National Park Service
Bureau of Land Management
U.S. Department of the Interior

Bureau of Land Management
Nevada State Office
Las Vegas Field Office

National Park Service
Pacific West Region
Lake Mead National Recreation Area

Jimbilnan, Pinto Valley, Black Canyon, Eldorado, Ireteba Peaks, Nellis Wash, Spirit Mountain, and Bridge Canyon Wilderness Areas

Draft
Wilderness Management Plan
Environmental Impact Statement

January 2014

Draft
Wilderness Management Plan / Environmental Impact Statement
Jimbilnan, Pinto Valley, Black Canyon, Eldorado, Ireteba Peaks,
Nellis Wash, Spirit Mountain, and Bridge Canyon Wilderness Areas
Clark County, Nevada

A wilderness study and recommendation process began in 1974, when the National Park Service (NPS) completed an initial wilderness review of all the lands within the Lake Mead National Recreation Area (Lake Mead NRA). At that time, 409,000 acres were proposed for wilderness. The 1986 general management plan for Lake Mead NRA identified 558,675 acres as meeting the criteria of the Wilderness Act, and an additional 115,700 acres that potentially meet the criteria. Per NPS policies, these areas were subsequently managed to ensure that no actions being taken would diminish their wilderness suitability, pending action by Congress.

In 2002, The Clark County Conservation of Public Land and Natural Resources Act (P.L107-282) was signed into law. This act designated 18 wilderness areas in Clark County, Nevada, as part of the national wilderness preservation system. Nine of these designated wilderness areas are fully or partially within Lake Mead NRA. The National Park Service and the Bureau of Land Management (BLM) jointly manage four of these wilderness areas. This plan covers eight of the nine wilderness areas, of which three are jointly managed with the Bureau of Land Management. One area, the Muddy Mountains Wilderness, is covered under a separate plan that was jointly developed by the Bureau of Land Management and the National Park Service in 2007.

In 2010, a draft wilderness management plan /environmental assessment was published. However, due to issues subsequently raised by climbers and American Indian tribes, the National Park Service and Bureau of Land Management agreed to prepare a revised wilderness management plan / environmental impact statement.

This draft wilderness management plan / environmental impact statement presents and analyzes three alternatives for future direction of the management and use of eight wilderness areas in Lake Mead NRA and adjacent BLM lands. Alternative B is the agencies' preferred alternative. The potential environmental impacts of all alternatives have been identified and assessed.

This draft plan proposes some changes in how the eight wilderness areas are managed. Three alternatives were developed that varied primarily in the level of public access and degree of management. All of the alternatives were crafted with the intention of ensuring cohesive management of the wilderness areas across jurisdictional boundaries. The proposed changes that would be most obvious to the public are those that address access and visitor distribution, visitor information services, management of climbers, and resource conditions. Alternative A, the "no-action" alternative, reflects current management of the wilderness areas and serves as a baseline for comparison with the other action alternatives. Alternative B, the agencies' preferred alternative, generally focuses on protecting the character of the wilderness areas while providing a few more opportunities for access into several areas. Alternative C provides a higher level of access and visitor use management while still protecting the overall character of the wilderness areas.

This draft wilderness management plan / environmental impact statement has been distributed to other agencies and interested organizations and individuals for their review and comment. The public comment period for this document will last for 60 days. Readers are encouraged to submit comments on this draft plan at http://parkplanning.nps.gov/lake. You may also send written comments to Lake Mead National Recreation Area Wilderness Management Plan, National Park Service, Denver Service Center – PDS, P.O. Box 25287, Denver, CO 80225.

Please note that NPS practice is to make comments, including names and addresses of respondents, available for public review; see "How to Comment on this Plan" for further information. The review and comment period closes 60 days after the Environmental Protection Agency (EPA) notice of filing is published in the *Federal Register*.

HOW TO COMMENT ON THIS PLAN

Comments on this draft wilderness management plan/environmental impact statement (WMP/EIS) are welcome and will be accepted for 60 days after the EPA notice of filing is published in the *Federal Register*. During the comment period, comments may be submitted using several methods as noted below.

Online: at http://parkplanning.nps.gov/lake

We prefer that readers submit comments online through the park planning website identified above, so the comments become incorporated into the NPS Planning, Environment, and Public Comment System. An electronic public comment form is provided through this website.

