISE

This section describes the current noise environment in the project corridor.

NPS Management Policies (2001) states that the National Park Service will strive to preserve the natural quiet and natural sounds associated with the physical and biological resources of parks. Activities causing excessive or unnecessary unnatural sounds in and adjacent to parks will be monitored, and action will be taken to prevent or minimize unnatural sounds that adversely affect park resources or values or visitors' enjoyment of them.

A qualitative noise analysis was conducted for the rehabilitation of Highway 62 West. This study was based on the type of land use found in the park, the distance to nearby receptors, traffic noise, and noise generated by construction equipment.

For this noise assessment, two types of noise descriptors were used. In discussing fluctuations in noise levels, ambient noise levels were described in terms of dBA. In discussing hourly average noise levels, the descriptor was $L_{eq}(h)$, or hourly equivalent noise level. The hourly equivalent noise level is a sound pressure level that, if constant over a specified time period, would contain the same sound energy as the actual sound that varies in level with time (Cowan 1994).

Traffic noise from roadway vehicles along Highway 62 West is generated by the engine, tire-roadway interaction, brakes, vehicle vibration, and air disturbance. Roadway traffic noise is influenced by vehicle speed, volume, auto-truck mix, and roadway grades. The effects of traffic noise on surrounding areas depends on the noise levels generated, background noise levels, intervening terrain, and nature of land uses.

Ambient noise levels along Highway 62 West within the project corridor are generally low (reflected in the light traffic volumes), are heavily wooded, and the undeveloped and unpopulated nature of the park comprises much of the surrounding landscape.

In order to estimate noise levels, the Federal Highway Administration's Traffic Noise Model Look-Up Tables were utilized. These tables calculate noise levels, when given the parameters of traffic volume, type of vehicle, number of vehicles, and speed for a flat straight roadway section. Therefore, the predictions at the reference locations are representative of most locations along Highway 62 West and do not represent any one location. During the summer, the average daily traffic is 1,130 vehicles, while during the winter months, the average daily traffic is 300 vehicles. A conservative 30% of the average daily traffic was considered as the peak or design hourly volume of traffic.

Using this method on a typical summer day, with a peak hour traffic volume of 339 vehicles per hour at 45 mph, the estimated noise level at 50 feet (known as Reference 1) was 61.4 dBA $L_{eq}(h)$, while at 100 feet (known as Reference 2) the noise level was 54.9 dBA $L_{eq}(h)$. To consider vehicles driving around curves known as a switchback, a 20 mph speed was used and the estimated noise level was estimated to be 51.7 dBA $L_{eq}(h$) at Reference 1, and 46.0 dBA $L_{eq}(h)$ at Reference 2. Although the estimated noise levels at Reference 1 at the 45 mph speed was predicted to exceed the noise abatement criteria, this receptor does not represent a noise sensitive use and is outside the proposed wilderness area.

For a typical winter day, with a peak hour traffic volume of 90 vehicles per hour at 45 mph, the estimated noise level at Reference 1 was 55.6 dBA $L_{eq}(h)$, while at Reference 2 the noise level was

49.1 dBA L_{eq}(h). At 20 mph, the estimated noise level was 45.9 dBA L_{eq}(h) at Reference 1, and 40.2 dBA L_{eq}(h) at Reference 2. These noise levels are well below the noise abatement criteria.

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This section describes the environmental consequences of the no-action and the action alternatives. First, the methods for assessing environmental consequences are discussed. NEPA requires consideration of context, intensity, and duration of impacts, and cumulative impacts. Next, is an explanation of resource impairment, which must also be assessed by alternative, according to National Park Service policy. Subsequent sections in this chapter are organized by impact topic, first for the no-action alternative, then alternative B, and then alternative C (the National Park Service-preferred alternative).

METHODS FOR ASSESSING IMPACTS

Impact analyses and conclusions are based on the review of existing literature and park studies, information provided by park staff, professional judgments and insights of other agencies and officials, and input from interested local tribes and the public. Definitions used to evaluate the context, intensity, duration, and cumulative nature of impacts associated with project alternatives are discussed below. Environmental consequences are evaluated based on the adoption of the mitigation measures outlined in the "Alternatives" section of this document.

Context is the setting within which impacts are analyzed such as the affected region, society as a whole, the affected interests, and/or a locality. In this environmental assessment, the intensity of impacts are evaluated within a local (i.e., project area) context, while the intensity of the contribution of effects to cumulative impacts are evaluated in a regional context.

Duration is the time period for which the impacts are evident. Short-term impacts are those that are noticeable during the project and six months thereafter. Long-term impacts are those that are evident for periods longer than one year after the project has been completed.

For this analysis, *impact intensity* or severity is defined as follows:

Biotic Communities

- Negligible – an action that could affect biotic communities or species of concern habitat, but the change would be so small that it would not be of any measurable or perceptible consequence.
- Minor – an action that could affect biotic communities or species of concern habitat, but the change would be slight and localized with few measurable consequences.
- Moderate – an action that would result in readily apparent changes to affect biotic communities or species of concern habitat with measurable consequences.
- Major – an action that would result in a measurable and substantial adverse or beneficial effect to biotic communities or species of concern habitat.

Threatened and Endangered Species

The impact types, levels, and definitions presented for threatened and endangered species are those defined by the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act (USFWS and NMFS 1998). Further information concerning the Endangered Species Act and procedures related to section 7 may be obtained at: http://endangered.fws.gov/consultations/ s7hndbk.htm.

- No effect – when the alternative would not affect a listed species or designated critical habitat.
- Not likely to adversely affect – when the affects of the alternative are expected to be discountable, insignificant, or completely beneficial.
- May effect – when the alternative may pose *any* effect on listed species or designated critical habitat.
- Likely to adversely affect – any adverse effect to the species that may occur as a direct or indirect result of the alternative and the effect is not discountable, insignificant, or completely beneficial.

Soils and Geology

- Negligible – an action that could cause change in soil and geology, but the change would be so small that it would not be of any measurable or perceptible consequence.
- Minor – an action that could change soil and geology, but the change would be slight and localized with few measurable consequences.
- Moderate – an action that would result in readily apparent changes to soil and geology with measurable consequences.
- Major – a substantial adverse or beneficial change to soil and geology would result.

Cultural Resources

Impacts to Cultural Resources and Section 106 of the National Historic Preservation Act

In this environmental assessment, impacts to archeological resources and historic structures are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality that implement the National Environmental Policy Act. These impact analyses are intended, however, to comply with the requirements of both NEPA and section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation's regulations implementing section 106 of the National Historic Preservation Act (36 CFR Part 800, *Protection of Historic Properties*), impacts to archeological resources and historic structures were identified and evaluated by (1) determining the area of potential effect; (2) identifying cultural resources present in the area of potential effect that are either listed in or eligible to be listed in the NRHP; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the NRHP; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected, NRHP-eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the NRHP, e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

Council on Environmental Quality regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order – 12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g., reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by section 106 is similarly reduced. Although adverse effects under section 106 may be mitigated, the effect remains adverse.

A section 106 summary is included in the impact analysis sections for archeological resources and historic structures. The section 106 summary is intended to meet the requirements of section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Archeological Resources

Definitions of Intensity Levels

In order for an archeological resource to be eligible for the NRHP, it must meet one or more of the following criteria of significance: (1) associated with events that have made a significant contribution to the broad patterns of our history; (2) associated with the lives of persons significant in our past; (3) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; and/or (4) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the archeological resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association (*National Register Bulletin, Guidelines for Evaluating and Registering Archeological Properties*). For purposes of analyzing impacts to archeological resources, either listed in or eligible to be listed in the NRHP, the thresholds of change for intensity of an impact are defined below:

- Negligible – impact is at the lowest levels of detection—barely measurable with no perceptible consequences, either adverse or beneficial, to archeological resources. For purposes of section 106, the determination of effect would be *no adverse effect*.

- Minor (adverse impact) – disturbance of a site(s) results in little, if any, loss of significance or integrity and the NRHP eligibility of the site(s) is unaffected. For purposes of section 106, the determination of effect would be *no adverse effect*.

- Minor (beneficial impact) – maintenance and preservation of a site(s). For purposes of section 106, the determination of effect would be *no adverse effect*.

- Moderate (adverse impact) – disturbance of a site(s) does not diminish the significance or integrity of the site(s) to the extent that its NRHP eligibility is jeopardized. For purposes of section 106, the determination of effect would be *adverse effect*.

- Moderate (beneficial impact) – stabilization of a site(s). For purposes of section 106, the determination of effect would be *no adverse effect*.

- Major (adverse impact) – disturbance of a site(s) diminishes the significance and integrity of the site(s) to the extent that it is no longer eligible to be listed in the NRHP. For purposes of section 106, the determination of effect would be *adverse effect*.

- Major (beneficial impact) – active intervention to preserve a site(s). For purposes of section 106, the determination of effect would be *no adverse effect*.

Historic Structures / Buildings

Definitions of Intensity Levels

In order for a structure or building to be listed in the NRHP, it must meet one or more of the following criteria of significance: (1) associated with events that have made a significant contribution to the broad patterns of our history; (2) associated with the lives of persons significant in our past; (3) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; (4) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the structure or building must possess integrity of location, design, setting, materials, workmanship, feeling, and association (*National Register Bulletin, How to Apply the National Register Criteria for Evaluation*). For purposes of analyzing potential impacts to historic structures/buildings, the thresholds of change for the intensity of an impact are defined as follows:

- Negligible – impact(s) is at the lowest levels of detection—barely perceptible and not measurable. For purposes of section 106, the determination of effect would be *no adverse effect*.

- Minor (adverse impact) – impact would not affect the character defining features of a NRHP eligible or listed structure or building. For purposes of section 106, the determination of effect would be *no adverse effect*.

- Minor (beneficial impact) – stabilization/preservation of character defining features in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. For purposes of section 106, the determination of effect would be *no adverse effect*.

- Moderate (adverse impact) – impact would alter a character defining feature(s) of the structure or building, but would not diminish the integrity of the resource to the extent that its NRHP eligibility is jeopardized. For purposes of section 106, the determination of effect would be *no adverse effect*.

- Moderate (beneficial impact) – rehabilitation of a structure or building in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. For purposes of section 106, the determination of effect would be *no adverse effect*.

- Major (adverse impact) – impact would alter a character defining feature(s) of the structure or building, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the NRHP. For purposes of section 106, the determination of effect would be *adverse effect*.

- Major (beneficial impact) – restoration of a structure or building in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. For purposes of section 106, the determination of effect would be *no adverse effect*.

Visitor Use, Traffic, and Highway Safety

- Negligible – could affect visitor use, traffic characteristics, and highway safety, but the change would be so small that it would not be of any measurable or perceptible consequence and/or would affect few people.
- Minor – could affect visitor use, traffic characteristics, and highway safety, but the change would be slight and localized with few measurable consequences, and/or would affect some people.
- Moderate – would result in readily apparent adverse changes to visitor use, traffic characteristics, and highway safety with measurable consequences, and/or an effect on a large number of people.
- Major – would have a substantial adverse or beneficial effect on visitor use, traffic characteristics, and highway safety, and/or would affect the majority of people.

Park Operations

- Negligible – could change the park maintenance operations, but the change would be so small that it would not be of any measurable or perceptible consequence.
- Minor – could change the park maintenance operations, but the change would be slight and localized, with few measurable consequences.
- Moderate – would result in readily apparent changes to park maintenance operations with measurable consequences.
- Major – would result in a substantial adverse or beneficial change in park maintenance operations.

Air Quality

- Negligible – an action that could change air quality, but the change would be so small that it would not be of any measurable or perceptible consequence.
- Minor – an action that could change air quality, but the change would be slight and localized with few measurable consequences.
- Moderate – an action that would result in readily apparent changes in air quality with measurable consequences.
- Major – a substantial adverse or beneficial change in air quality would result.

Soundscapes and Noise Quality

Relevant Criteria

The Federal Highway Administration has adopted noise abatement criteria (23 CFR 772) that establish hourly A-weighted decibel (dBA) levels for various land-use activity categories. Noise levels were considered to have an impact when they approached (within 1 decibel) or exceeded the criteria, or when the predicted noise levels substantially exceeded the existing noise levels. A substantial increase is defined as a predicted noise level of 10 to 15 dBA greater than the existing noise level. Table 5 summarizes the noise levels for various land-use categories. Due to the types of activities and serene quality of the park, Activity Category A was used with a criterion of 57 dBA $L_{eq}(h)$.

TABLE 5. FEDERAL HIGHWAY ADMINISTRATION NOISE ABATEMENT CRITERIA

Activity Category	Criteria dBA $L_{eq}(h)$[1]	Description of Activity
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 (exterior)	Developed lands, properties, or activities not included in Categories A or B, above
D	N/A	Undeveloped lands
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

1 dBA Leq(h) = A-weighted average noise level over a 1-hour period.
Source: 23 CFR 772.

Noise levels are described by a logarithmic scale in units of decibels. The human ear perceives noises of different frequencies in different ways. The dBA approximates human perception of the overall noise spectrum and is, therefore, used in most noise studies. Small changes in noise levels of 3 dBA or less are not noticeable by the average person. Because the dBA scale is logarithmic, a 10 dBA increase in noise level is generally perceived as a doubling of the sound.

Sensitive Receptors

The only known noise receptors in the project study area would be potential hikers along the Pacific Crest Trail (which crosses the roadway near the east terminus of the project), Annie Creek Canyon Trail (located 1,320 feet (402 meters) from the east terminus of the project), and a northern spotted owl activity center near the west boundary (located 2,952 feet (900 meters) from the roadway). Park staff presumes that the wilderness area around the project corridor is not heavily used by visitors (Mac Brock pers. comm. 2002). For the purposes of this study, reference locations of 50 and 100 feet from the roadway centerline were used in estimating noise levels.

Construction Noise

Construction projects would be accomplished under the implementation of either alternative B or C. Equipment and vehicles involved in milling the pavement, road base preparation, paving, and finishing activities would generate the primary source of noise. Construction noise would be intermittent and short term in duration.

- Negligible – an action that could change the ambient noise environment, but the change would be slight and result in an increase of 3 dBA or less.
- Minor – an action that would result in readily apparent changes in the noise environment with an increase or decrease of 4 to 9 dBA and affect few sensitive receptors.
- Moderate – an action that would result in readily apparent changes in the noise environment with an increase or decrease of 10 or higher dBA and affect few sensitive receptors.
- Major – an action that would result in readily apparent changes in the noise environment with an increase or decrease of 10 or higher dBA and affects most of the sensitive receptors.

Cumulative Impacts

Council on Environmental Quality regulations, which implement NEPA, 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 nonfederal) or person undertakes such other actions (40 CFR 1508.7)." Cumulative impacts are considered for all alternatives.

Cumulative impacts were determined by combining the impacts of the preferred alternative (rehabilitating and reconstructing Highway 62 West) with other past, present, or reasonably foreseeable future actions. It was, therefore, necessary to identify major past, ongoing, or reasonably foreseeable future actions affecting the park.

There were no past projects identified during scoping that would contribute to cumulative impacts. Present and future actions that may have potential to cumulatively impact resources include:

- planned prescribed burns (fire management),
- trails rehabilitation and relocation,
- reconstruction of the Rim parking lot,
- waterline replacement from Munson Springs to Garfield,
- lagoon project at Munson Valley, and
- rehabilitation of superintendent's house.

IMPAIRMENT OF PARK RESOURCES AND VALUES

In addition to determining the environmental consequences of the proposed action and alternatives, the 2001 *NPS Management Policies* and Director's Order – 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* require analysis of potential effects to determine if actions would impair park resources. The fundamental purpose of the national park system, established by the Organic Act (1916) and reaffirmed by the General Authorities Act (1976), as amended, begins with a mandate to conserve park resources and values. National Park Service managers must seek ways to avoid, or minimize to the greatest degree practicable, adversely impacting park resources and values.

Congress has given National Park Service managers discretion, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

The prohibited impairment is an impact that would, in the professional judgment of the responsible National Park Service manager, harm the integrity of park resources or values, including opportunities that would otherwise be present for the enjoyment of those resources or values. An impact would be more likely to constitute an impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific park 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 National Park Service planning documents.

Park resources and values that are subject to no impairment include the park's scenic, natural, and historic objects, wildlife, and the processes and conditions that sustain them (*NPS Management Policies*). Therefore, a determination on impairment is made in "Conclusion" of the biotic communities, threatened and endangered species, soil and geology, cultural resource sections, air quality, and noise and soundscapes. Impairment statements are not included for visitor use, traffic, and highway safety, or park operations.

ENVIRONMENTAL CONSEQUENCES — ALTERNATIVE A: NO ACTION

This section evaluates the potential impacts of the no-action alternative.

Biotic Communities

Vegetation

Under the no-action alternative, impacts to vegetation associated with the existing Highway 62 West corridor would result from continued highway maintenance activities. Maintenance activities would

occasionally remove vegetation from road shoulders as they are regraded for safety or bladed during snow removal. Vegetation near the highway would be subject to breakage under the deep snow removed from the road surface and deposited adjacent to the highway. There would be no change to biotic communities from the no-action alternative; however, the existing condition constitutes a localized, long-term, negligible, and adverse effect to vegetation.