Mail: Lake Mead National Recreation Area Wilderness Management Plan
National Park Service
Denver Service Center – PDS
P.O. Box 25287
Denver, CO 80225

Hand delivery: at public meetings to be announced in the media following release of this plan.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

SUMMARY

This document contains the proposed wilderness management plan for Jimbilnan, Pinto Valley, Black Canyon, Eldorado, Ireteba Peaks, Nellis Wash, Spirit Mountain, and Bridge Canyon wilderness areas and the associated environmental impact statement. The purpose of this plan is to serve as:

1. A public document that outlines steps for preserving the wilderness character, natural resources, and cultural resources in eight designated wilderness areas within Lake Mead National Recreation Area and adjacent Bureau of Land Management (BLM) lands while also providing for the use and enjoyment of the wilderness areas by current and future generations.
2. A management document that will provide accountability, consistency, and continuity for managing the wilderness areas in the National Park Service (NPS) and Bureau of Land Management wilderness management programs.

This plan covers eight wilderness areas; three of these are managed jointly with the Bureau of Land Management.

The plan addresses issues, provides guidelines for managing the eight wilderness areas, and identifies specific goals, objectives, and decision-making guidelines for administrative actions and visitor use. In many cases, this plan formalizes current NPS and BLM management practices in the wilderness areas. However, several modifications and changes are proposed that are intended to make BLM and NPS management practices consistent, improve visitor services, or generally improve wilderness management. This plan does not propose any changes to the NPS or BLM wilderness boundaries set forth in Clark County's 2002 wilderness legislation.

Adopting this plan would result in some changes in how the National Park Service and Bureau of Land Management manage wilderness and visitors—some would be readily apparent to the public, while others would be primarily operational. The National Park Service and Bureau of Land Management would implement a minimum requirement process to guide and document decisions on appropriate tools for maintenance activities, research projects, and appropriate administrative actions within the wilderness areas. The agencies would aim to make better use of research and monitoring to guide management through the creation and implementation of a coordinated monitoring plan, and would strive to increase staff training and accountability for wilderness management.

The primary issues facing the wilderness areas include the following:

- identifying appropriate uses for the areas
- providing access within the wilderness areas versus protecting wilderness characteristics
- providing information about the wilderness areas versus protecting wilderness characteristics
- providing for use of Spirit Mountain by the general public while meeting tribal needs and concerns
- how to manage rock climbing in the wilderness areas, particularly the placement or removal of fixed anchors for rock-climbing activities
- how to manage bouldering in wilderness areas (e.g., in areas containing cultural resources such as petroglyphs and pictographs)
- consideration of the kinds of activities and levels of visitor use that should be permitted while ensuring cultural resource protection

- the use of climbing equipment (including climbing chalk) near sensitive cultural resources (e.g., petroglyphs and pictographs)
- restoring disturbed areas within the wilderness areas
- coordinating agency management efforts

This draft wilderness management plan/ environmental impact statement proposes some changes in how the eight wilderness areas are managed. Three alternatives were developed that vary primarily in the level of public access and degree of management. All of the alternatives were crafted with the intention of ensuring cohesive management of the wilderness areas. The proposed changes that would be most obvious to the public are those that address access and visitor distribution, visitor information services, and resource conditions.

ALTERNATIVE A (NO-ACTION ALTERNATIVE)

Alternative A, the "no-action" alternative, reflects current management of the wilderness areas and serves as a baseline for comparison with the other alternatives. No major change would occur in the management of the wilderness areas. NPS and BLM managers would continue to strive to protect and maintain current natural and cultural resource conditions in the areas, and provide for quality visitor experiences. Existing visitor uses (e.g., hiking, rock climbing, and bouldering) would continue. Dispersed access into the areas would continue. The agencies would not change access to or within the wilderness areas, or current efforts in educating visitors and the public about the areas. Natural and cultural resource management efforts would continue as they are, under existing approved plans, without substantial changes.

In alternative A most of the adverse impacts on natural and cultural resources would be long-term and negligible to minor due to continuing visitor use in the wilderness areas and the use of the Spirit Mountain traditional cultural property. There would be some minor to moderate adverse long-term impacts on soils and vegetation due to visitor use in localized areas such as along designated routes, in washes, and at particular points of interest. The alternative would result in no new impacts on most qualities of wilderness character or visitor use and experience. But there would continue to be a long-term, moderate, adverse impact on one quality of wilderness character (cultural resources) in the Spirit Mountain and Bridge wilderness areas due to continuing hiking, bouldering, climbing, and use of fixed anchors.

ALTERNATIVE B (PREFERRED ALTERNATIVE)

Alternative B, the agencies' preferred alternative, generally focuses on protecting the character of the wilderness areas while providing a few more opportunities for access into some of the wilderness areas. The agencies would provide a variety of opportunities for appropriate wilderness activities, including provisions for both day users and overnight users, and for those who have limited wilderness skills as well as those who are experienced and self-reliant. Entry to the wilderness areas would be improved primarily through the establishment of access points at various locations. Additional efforts would be made to inform and educate both visitors and the public about the presence of the wilderness areas and the opportunities that are available. Dispersed use would continue to be encouraged, while the establishment and maintenance of designated routes would concentrate use in some areas. More proactive management also would be given to the Black Canyon, Pinto Valley, Spirit Mountain, and Bridge Canyon wilderness areas to address existing and potential impacts. No fixed anchors and equipment for climbing activities would be permitted in the Spirit Mountain Wilderness; all existing fixed anchors and equipment would be removed if it can be done so without damaging rock faces. In the

Bridge Canyon Wilderness no new fixed anchors or fixed equipment would be permitted, with the exception of permitted replacement anchors. After an inventory of climbing routes is completed, the National Park Service would work with tribes and partners to reduce the concentration of some of the existing bolt-intensive face climbs at certain climbing areas in the Bridge Canyon Wilderness.

Alternative B would have both adverse and beneficial impacts on the wilderness areas' natural and cultural resources, and on visitors. Most adverse impacts would be negligible to minor and long-term, and would be due to increased visitor use in localized areas, the development of designated routes and trails, and the presence of visitors in the Spirit Mountain traditional cultural property.

In alternative B, climbing and bouldering would continue to be allowed in all wilderness areas and would be managed as described in the overall climbing management directions in chapter 2. In addition, in this alternative the use and replacement of fixed anchors and equipment would be managed according to policies set forth in Director's Order 41: *Wilderness Stewardship* and BLM climbing policy (see the discussion of Spirit Mountain and Bridge Canyon wilderness areas). The removal of fixed anchors and equipment in the Spirit Mountain Wilderness and the reduction in concentration of some bolt-intensive face climbs at certain climbing areas in the Bridge Canyon Wilderness would reduce the number of climbers using the climbing areas at one time, therefore increasing opportunities for solitude. Use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would be prohibited. Because only a few climbers are typically present at these areas at a given time, the impact on opportunities for solitude would result in a long-term, minor, beneficial impact on the visitor experience. Although the reduction in bolt-intensive face climbs would be directed by Director's Order 41, there would probably be long-term, negligible to minor adverse impacts for some climbers who would no longer have access to some of the existing bolt-intensive face climbing opportunities in these areas.

ALTERNATIVE C

In alternative C the agencies would provide for a variety of opportunities for appropriate wilderness activities, including both day use and overnight use, and for those who have limited wilderness skills as well as those who are experienced and are self-reliant. Additional efforts would be made to inform and educate both visitors and the public about the presence of the wilderness areas and opportunities that are available. Dispersed use would continue to be encouraged, while the establishment and maintenance of designated routes would concentrate use in some areas. Although slightly more access opportunities would be provided in most of the wilderness areas, slightly fewer opportunities would be provided in the Black Canyon area. Access to the wilderness areas would be improved primarily through the establishment of trailheads at various points. More proactive management would be given to the Black Canyon, Pinto Valley, Spirit Mountain, and Bridge Canyon wilderness areas to ensure their values are protected and unacceptable impacts do not occur. No fixed anchors and equipment would be permitted in the Spirit Mountain Wilderness; all existing fixed anchors and equipment would be removed if it can be done without damaging the rock face. In the Bridge Canyon Wilderness no new fixed anchors or fixed equipment would be permitted, with the exception of permitted replacement anchors. After an inventory of climbing routes is completed, the National Park Service would work with tribes and partners to reduce the concentration of some of the existing bolt-intensive face climbs at certain climbing areas in the Bridge Canyon Wilderness.