Wildlife

Under the no-action alternative, impacts to wildlife associated with the existing Highway 62 West corridor would result from continued traffic on the highway. Wildlife species crossing this highway would be subject to injury and death due to collision with vehicles. Some sensitive wildlife species would probably avoid the highway due to vehicle noise, motion, and human presence, or would only pass through the area when traffic had abated. There would be no change to biotic communities from the no-action alternative; however, the existing condition constitutes a localized, long-term, negligible, and adverse effect to wildlife.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions include fire management using prescribed burning and construction projects related to waterlines and lagoons in Munson Valley. Prescribed burns would emulate a natural occurrence under controlled conditions that would result in short-term, adverse impacts to vegetation, individual wildlife, and habitat; however, the long-term effect from prescribed burns would be beneficial as the health of the plant communities would improve, and habitat would be more diverse for wildlife. Construction in the Munson Valley would result in temporary to long-term adverse effects on biotic communities on a localized site. This alternative would contribute negligibly to the cumulative impacts on biotic communities.

Conclusion. There would be a continuing impact to vegetation invading onto and growing adjacent to road shoulders and wildlife in general due to vehicle collisions resulting from the no-action alternative. The impacts would be limited to vegetation and wildlife habitat adjacent to highway and parking lot surfaces and considered local, long term, negligible, and adverse. The cumulative effect of the no-action alternative would be short and long term, negligible, and adverse to vegetation and wildlife resources.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to biotic communities at Crater Lake National Park.

Threatened And Endangered Species And Species of Concern

Under the no-action alternative, the threatened northern spotted owl activity center located approximately 900 meters north of the highway near the west entrance (within or across the deep Castle Creek Gorge) is screened from the highway by dense forest and has been active over many years while the highway has been in operation. There would be no change to threatened and endangered species from the no-action alternative. Continued use and maintenance activities associated with the road is not likely to adversely affect threatened and endangered species. There is no designated critical habitat present.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that could have an effect on threatened and endangered species include fire management using prescribed burning and construction projects related to waterlines and lagoons in Munson Valley. Prescribed burns would emulate a natural occurrence under controlled conditions that could affect threatened and endangered species and/or their habitat; however, the long-term effect from prescribed burns would be beneficial as the health of plant communities would improve and habitat would be more diverse. Construction in the Munson Valley could result in impacts on threatened and endangered species within a localized site. The effects to the northern spotted owls occupying the activity center located approximately 900 meters north of Highway 62 West, taken in context with other activities on the park, may affect, but would not likely adversely affect, threatened and endangered species.

Conclusion. There would be no change to threatened and endangered species from the no-action alternative. The northern spotted owl activity center, screened from Highway 62 West by dense forest and the Castle Creek Gorge, would continue to be occupied and would not likely be adversely affected by highway maintenance and public use. The cumulative effect of the no-action alternative may affect, but is not likely to adversely affect, threatened and endangered species.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to threatened and endangered species or special concern species at Crater Lake National Park.

Soils and Geology

The no-action alternative would leave the road within the existing road alignment and in its current condition. There would be no change to soils and geology from the no-action alternative.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have an effect on soils and geology within the park include the waterline replacement from Munson Springs to Garfield and the lagoon project at Munson Valley. The adverse effects of these projects would result in long-term, localized, adverse, cumulative impacts. The no-action alternative would not contribute to these actions.

Conclusion. There would be no change to soils and geology from the no-action alternative. The no-action alternative would not contribute to cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to soils and geology at Crater Lake National Park.

Cultural Resources

Archeological Resources

There would be no ground disturbance with the potential to disturb archeological resources. Therefore, the no-action alternative would have no impact on previously recorded archeological resources within the proposed project area.

Cumulative Impacts. All construction projects have the potential to impact archeological resources. Proposed projects, including trails rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house; have the potential to have long-term adverse impacts to archeological resources. Because there would be no ground-disturbing actions, the no-action alternative would not contribute to cumulative effects on archeological resources.

Conclusion. The no-action alternative would have no impact on archeological resources within the proposed project area and would not contribute to cumulative effects on cultural resources.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

Historic Structures

The no-action alternative would continue existing conditions. There would be no disturbance to historic structures and no impact on historic structures within the proposed project area.

Cumulative Impacts. In conjunction with the impacts of past, present, and reasonably foreseeable future actions including trails rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house, the no-action alternative would not contribute to cumulative effects on historic structures.

Conclusion. The no-action alternative would have no impact on, and no contribution to cumulative impacts on historic structures.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

Visitor Use, Traffic, and Highway Safety

The no-action alternative would leave the road with existing tight curves and poor surface condition, and the negative aspects of these road conditions would continue to be a problem for vehicle operators on this section of Highway 62 West, particularly at Whitehorse Crossing and switchback segments of Highway 62 West. There would be no anticipated change to visitor use, traffic, and highway safety from the no-action alternative.

The no-action alternative would not affect visitor use of the road, trails, and turnouts.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have an effect on visitor use, traffic, and highway safety include trails rehabilitation and relocation and the reconstruction of the Rim parking lot. The effects of these projects would be short-term adverse during construction, but be negligible beneficial in the long term. The no-action alternative would not contribute to these actions.

Conclusion. There would be no change in impacts to visitor use, traffic, and highway safety from the no-action alternative. The no-action alternative would not contribute to cumulative impacts.

Park Operations

The no-action alternative would leave the road with the existing tight curves and a poor surface condition. There would be no change to park maintenance operations from the no-action alternative, and the periodic maintenance operations undertaken to maintain the road surface would continue to be required; although, the condition of the road is anticipated to continue to deteriorate with age. The tight curves would continue to impede snow removal operations and create a safety hazard for vehicles and snow plows. There would be no change in park operations under the no-action alternative; however, the existing condition constitutes a long-term, minor to moderate, adverse impact to park maintenance operations.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have an effect on park maintenance operations include trails rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house. The effects of these projects would be long term and negligible beneficial. The no-action alternative would not contribute to these actions.

Conclusion. The no-action alternative would not change park maintenance operations along Highway 62 West. The no-action alternative would not contribute to cumulative impacts.

Air Quality

There would be no change to air quality as a result of the no-action alternative.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions would not have long-term effects on air quality; any impacts would be short term, localized, and negligible. The no-action alternative would not contribute to these actions.

Conclusion. There would be no change in impacts to air quality from the no-action alternative. The no-action alternative would not contribute to cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

Soundscapes and Noise

Because no action would be taken in this alternative, there would be no change to soundscapes or noise quality as a result of the no-action alternative.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions would not have long-term effects on soundscapes or noise quality; any impacts would be short term, localized, and negligible. The no-action alternative would not contribute to these actions.

Conclusion. There would be no change to soundscapes or noise quality from the no-action alternative. The no-action alternative would not contribute to cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE B: RESURFACING, RESTORATION, AND REHABILITATION

This section evaluates the potential impacts of alternative B.

Biotic Communities

Vegetation

Under alternative B, impacts would occur to vegetation associated with construction required to rehabilitate the Highway 62 West corridor resulting from dust generation and construction activity. Dust generated during construction would coat vegetation adjacent to the highway until the next precipitation event occurred, resulting in a localized, short-term, negligible, adverse effect to downwind vegetation. Vegetation that has re-established along the road shoulders (mostly lodgepole pine seedlings) would be removed under alternative B, resulting in a short-term, negligible, and adverse effect. Long-term effects would be the same as the no-action alternative.

Small areas of existing turnouts (approximately 0.2 acre or 0.08 hectare) would be obliterated and revegetated following the rehabilitation project resulting in a long-term, negligible, beneficial effect to vegetation.

Non-native plant species could be introduced to this road segment from rock and gravel hauled in from the Wizard III Quarry; however, mitigation measures would be implemented to reduce the likelihood of "weed seed" introduction.

Wildlife

Traffic delays due to construction events would result in vehicles idling in long lines, then traveling from the construction site in more dense groups and in a more pulsed manner, resulting in a change in normal traffic flow during the construction period.

Loss of wildlife would be proportional to the amount of habitat lost. The existing road corridor and nearby forested areas have been previously affected through years of close association with vehicles and attendant human activity; wildlife in the area have unquestionably been long habituated to human activity, noise, and traffic. Wildlife would probably avoid the construction zone to a certain extent during construction. Overall, populations of affected species might be slightly and temporarily lowered during construction, but no permanent negative effects on wildlife would be anticipated. Revegetating the roadside areas would result in negligible additional wildlife habitat. A long-term, negligible, beneficial effect would occur for wildlife where habitat is restored through revegetation.

Alternative B would result in a short-term, negligible, adverse effect to wildlife during construction.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions would have an effect on biotic, vegetation, and wildlife communities and include fire management using prescribed burning and construction projects related to waterlines and lagoons in Munson Valley. Prescribed burns would emulate a natural occurrence under controlled conditions that would result in short-term, adverse impacts to vegetation, individual wildlife, and habitat; however, the long-term effect from prescribed burns would be beneficial as the health of plant communities would improve and habitat would be more diverse for wildlife. Construction in the Munson Valley would result in temporary to long-term, minor, adverse effects on biotic, vegetation, and wildlife communities on a localized site. This alternative would contribute negligibly to the cumulative impacts on both vegetation and wildlife, which would be anticipated to be short and long term and adverse.