In alternative C, climbing would continue to be allowed in all wilderness areas, and would be managed as described in the overall

climbing management directions in chapter 2. In addition, in this alternative the use and replacement of fixed anchors and equipment would be managed according to policies set forth in Director's Order 41 (see the discussion of Spirit Mountain and Bridge Canyon Wilderness areas). The removal of fixed anchors and equipment in the Spirit Mountain Wilderness and the reduction in concentration of some of bolt-intensive face climbs at certain climbing areas in the Bridge Canyon Wilderness would reduce the number of climbers using the climbing areas at one time, therefore increasing opportunities for solitude. Use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would be prohibited. Because only a few climbers are typically present at these areas at a given time, the impact on opportunities for solitude would result in a long-term, minor, beneficial impact on the visitor experience. Although the reduction in bolt-intensive face climbs would be directed by Director's Order 41, there would probably be long-term, negligible to minor adverse impacts for some climbers who would no longer have access to some of the existing bolt-intensive face climbing opportunities in these areas.

After the distribution of the draft wilderness management plan / environmental impact statement, there will be a 60-day public review and comment period. After this comment period, the NPS planning team will evaluate comments from other federal agencies, tribes, organizations, businesses, and individuals regarding the draft plan and incorporate appropriate changes into a final wilderness management plan / environmental impact statement. The final plan will include letters from governmental agencies, any substantive comments on the draft document, and NPS responses to those comments.

Following distribution of the final wilderness management plan / environmental impact statement and a 30-day no-action period, a Record of Decision approving a final plan will be signed by the NPS Pacific West regional director and the BLM Southern Nevada district manager. The Record of Decision documents the NPS-BLM selection of an alternative for implementation. With the signing of the Record of Decision the plan can then be implemented.

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FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS USED IN THIS DOCUMENT

ADA	Americans with Disabilities Act
AIRFA	American Indian Religious Freedom Act
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DO	Director's Order
DOI	Department of the Interior
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FLPMA	Federal Land Policy Management Act
FMP	Fire Management Plan
FONSI	Finding of No Significant Impact
GIS	Geographic Information Systems
GMP	General Management Plan
GPS	Global Positioning System
LNT	Leave No Trace
MOU	Memorandum of Understanding
MSHCP	Multiple Species Habitat Conservation Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRA	National Recreation Area
NRHP	National Register of Historic Places
RM	Reference Manual
SHPO	State Historic Preservation Office
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VERP	Visitor Experience and Resource Protection
WMP	Wilderness Management Plan

Chapter One:
Introduction

A GUIDE TO THIS DOCUMENT

This draft wilderness management plan / environmental impact statement for Lake Mead National Recreation Area and adjacent Bureau of Land Management (BLM) lands in the Southern Nevada District Office (SNDO) Las Vegas Field Office is organized in accordance with the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act, the National Park Service's (NPS) "Park Planning Program Standards," and Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* and the *DO-12 Handbook*.

Chapter 1: Introduction sets the framework for the entire document. It describes why the plan is being prepared and what needs it must address. It gives guidance for the management alternatives that are being considered—guidance that is based on the Wilderness Act, special mandates and administrative commitments, agency laws and policies, and other planning efforts in the area.

The chapter also details the planning opportunities and issues that were raised during public scoping meetings and initial planning team efforts; the alternatives in chapter three address these issues and concerns. This chapter concludes with a discussion of the scope of the environmental impact statement, specifically what issues and impact topics are or are not analyzed in detail.

Chapter 2: Framework for Management, Use, and Administration of the Wilderness Areas provides general directions for management of the eight wilderness areas. A variety of administrative and operational topics is covered. The management directions included in this chapter would be the same for all the alternatives in chapter 3.

Chapter 3: Management Alternatives, Including the Preferred Alternative begins by describing the management zones that would be used to manage the wilderness areas in the future. It includes a description of the continuation of current management practices and trends in the wilderness areas (alternative A—no action). Two alternatives for managing the wilderness areas, the preferred alternative (alternative B) and alternative C are presented next. Mitigative measures proposed to minimize or eliminate the impacts of proposed actions in the alternatives are described, followed by a discussion of future studies that would be needed. The environmentally preferable alternative is identified, followed by a discussion of alternatives or actions that were considered but dismissed from further evaluation. The chapter concludes with summary tables of the alternatives and the environmental consequences of implementing the three alternatives.

Chapter 4: The Affected Environment describes those areas and resources that would be affected by implementing the actions contained in the alternatives. It is organized according to the following topics: natural resources, cultural resources, visitor use and experiences, and wilderness character.

Chapter 5: Environmental Consequences analyzes the impacts of implementing the alternatives on topics described in chapter 4. Methods for assessing the intensity, type, and duration of impacts are outlined at the beginning of the chapter.