Conclusion. Alternative B would have a short-term, negligible, adverse effect on roadside biotic, vegetation, and wildlife communities during construction. A long-term, negligible, adverse impact on roadside vegetation would continue following construction due to maintenance activities and public use. A long-term, negligible beneficial effect would occur for vegetation and wildlife where habitat is restored through revegetation. The cumulative impact would be short- and long-term, negligible, adverse affects on biotic communities.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to biotic communities at Crater Lake National Park.

Threatened and Endangered Species, Species of Concern

The threatened northern spotted owl activity center located approximately 900 meters (2,953 feet) north of the highway (within or across the deep Castle Creek Gorge) is screened from the highway by dense forest and has been active over many years while the highway has been in operation. Since the habitat in the project area is suitable for foraging, northern spotted owls may use areas near the construction site to forage or rest, but no construction activities are proposed to take place after dusk. Should disturbance occur, it would be expected to be insignificant and the likelihood of any adverse effects occurring is discountable (USFWS 2002b). There is no designated critical habitat present.

The northern spotted owl activity center is considered a sensitive noise receptor more than 900 meters (2,953 feet) away. At the evaluated distance of 800 feet, ambient noise levels would be less than the 51 to 65 dBA estimated using the 6 dBA drop-off with each doubling of distance, due to shielding by the forested woodlands, and would likely approach, or be slightly above existing levels. The existing noise environment includes an insignificant amount of daily traffic volume, with no additional noise sources, other than the natural soundscape. Construction noise would be minimized through best management practices (see mitigation measures), during daytime hours during the summer months, and is not expected to be constant in duration. Therefore, alternative B may affect, but is unlikely to adversely affect, threatened and endangered species. Section 7 consultation with the U.S. Fish and Wildlife Service is mandatory (see appendix 5).

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that could have an effect on threatened and endangered species include fire management using prescribed burning and construction projects related to waterlines and lagoons in Munson Valley. Prescribed burns would emulate a natural occurrence under controlled conditions that could result in short-term, adverse impacts to threatened and endangered species and/or their habitat; however, the long-term effect from prescribed burns would be beneficial as the health of plant communities would improve and habitat would be more diverse. Construction in the Munson Valley could result in temporary to long-term effects on threatened and endangered species within a localized site. The cumulative effect of this alternative may affect, but is not likely to adversely affect, threatened and endangered species.

Conclusion. Alternative B may affect, but is unlikely to adversely affect the northern spotted owls occupying the activity center approximately 900 meters north of Highway 62 West. The cumulative impact of this alternative may affect, but is unlikely to adversely affect, threatened and endangered species.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to threatened and endangered species or special concern species at Crater Lake National Park.

Soils and Geology

Roadway

The existing roadway covers approximately 26 acres (11 hectares). The total amount of previously undisturbed soil permanently affected by alternative B would be 0 acres (0 hectares) (FHWA, 30% design, 2002). About 0.2 acre (0.08 hectare) of previously disturbed ground (removed turnouts) would be restored and revegetated. Surface scarring, rehabilitation, and revegetation efforts would reduce loss of soil through erosion. Natural soil processes would be restored in rehabilitated areas only over

the very long term, as soil structure slowly returned to a more natural condition. This would constitute a long-term, negligible, beneficial effect on soils.

No blasting activities should be required. Some moving, covering, trampling, and compaction of soils by equipment and workers within the construction zone is expected, but soils in much of the construction zone have been previously disturbed by road-related activities (e.g., construction and maintenance). Local soil compaction would temporarily decrease permeability, alter soil moisture content, and diminish the water storage capacity. This would constitute a negligible, long-term, adverse effect to soils.

Alternative B would not change geological conditions of the road.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that affect soils and geology within the park include the waterline replacement from Munson Springs to Garfield and the lagoon project at Munson Valley. The adverse effects of these projects would result in long-term, negligible, localized, adverse impacts. Alternative B would contribute a long-term and negligible beneficial cumulative effect on reclaimed sites, but a long-term, adverse, and negligible impact on roadside soils due to compaction.

Conclusion. There would no change to geology on the road corridor. Construction activities associated with alternative B would have a long-term, negligible, adverse effect on soils, but erosion controls, restoration, and revegetation would have a long-term, negligible beneficial effect on soils. Alternative B would contribute a long-term and negligible, beneficial, cumulative effect on reclaimed sites, but a long-term, adverse, and negligible impact on roadside soils due to compaction.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to soils and geology at Crater Lake National Park.

Cultural Resources

Archeological Resources

There are historic-period archeological sites associated with segments of the Fort Klamath-Jacksonville wagon road located in the vicinity of the project corridor. The location of these sites, however, lies outside of the area of potential effect for this alternative. There are no known archeological resources at the Pacific Crest trailhead parking lot, the area around turnout B, and a turnout to the west of Whitehorse Crossing, and therefore, no impacts are anticipated. At Whitehorse Creek and the switchback area, all known archeological resources would be avoided. Therefore, there would be no impacts to archeological resources under alternative B.

Should previously unidentified archeological resources be discovered during construction, work in that location would stop until a qualified archeologist could inventory and evaluate the resource and appropriate measures could be implemented, either to avoid further resource impacts or to mitigate their loss or disturbance in consultation with the Oregon SHPO.

Cumulative Impacts. In conjunction with all past, present, and reasonably foreseeable future actions, including trail rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house; implementation of alternative B would not contribute to cumulative impacts to archeological resources.

Conclusion. Alternative B would have no impact on archeological resources and would not contribute to cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

Section 106 Summary. Under alternative B, all road work would be confined within the existing roadbed and previously disturbed areas. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the National Park Service proposes that implementing alternative B would result in a determination of *no historic properties affected.*

Historic Structures

Although Highway 62 West crosses, covers, and parallels the Fort Klamath-Jacksonville wagon road in several locations, the rehabilitation of the roadway would not create any new impacts to the wagon road, and therefore, no impacts are anticipated. At turnout A and the switchback area, all known resources would be avoided. Therefore, there would be no impacts to historic structures under alternative B.

Cumulative Impacts. In conjunction with other past, present, and reasonably foreseeable actions, including trail rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house, alternative B would not contribute to cumulative actions.

Conclusion. Alternative B would have no impact on historic structures and would not contribute to cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

Section 106 Summary. Under alternative B, all road work would be confined within the existing roadbed and previously disturbed areas. After applying the Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the National Park Service proposes that implementing alternative B would result in a determination of *no historic properties affected*.

Visitor Use, Traffic, and Highway Safety

This alternative would not add to traffic volume or visitor use for this area of the park.

Over the short term, visitor experience would be adversely affected by noise, dust, fumes, delays, increased congestion, and construction vehicle traffic along this section of Highway 62 West for the duration of road reconstruction activities. Some visitors would be dissatisfied because they would be unable to visit a particular feature or features due to road reconstruction actions, work on parking lots, and turnout closures. This would result in a short-term, negligible to minor, adverse impact. However, during the rehabilitation of Highway 62 West, speeds would be reduced in construction zones, possibly resulting in the reduction of the number and severity of vehicle accidents in these segments. This would result in a short-term, negligible, beneficial effect to safety.

The reconstructed road would provide a smoother ride. The consistent 11-foot travel way would meet the recommended National Park Service road standard for lanes. The consistent width would reduce frustration for some visitors, especially those operating large vehicles. Additional signage and appropriate guardrail installation would also improve the driving experience and safety. This would result in a long-term, negligible, beneficial effect.

The most dramatic change would be for eastbound drivers at Whitehorse Crossing. The hill would be flattened allowing for greater sight distance to the upcoming curve. Drivers may be able to anticipate the curve and adjust their speed accordingly, possibly resulting in a reduction in the number and severity of accidents along this segment of the road. This would result in a long-term, negligible, beneficial effect to visitor use and highway safety.

The reconstruction associated with alternative B would also allow for improved sight distance and safer egress of the Pacific Crest Trail parking lot and at remaining turnouts. This would result in a long-term, negligible beneficial effect to visitor use and highway safety. The loss of a turnout would have a long-term, negligible, adverse effect to visitor use.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have an effect on visitor use, traffic, and highway safety include trail rehabilitation and relocation, and the reconstruction of the Rim parking lot. The effects of these projects would be long term and negligible beneficial. Alternative B would contribute a long-term, negligible, beneficial effect to these actions.

Conclusion. Alternative B would have short-term, negligible to minor, adverse effects on traffic and visitor use, and a negligible, beneficial effect on safety. However, alternative B would have a long-term, negligible beneficial effect on visitor use, traffic, and highway safety. The cumulative effect would be long term, negligible, beneficial.

Park Operations

There would be a minimal change to park maintenance operations as a result of the implementation of alternative B. The road surface would be replaced, reducing the need for pothole filling. The road would be chipsealed about every five years. Improved drainage along the roadside would allow runoff to escape the roadway and, therefore, have a negligible, long-term, beneficial effect on snow removal. This would result in a long-term, negligible, beneficial effect to park operations.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have an effect on park maintenance operations include trail rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house. The effects of these projects would be long term and negligible beneficial. The cumulative effect of alternative B on park maintenance

operations, in combination with other past, present, and reasonably foreseeable future events, would be long term and negligible beneficial.

Conclusion. Alternative B would have a long-term, negligible, beneficial effect on park operations. The cumulative effect of alternative B on park maintenance operations would be long term and negligible beneficial.

Air Quality

Alternative B would temporarily affect local air quality through increased dust and vehicle emissions. Hydrocarbons, nitrous oxide, and sulfur dioxide emissions would be rapidly dissipated by air drainage since air stagnation is rare at the project site.

Fugitive dust plumes from construction equipment would intermittently increase airborne particulates in the area near the project site, but loading rates are not expected to be significant. To partially mitigate these effects, such activity would be coupled with water sprinkling to reduce dust. Impacts from dust and construction equipment emissions would be short term, adverse, and minor along the project corridor.

Hauling material and operating equipment during the construction period would result in increased vehicle exhaust and emissions. There would also be temporary increases in air pollution from queuing of visitor vehicles stopped temporarily during the construction period. The park would apply appropriate mitigating measures limiting idling of construction vehicles. Signs would also be posted for several miles outside the park alerting visitors of the construction and the possibility of 20- to 30-minute delays, and requesting that during any such delay, engines be turned off to eliminate motor vehicle emissions (idling vehicles emit far more air pollutants than moving vehicles).

Overall, there would be a negligible, short-term, adverse degradation of local air quality due to dust generated from road reconstruction activities and emissions from construction equipment and visitor vehicles. These effects would last only as long as road reconstruction activities occurred and the park's Class I air quality would not be affected by alternative B.

Cumulative Impacts. Air quality at Crater Lake National Park is near pristine with minimal internal and external emissions sources. Past, present, and reasonably foreseeable future actions that would have an effect on air quality include trail rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, and the lagoon project at Munson Valley. The effects of these projects would be short term, adverse, and negligible parkwide. Alternative B would only contribute to these actions if they are occurring concurrently, resulting in a short-term, adverse, and negligible parkwide effect.

Conclusion. Overall, there would be negligible, short-term degradation of air quality from construction-generated dust and emissions from construction equipment along the project corridor. Cumulative effects would be short-term, negligible, and adverse only if they are constructed concurrently.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

Soundscapes and Noise

Traffic Noise

This alternative would not add traffic volume to the roadway corridor, and changes to the horizontal or vertical alignments are slight. Therefore, the noise environment would not change and would be similar to that described for the no-action alternative.

Construction Noise

Since noise that radiates from construction equipment radiates equally in all directions, the sound intensity would diminish inversely as the square of the distance from the source. Therefore, in a free field (no reflections of sound), the L_p decreases 6 decibel (dB) with each doubling of the distance from the source. Under most conditions, reflected sound will reduce the attenuation due to distance. Therefore, doubling the distance may only result in a decrease of 4 to 5 dB (Cowan 1994).

Table 6 provides estimated sound pressure levels at a distance of 50 feet for miscellaneous heavy construction equipment.

Typical noise levels generated by these activities range from 75 to 89 dB at 50 feet from the source. At 100 feet from the source, noise levels would range from 69 dBA to 83 dBA. In the proposed wilderness area, noise levels would range from 63 to 77 dB at the wilderness boundary (200 feet), and vary by distance and forest shielding along the trail.

TABLE 6. HEAVY EQUIPMENT NOISE LEVELS AT 50 FEET

Equipment Type	Number Used[1]	Generated Noise Levels, L_p(dB)[2]
Bulldozer	1	88
Backhoe (rubber tire)	1	80
Front Loader (rubber tire)	1	80
Concrete Truck	1	75
Concrete Finisher	1	80
Asphalt Spreader	1	80
Roller	1	80
Scraper	1	89

[1] Estimated number in use at any time.
[2] Source: CERL 1978.

The sensitive noise receptor (Pacific Crest Trail user) would experience a substantial increase in noise levels (15 to 29 dB at 100 feet, and 9 to 23 dB at the wilderness boundary). However, this impact would be very short in duration (only when construction is occurring on the segment in close proximity to the receptor) and affecting a small number of park visitors (less than 4% of park visitors). Therefore, the impacts are expected to be minor to moderate, short term, and adverse.

The other two noise sensitive receptors (the northern spotted owl activity center and Annie Creek Canyon Trail) are more than 800 feet away (2,952 feet and 1,320 feet, respectively). At the evaluated distance of 800 feet, ambient noise levels would be less than the 51 to 65 dBA estimated using the 6 dBA drop-off with each doubling of distance, due to shielding by the forested woodlands, and would likely approach, or be negligible above existing levels. The existing noise environment includes a negligible amount of daily traffic volume, with no additional noise sources other than the natural soundscape. Construction noise would occur during daytime hours during the summer months, and is not expected to be constant in duration. Therefore, the impacts are expected to be negligible, short term, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have effects on soundscapes and noise quality within the park include the waterline replacement from Munson Springs to Garfield, lagoon project at Munson Valley, installation of vault toilet and kiosk, trail rehabilitation and relocation, reconstruction of the Rim parking lot, and rehabilitation of the superintendent's house. The effects of these projects would be short term, adverse, and negligible parkwide. These projects would be very localized and scheduled during different years. Alternative B would possibly contribute to one or more of these project as they are scheduled during the same building season. The impact would be short term, adverse, and negligible.

Conclusion. There would be no change to the long-term soundscapes or noise environment at the park once construction is completed. There would be a minor to moderate, very short-term, adverse impact to noise quality along the wilderness boundary and near the Pacific Crest Trail. There would be a negligible, very short-term, adverse impact to sensitive receptors—the northern spotted owl activity center and users of the Annie Creek Canyon Trail. The cumulative effect of alternative B would be very short term, negligible, and adverse to the soundscapes or noise environment at the park. There would be very short-term exceedances of the Noise Abatement Criteria at the Pacific Crest Trail where it intersects the highway.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE C: PREFERRED ALTERNATIVE

This section evaluates the potential impacts of alternative C, the preferred alternative.

Biotic Communities

Under alternative C, impacts would occur to vegetation and wildlife associated with rehabilitation of the Highway 62 West corridor and the realignment of the highway through the switchbacks. Impacts associated with rehabilitation of the roadway would be similar to the impacts described in alternative B, resulting in a short-term, negligible, adverse effect to vegetation and wildlife.

Vegetation

Under this alternative, approximately 0.5 mile of roadway—the switchbacks—would be removed and the road realigned (figure 7). Approximately 2.5 acres (1.0 hectares) of vegetation would be disturbed for the new alignment, resulting in a long-term, negligible, adverse impact to vegetation. Up to six pine trees over 10-feet tall located at or near the toe of the fill slope would be protected with tree wells. Also, six to eight pine trees under 10-feet tall would be saved for transplanting. Following highway rehabilitation work, 1 acre (0.4 hectare) of land previously covered by the existing highway and turnouts would be available for restoration to native habitat resulting in a long-term, negligible, beneficial effect to vegetation.

Wildlife

Wildlife species would be expected to avoid the area during construction or would only travel through the area when traffic and noise had abated. Following highway rehabilitation work, 1 acre (0.4 hectare) of land previously covered by the existing highway and turnouts would be available for restoration to native habitat resulting in a long-term, negligible, beneficial effect to wildlife. Alternative C would result in a short-term, negligible, adverse effect to wildlife during construction.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have an effect on vegetation and wildlife include fire management using prescribed burning and construction projects related to waterlines and lagoons in Munson Valley. Prescribed burns would emulate a natural occurrence under controlled conditions that would result in short-term adverse impacts to vegetation, individual wildlife, and habitat; however, the long-term effect from prescribed burns would be beneficial as the health of the plant communities would improve and habitat would be more diverse for wildlife. Construction in the Munson Valley would result in temporary to

long-term adverse effects on vegetation and wildlife on a localized site. This alternative would contribute a negligible, long-term, adverse effect to the cumulative impacts on vegetation and wildlife.

Conclusion. Alternative C would have a short-term, negligible, adverse effect on vegetation and wildlife during construction. Long-term, negligible, adverse impacts on vegetation and wildlife would be expected; however, a long-term, negligible beneficial effect would occur where habitat is restored. The cumulative effect would be a long-term, negligible, adverse effect on vegetation and wildlife.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to biotic communities at Crater Lake National Park.