Chapter 6: Consultation and Coordination describes the history of public and agency coordination during the planning effort, including American Indian consultations, and any future compliance requirements. It also lists agencies and organizations that will be receiving copies of the document.

Appendixes, **Selected References**, and a list of **Preparers and Other Contributors** are found at the end of the document.

BACKGROUND

INTRODUCTION

This draft wilderness management plan / environmental impact statement presents and analyzes three alternatives for future direction of the management and use of eight wilderness areas in Lake Mead National Recreation Area (NRA) and adjacent BLM lands in the Southern Nevada District Office (see figure 1). Alternative B is the agencies' preferred alternative. The potential environmental impacts of all alternatives have been identified and assessed.

BRIEF DESCRIPTION OF LAKE MEAD NATIONAL RECREATION AREA, ADJACENT BLM LANDS, AND THE WILDERNESS AREAS

Lake Mead National Recreation Area, in southern Nevada and northwestern Arizona, was formally established by the Act of October 8, 1964 (78 Stat. 1039). The national recreation area covers 1,495,664 acres, including two Bureau of Reclamation impoundments: Lake Mead and Lake Mohave. In both the national recreation area and adjacent BLM lands the scenery includes dramatically colorful geologic landforms and largely undisturbed panoramic vistas. Rugged north-trending mountain ranges and broad alluvial slopes dominate the area. The seemingly endless desert and massive mountain ranges, unencumbered by dense vegetation, are strange and awesome to many visitors.

Shaped by fiercely hot summers, temperate winters, and low cumulative, but often locally intense rainfall, the desert generally supports sparse vegetation. The vegetation of the Lake Mead National Recreation Area and adjacent BLM lands contain species representative of three of the four North American deserts. The creosote bush community is the most widespread and prominent plant community of the areas. However, in washes and other areas where moisture periodically accumulates, scattered cottonwood, desert willow, and mesquite grow.

These areas and their environs contain a great diversity of wildlife. Animals of special interest include the desert bighorn—which thrive in the national recreation area's mountain ranges—and desert tortoises. Other animals include cougar, mule deer, bobcat, coyote, ringtail cat, and a host of small desert rodents. More than 230 species of birds have been recorded in the area. The wilderness units provide vital habitat for the threatened desert tortoise and other species of concern.

Fossils and other paleontological resources, including petrified wood, are abundant within the national recreation area and adjacent lands.

Archeological artifacts and rock art provide a record of early Indian habitation. There are more than 1,200 identified archeological sites above the water line of Lakes Mead and Mohave in the national recreation area and adjacent BLM lands.

These eight designated wilderness areas offer picturesque views and remarkable natural and cultural resources found in the desert Southwest. Rugged mountains, secluded valleys, flat alluvial fans, steep canyons, astonishing geological formations, caves, springs, and seeps define the landscape. Opportunities for silence, solitude, and isolation abound within the wilderness areas.