Threatened and Endangered Species, Species of Concern

Under alternative C, effects to the northern spotted owl would be similar as described under alternative B. The switchbacks are located over 4 miles from the owl activities center, and therefore, the realignment of the switchback would not increase potential effects to the owl.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that could have an effect on threatened and endangered species include fire management using prescribed burning and construction projects related to waterlines and lagoons in Munson Valley. Prescribed burns would emulate a natural occurrence under controlled conditions that could result in short-term adverse impacts to threatened and endangered species and/or their habitat; however, the long-term effect of prescribed burns would be beneficial as the health of plant communities would improve and habitat would be more diverse. Construction in the Munson Valley could result in temporary to long-term effects on threatened and endangered species within a localized site. The cumulative effect of this alternative may affect, but is not likely to adversely affect, threatened and endangered species.

Conclusion. Alternative C may affect, but is unlikely to adversely affect the northern spotted owls occupying the activity center approximately 900 meters north of Highway 62 West. The cumulative impact of this alternative may affect, but is unlikely to adversely affect, threatened and endangered species.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to threatened and endangered species at Crater Lake National Park.

Soils and Geology

Roadway

The existing roadway covers approximately 26 acres (10.5 hectares). The total amount of previously undisturbed soil permanently affected by the switchback realignment would be approximately 2.5 acres (approximately 1.0 hectare) (FHWA, 30% design, 2002). This would have a long-term, negligible, adverse impact on soils.

The approximate area of existing roadway to be obliterated, then revegetated, due to realignment of the switchbacks and removal of the turnouts, would be 1 acre (0.4 hectare). Surface scarring, rehabilitation, and revegetation efforts would reduce loss of soil through erosion. Natural soil processes would be restored in rehabilitated areas only over the very long term, as soil structure slowly returned to a more natural condition. This would constitute a long-term, negligible beneficial effect on soils.

No blasting activities should be required. Some moving, covering, trampling, and compaction of soils by equipment and workers within the construction zone is expected, but soils in much of the construction zone have been previously disturbed by road-related activities (e.g., construction and maintenance). Local soil compaction would temporarily decrease permeability, alter soil moisture content, and diminish water storage capacity. Some excavation of rock in the upper switchback would be required for the new alignment. Construction activities associated with the preferred alternative would have long-term, negligible, adverse impacts on soils and geology.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have effects on soils and geology within the park include the waterline replacement from Munson Springs to Garfield and the lagoon project at Munson Valley. The effects of these projects would result in long-term, localized, adverse impacts. Alternative C would contribute a long-term and negligible, beneficial, cumulative effect on reclaimed sites, but a long-term, adverse, and negligible impact on soils. The cumulative impacts of these projects would be long term, adverse, and negligible.

Conclusion. Construction activities associated with the preferred alternative would have long-term, negligible beneficial effects on reclaimed areas, but a long-term, negligible to minor, adverse impact to soils and geology. Alternative C would contribute a negligible, adverse, and long-term, cumulative impact.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to soils and geology at Crater Lake National Park.

Cultural Resources

Archeological Resources

There are historic-period archeological sites associated with segments of the Fort Klamath-Jacksonville wagon road located in the vicinity of the project corridor. There are no known archeological resources at the Pacific Crest trailhead parking lot, the area around turnout B, and a turnout to the west of Whitehorse Crossing, and therefore, no impacts are anticipated in these areas. At Whitehorse Creek, all known archeological resources would be avoided. Therefore, there would be no impacts to archeological resources under alternative C.

Should previously unidentified archeological resources be discovered during construction, work in that location would stop until a qualified archeologist could inventory and evaluate the resource and appropriate measures could be implemented, either to avoid further resource impacts or to mitigate their loss or disturbance in consultation with the Oregon SHPO.

Cumulative Impacts. In conjunction with all past, present, and reasonably foreseeable future actions, including trails rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house; implementation of alternative C would not contribute to cumulative impacts to archeological resources.

Conclusion. Alternative C would have no impact on archeological resources and would not contribute to cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

Section 106 Summary. Under alternative C, the majority of the road work would be confined within the existing roadbed and previously disturbed areas. Reconstruction of the switchbacks would avoid known archeological resources. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the National Park Service proposes that implementing alternative C would result in a determination of *no historic properties affected.*

Historic Structures

A contributing feature of the Fort Klamath-Jacksonville wagon road is located within the area of potential effect. This resource would be avoided through road design in the switchback segments by increasing the steepness of the slope for the fill on the upper (southern) switchback to 1.5:1. This road design would avoid the two 1911 road segments and the revetment wall resulting in no impacts to historic structures.

Cumulative Impacts. In conjunction with other past, present, and reasonably foreseeable actions, including trail rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house; implementation of alternative C would not contribute to cumulative impacts on historic structures.

Conclusion. Alternative C would have no impact on known cultural resources and would not contribute to cumulative impacts.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values.

Section 106 Summary. Project design avoids known historic structures in the area of potential effect. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5) the National Park Service proposes that implementing alternative C would result in a determination of *no historic properties affected*.

Visitor Use and Highway Safety

Under alternative C, effects to visitor use and highway safety would be similar to those described for alternative B, with the exception of the switchbacks. The radii of the switchbacks would be increased, resulting in longer sight distances, possibly reducing the potential for vehicular loss of control and associated collisions. Visitors would experience a more pleasurable driving experience through the widened switchback, particularly those operating long vehicles (buses, recreational vehicles, and towing vehicles). This would also result in a long-term, minor, beneficial effect.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have an effect on visitor use and highway safety include trail rehabilitation and relocation, and the reconstruction of the Rim parking lot. The effects of these projects would be long term and negligible beneficial. Alternative C would contribute a long-term, negligible, beneficial effect to these actions.

Conclusion. Alternative C would have a long-term, minor, beneficial effect on visitor use and highway safety. Short-term effects would be both minor and adverse and negligible beneficial. The cumulative effect would be a long-term, negligible, beneficial effect.

Park Operations

Alternative C would result in widened curves in the switchback section of Highway 62 West, allowing for more efficient snow removal. The push plow would be able to clear the road with less passes, and the rotary plow would be required less often during early and late portions of the snow season. This would result in a long-term, minor, beneficial effect on park maintenance operations. The road surface would be replaced, reducing the need for pothole filling. The road would be chipsealed approximately every five years. This would result in a long-term, negligible, beneficial effect to park maintenance operations.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would have an effect on park maintenance operations include trail rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, the lagoon project at Munson Valley, and rehabilitation of the superintendent's house. The effects of these projects would be long term and negligible beneficial. The cumulative effect of alternative C on park maintenance operations, in combination with other past, present, and reasonably foreseeable future events, would be long term and minor beneficial.

Conclusion. Alternative C would have a long-term, minor, beneficial effect on park operations. The cumulative effect of alternative C on park maintenance operations would be long term and minor beneficial.

Air Quality

Alternative C, the preferred alternative, would temporarily affect local air quality through increased dust and vehicle emissions. Fugitive dust plumes from construction equipment would intermittently increase airborne particulates in the area near the project site. Impacts associated with alternative C would be similar to the impacts described under alternative B, although the construction phase of the project would be slightly longer.

Cumulative Impacts. Air quality at Crater Lake National Park is near pristine with minimal internal and external emission sources. Past, present, and reasonably foreseeable future actions that would have an effect on air quality include trail rehabilitation and relocation, the reconstruction of the Rim parking lot, the waterline replacement from Munson Springs to Garfield, and the lagoon project at Munson Valley. The effects of these projects would be short term, adverse, and negligible parkwide. Alternative C would only contribute to these actions if they are occurring concurrently, resulting in a short-term, adverse, and negligible parkwide effect.

Conclusion. Overall, there would be negligible, short-term degradation of air quality from construction-generated dust and emissions from construction equipment along the project corridor. Cumulative effects would be negligible and adverse only if they are constructed concurrently.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to air quality at Crater Lake National Park.

Soundscapes and Noise

Traffic Noise

This alternative would not add traffic volume to the roadway corridor, and changes to the horizontal or vertical alignments are slight. Therefore, the noise environment would not change and be similar to that described for the no-action alternative.

Construction Noise

Although additional equipment would be required for a slightly longer duration to clear and fill the alignment for the switchbacks, there are no sensitive noise receptors in this area. The noise environment would be similar to that described for alternative B.

Cumulative Impacts. The noise environment would be similar to that described for alternative B.

Conclusion. There would be no change to the long-term soundscapes or noise environment at the park once construction is completed. There would be a minor to moderate, very short-term, adverse impact to noise quality along the wilderness boundary and near the Pacific Crest Trail. There would be a negligible, very short-term, adverse impact to sensitive receptors—the northern spotted owl activity center and users of the Annie Creek Canyon Trail. The cumulative effect of alternative C would be very short-term, negligible, and adverse to the soundscapes or noise environment at the park. There would be very short-term exceedances of the Noise Abatement Criteria at the Pacific Crest Trail where it intersects the highway.

Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of park resources or values related to soundscapes and noise at Crater Lake National Park.

REFERENCES

Anthony, R.G. and F.B. Isaacs
1989 Characteristics of bald eagle nest sites in Oregon. *Journal of Wildlife Management*. 53: 148-159.

Bailey, Robert G.
1998 Ecoregions Map of North America. USDA – Forest Service, in cooperation with The Nature Conservancy and the U.S. Geological Survey. Washington, DC.

Brennan, David
2002 National Park Service, Crater Lake National Park. Personal Communication with Jayne Aaron, e^2M Environmental Planner.

Carey, A.B., S.P. Horton, and B.L. Biswell
1992 Northern spotted owls: influence of prey base and landscape character. Ecological Monographs 62: 223-250.

Cowan, James P.
1994 *Handbook of Environmental Acoustics*. Van Nostrand Reinhold. New York.

Crater Lake National Park, USDI-NPS
1999 Nature Notes from Crater Lake, Volume XXX – 1999. Casey Baldwin: *The Rare Treasure of Mount Mazama Collomia*. Crater Lake Natural History Association, Stephen R. Mark, Editor. Acquired online at: http://www.nps.gov/crla/nn-vol30.htm.

2002a Crater Lake – Fire Management Plan. Acquired online at: http://www.nps.gov/crla/firempaq.htm.

2002b Trails Relocation and Rehabilitation Environmental Assessment. Acquired Online at: http://www.nps.gov/crla.htm.

2002c Request for Concurrence on Effects Determination for Effects to Northern Spotted Owls. Submitted to the USFWS – Klamath Falls Fish and Wildlife Office on 23 August 2002. Crater Lake, OR.

Donohue, John
1999 John Donohue's National Park Photos. Cover Photo. Acquired Online at: http://www.serve.com/wizjd/parks/crater_lake/crater_lake.html.

Federal Register
1999 Endangered and Threatened Wildlife and Plants; proposed rule to remove the bald eagle in the lower 48 states from the list of endangered and threatened wildlife. Vol. 64, No. 128, July 6. Washington, DC.

Gedalof, Ze'ev and Dan J. Smith
2001 Dendroclimatic response of mountain hemlock (*Tsuga mertensiana*) in Pacific North America. Canadian Journal of Forest Resources: 31: 322-332.

Hamer, T.E., et al.
1994 Hybridization between barred and spotted owls. Auk 111: 487-492.

Koehler, G.M.
1990 Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology. 68: 845-851.

LaCaptain, Leonard
2002 Wildlife Biologist – USFWS, Klamath Falls Fish and Wildlife Office. Personal Communication with J. Von Loh, e^2M Biologist.

Mail Tribune News
2002 Groups to sue for Wolverine listing. Paul Fattig. Acquired online at: http://www.mailtribune.com/archive/2000/december/122000n3.htm.

Minnesota Zoo
2002 Wolverine. Acquired online at: http://www.mnzoo.com/animals/Minnesota_trail/wolv_2.asp.

Murray, Michael
2002a Electronic Mail Summary of Contact with the Oregon Natural Heritage Program to J. Von Loh, e^2M Biologist. USDI-NPS, Crater Lake, OR.

2002b List of Rare Species of Crater Lake National Park. in personal communication with J. Von Loh, e^2M Biologist. USDI-NPS, Crater Lake, OR.

National Park Service (NPS), U.S. Department of Interior
1974 Legislative Proposal. Wilderness Designation of Crater Lake National Park, Crater Lake, OR. Available at Crater Lake National Park, Klamath County, OR.

1980 Public Law 96-553, Wilderness Designation of Crater Lake National Park. Available at Crater Lake National Park, Klamath County, OR.

1986 *Park Roads Standards*, Crater Lake, OR. Available at Crater Lake National Park, Klamath County, OR.

1987 Crater Lake National Park Administrative History, Harlan D. Unrau and Stephen R. Mark. Available at Crater Lake National Park, Klamath County, OR.

1994a Final Winter Use Plan and Environmental Assessment for Crater Lake National Park. Available at Crater Lake National Park, Klamath County, OR.

1994b Legislative Proposal. Wilderness Designation of Crater Lake National Park. Available at Crater Lake National Park, Klamath County, OR.

_____ Floodplain Management Guideline. Special Directive 93-4. Available at the National Park Service, Denver Service Center, Denver, CO.

1995 Record of Decision, Development Concept Plan, Amendment to the General Management Plan, Final Environmental Impact Statement, Crater Lake, OR. Available at Crater Lake National Park, Klamath County, OR.

1996-99 Motor Vehicle Traffic Accident Reports, form #10-413. Available at Crater Lake National Park, Klamath County, OR.

1999a National Park Service Director's Order – 41 and Reference Manual 41 – Wilderness Preservation and Management, Department of the Interior, National Park Service. Available at the National Park Service, Denver Service Center, Denver, CO.

1999b Fire Management Plan, Crater Lake, OR. Available at Crater Lake National Park, Klamath County, OR.

1999c Visitor Services Plan, Crater Lake, OR. Available at Crater Lake National Park, Klamath County, OR.

2000a Strategic Plan 2001 – 2005. Crater Lake National Park. Available at Crater Lake National Park, Klamath County, OR.

2000b Crater Lake National Park: Information Brochure. Government Printing Office, Washington, DC.

2001a National Park Service Management Policies. Available at Crater Lake National Park, Klamath County, OR.

2001b Director's Order –12: Conservation Planning, Environmental Impact Analysis, and Decision-Making. Available at Lake Mead National Recreation Area, Clark County, NV.

2002a Visitor Study, Summer 2001. Visitor Services Report. Available at Crater Lake National Park, Klamath County, OR.

2002b Trails Relocation and Rehabilitation, Environmental Assessment Crater Lake National Park, Klamath County, OR. Available at Crater Lake National Park, Klamath County, OR.

2002c Archaeological Clearance Survey Form, Project No., Clearance No. Report Date: /2002.

NatureServe

2002a Comprehensive Report Alliance – *Pinus contorta* Forest Alliance. Acquired online at: http://www.natureserve.org/explorer.

2002b Comprehensive Report Alliance – *Tsuga mertensiana* Forest Alliance. Acquired online at: http://www.natureserve.org/explorer.

2002c Comprehensive Report Species – *Arabis suffrutescens* var. *horizontalis*. Acquired online at: http://www.natureserve.org/explorer.

2002d Comprehensive Report Species – *Botrychium pumicola*. Acquired online at: http://www.natureserve.org/explorer.

2002e Comprehensive Report Species – *Collomia mazama*. Acquired online at: http://www.natureserve.org/explorer.

2002f Comprehensive Report Species – *Gulo gulo*. Acquired online at: http://www.natureserve.org/explorer.

2002g Comprehensive Report Species – *Haliaeetus leucocephalus*. Acquired online at: http://www.natureserve.org/explorer.

2002h Comprehensive Report Species – *Lynx canadensis*. Acquired online at: http://www.natureserve.org/explorer.

2002i Comprehensive Report Species – *Martes americana*. Acquired online at: http://www.natureserve.org/explorer.

2002j Comprehensive Report Species – *Strix occidentalis caurina*. Acquired online at: http://www.natureserve.org/explorer.

Oregon Department of Agriculture
2002 Oregon's Quarantine Against Noxious Weeds. Acquired online at: http://www.oda.state.or.us/plant/weed_control/noxweedquar.html.

Pernot, J.F.
1916 Forests of Crater Lake National Park. Acquired online at: http://www.nps.gov/crla/pernot/pernot.htm.

Predator Defense Institute
2002 Oregon's Forest Carnivores. Acquired online at: http://pdi.enviroweb.org/oregonfc.htm.

Roach, John
1999 Lynx Rediscovered in Oregon Cascades. Environmental News Network. Acquired online at: http://lynx.uio.no/lynx/nancy/news/orja999u.htm.

Robert Peccia and Associates, Inc.
2001 Traffic Study data, Crater Lake National Park, OR.

Seattle Times
2000 Botanist watching over rare ferns in Oregon. The Associated Press. Acquired online at: http://seattletimes.nwsource.com/news/local/html98/fern14m_20000814.html.

Stonum, Lori
1993 Spotted Owls: A Puzzle Piece? USDI-NPS Crater Lake. Acquired online at: http://www.nps.gov/crla/clnp-owl.htm.

Thomas, J.W., et al.
1993 Viability assessments and management considerations for species associated with late-successional and old-growth forests of the Pacific Northwest. The report of the Scientific Analysis Team. USDA Forest Service, Spotted Owl EIS Team. Portland, OR. 530 pp.

Tuss, Craig T.
1998 USFWS Biological Opinion: Crater Lake National Park Fire Management Plan, Appendix Q. Acquired online at: http://www.nps.gov/crla/firempaq.htm.

U.S. Department of Agriculture – Forest Service
1994 Rogue River National Forest Location Map. Washington, DC.

1993 See Thomas et al. 1993.

_____ and U.S. Department of the Interior, Bureau of Land Management (BLM), Prineville District
2002 Conservation Strategy for *Botrychium pumicola* (Pumice Grape Fern) on the Deschutes, Fremont, and Winema National Forests, and Prineville District, Bureau of Land Management, Oregon. Acquired online at: http://www.fs.fed.us/r6/fremont/botany/bopu_conservation_strategy.htm.

U.S. Department of Agriculture, Natural Resources Conservation Service
2002 Unpublished Manual: Soil Survey of Crater Lake National Park. Pacific Northwest Soil Survey Region. Copied to CD by Sheri Schneider.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS)
2002 Federally threatened, endangered, and proposed species list update. Klamath Falls Fish and Wildlife Office. Klamath Falls, OR.

2002b Crater Lake National Park, Highway 62 Rehabilitation Project – Concurrence on Effects, Crater Lake, Oregon. Klamath Falls Fish and Wildlife Office. Klamath Falls, OR.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS)
1998 *Endangered Species Consultation Handbook*. Washington, DC.

U.S. Department of the Interior, National Park Service
2001 Crater Lake National Park Map and Brochure. Government Printing Office. Washington, DC.

2002 Request for Concurrence on Effects Determination for Effects to Northern Spotted Owls. Submitted to the U.S. Fish and Wildlife Service – Klamath Falls Fish and Wildlife Office on August 23, 2002. Crater Lake, OR.

2002 Checklists of Birds, Fish, Mammals, Reptiles and Amphibians for Crater Lake National Park. Acquired online at: http://www.nps.gov/crla/brochures.

_____. and Oregon Fish and Wildlife Department
1997 Crater Lake Threatened and Endangered Animals. Acquired online at: http://www.nps.gov/crla/tesanima.htm.

Warfield, Ronald G., Lee Juillerat, and Larry Smith
1999 Crater Lake, the Story Behind the Scenery. LC 82-82579. ISBN 0-916122-79-4. KC Publications, Inc. 1982.

Wolverine
2002 Wolverine. Acquired online at: http://www.wolverines-wolverines.com/.

Wooley, Robert L.
2001 Sensitive Plant Monitoring Report for 2001 – Fremont National Forest. Acquired online at: http://www.fs.fed.us/r6/fremont/botany/plantmonitor.html.

Ziegler, Robert S.
1978 in Zobel and Ziegler, 2001. http://www.nps.gov/crla/lodgepole/lodgepole.htm.

Zobel, Donald B. and Robert S. Ziegler
2001 Lodgepole Pine at Crater Lake: History and Management of the Forest Structure. Oregon State University. Acquired online at: http://www.nps.gov/crla/lodgepole/lodgepole.htm.

Personal Communication. June – July 2002.

_____. Federal Lands Highway Program. Kerry Cook.

_____. National Park Service Center Staff: Alan Woodrow (Landscape Architect).

_____. U.S. Fish and Wildlife Service. Klamath Falls, OR. Doug Laye

_____. United States Forest Service, Jim Hays.

LEGAL CITATIONS

- Act of August 25, 1916 (National Park Service Organic Act), P.L. 64-235, 16 USC § 1 *et seq.* as amended.
- National Historic Preservation Act as amended, P.L. 89-665, 80 Stat. 915, 16 USC § 470 *et seq.* and 36 CFR 18, 60, 61, 63, 68, 79, 800.
- Native American Grave Protection and Repatriation Act, P.L. 101-601, 104 Stat. 3049, 25 USC §§ 3001-3013.
- Presidential Memorandum of April 29, 1994 "Government-to-Government Relations with Native American Tribal Governments," 59 FR 85.
- Clean Air Act, as amended, P.L. Chapter 360, 69 Stat. 322, 42 USC § 7401 *et seq.*
- Endangered Species Act of 1973, as amended, P.L. 93-205, 87 Stat. 884, 16 USC § 1531 *et seq.*
- Executive Order 11988: Flood Plain Management, 42 FR 26951, 3 CFR 121 (Supp 177).
- Executive Order 11990: Protection of Wetlands, 42 FR 26961, 3 CFR 121 (Supp 177).
- Executive Order 11991: Protection and Enhancement of Environmental Quality.
- Farmland Protection Policy Act of 1982, P.L. 97-98.
- Federal Water Pollution Control Act (commonly referred to as Clean Water Act), P.L. 92-500, 33 USC § 1251 *et seq.*, as amended by the Clean Water Act, P.L. 95-217.
- Fish and Wildlife Coordination Act of 1958, as amended, P.L. 85-624, 72 Stat. 563, 16 USC § 661 *et seq.*
- National Environmental Policy Act of 1969, P.L. 91-190, 83 Stat. 852, 42 USC § 4321 *et seq.*
- Protection and Enhancement of Environmental Quality, E.O. 11514, as amended, 1970, E.O. 11991, 35 *Federal Register* 4247; 1977, 42 *Federal Register* 26967).
- Resource Conservation and Recovery Act, P.L. 94-580, 30 Stat. 1148, 42 USC § 6901 *et seq.*

- Secretarial Order 3175, Departmental Responsibility for Indian Trust Resources.
- Soil and Water Resources Conservation Act of 1977.
- Watershed Protection and Flood Prevention Act, P.L. 92-419, 68 Stat. 666, 16 USC § 100186.
- The Wilderness Act of 1964.

CONSULTATION AND COORDINATION

A press release was distributed in July 2002, requesting scoping comments related to the Highway 62 West road project. No comments were received.

Agencies and organizations contacted for information; or that assisted in identifying important issues, selecting alternatives, or that will be given an opportunity to review and comment on this environmental assessment include the following:

FEDERAL AGENCIES

National Park Service – Crater Lake National Park
U.S. Army Corps of Engineers
U.S. Department of Agriculture – Forest Service
U.S. Department of Agriculture – Natural Resources Conservation Service
U.S. Department of Transportation – Federal Highway Administration
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service – Klamath Falls Fish and Wildlife Office

STATE AND LOCAL AGENCIES OF OREGON

Division of Environmental Quality
Oregon Department of Transportation
Oregon Fish and Wildlife
Oregon Natural Heritage Program
State Historic Preservation Office

NATIVE AMERICAN TRIBES

Cow Creek Band of Umpqua Tribe of Indians
Klamath Tribes

PREPARERS

This environmental assessment was prepared by engineering-environmental Management, Inc. (e^2M) under the direction of Mr. Charles V. Lundy, Superintendent, Crater Lake National Park. Mr. Lundy, Crater Lake National Park staff, National Park Service staff, U.S. Forest Service staff, and Federal Highway Administration staff, provided invaluable assistance in the development and technical review of this environmental assessment, and include:

Crater Lake National Park

Ron Theall; Road and Shop Foreman
Mac Brock; Chief, Resource Management
Gordon Toso; Chief, Maintenance
Michael Murray; Terrestrial Ecologist
Steve Mark; Historian

National Park Service

Alan Woodrow; Landscape Architect, Denver Service Center
Jane Sikoryak; Cultural Resource Specialist, Denver Service Center
Dick Engle; Park Road Program, Seattle
Steve Stone; Natural Resources Specialist, Denver Service Center
Debbie Campbell, Project Manager, Denver Service Center

Federal Highway Administration

Jody Marshall; Staff Environmental Compliance Engineer
Kerry Cook; Geotechnical Engineer
Susan Pobar; Designer
Dick Gatten; Design Operations Engineer

U.S. Department of Agriculture, Natural Resources Conservation Service

Chad McGrath
Sheri Schneider

U.S. Fish and Wildlife Service, Klamath Falls

Doug Laye
Leonard LaCaptain

U.S. Forest Service

Jim Hays, Rogue River National Forest

The preparers of this document are listed below:

Jayne Aaron, Cultural Resources Program Manager/Environmental Planner
M.A. Environmental Policy and Management
B.A. Environmental Design
Years of Experience: 11

Jim Von Loh, Senior Biologist
M.S. Biology
B.S. Biology
Years of Experience: 25

Gustin Hare, Noise Analyst
B.S. Environmental Science
Years of Experience: 7

David Fischer, Health and Safety Specialist
B.S. Occupational Safety and Industrial Hygiene Management
Years of Experience: 8

Brian Davis, Land Use Planner
B.S. Landscape Architecture
Years of Experience: 20

Wanda Gray Lafferty, Technical Publications Specialist
Two Years undergraduate work
Years of Experience: 25

David Hesker, Graphic Design
Years of Experience: 12

Chris Baker, Cultural Resources Specialist
M.A. History and Public History
B.A. History
Years of Experience: 4