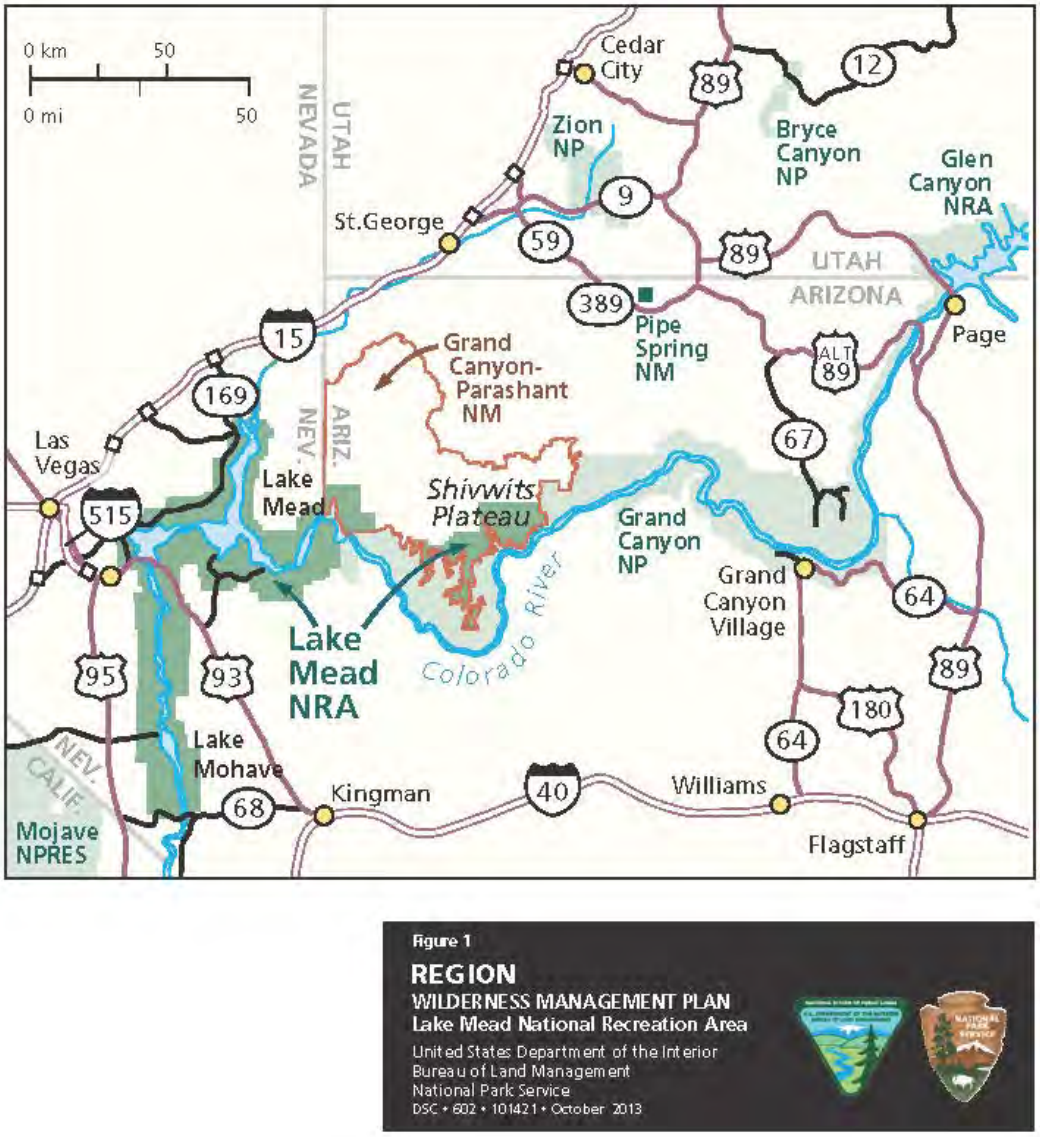


Figure 1. Regional Map

History of Wilderness Designation in the Vicinity of Lake Mead National Recreation Area

The wilderness study and recommendation process for Lake Mead National Recreation Area began in 1974 when the National Park Service completed an initial wilderness review of all the lands within the national recreation area. At that time, 409,000 acres were proposed for wilderness. The 1986 general management plan for Lake Mead National Recreation Area identified 558,675 acres as meeting the criteria of the Wilderness Act, and 115,700 acres that potentially meet the criteria. Per NPS management policies, these areas were subsequently managed to ensure that no actions being taken would diminish their wilderness suitability, pending action by Congress.

In 2002, The Clark County Conservation of Public Land and Natural Resources Act (P.L. 107-282) was signed into law. This act designated 18 wilderness areas in Clark County, Nevada, as part of the national wilderness preservation system. Nine of these designated wilderness areas are fully or partially within Lake Mead National

Recreation Area. These nine designated wilderness areas include approximately 181,330 acres, or approximately 12% of the national recreation area's total of 1,495,664 acres. This number excludes the portions of the wilderness areas that are managed by the Bureau of Land Management. Table 1 lists the nine designated wilderness areas, their acreage, and their administrating agency.

TABLE 1. DESIGNATED WILDERNESS AREAS IN LAKE MEAD NATIONAL RECREATION AREA AND ON ADJACENT BLM LANDS, THEIR ACREAGES, AND THEIR ADMINISTRATION

Wilderness Area	Acreage*	Administration
Jimbilnan	18,893	NPS
Muddy Mountains	48,019 (3,521 NPS; 44,498 BLM)	NPS and BLM
Pinto Valley	39,358	NPS
Black Canyon	17,146	NPS
Eldorado	31,919 (26,219 NPS; 5,760 BLM)	NPS and BLM
Ireteba Peaks	31.979 (22,209 NPS; 10,330 BLM)	NPS and BLM
Nellis Wash	16,672	NPS
Spirit Mountain	33,489 (32,939 NPS; 550 BLM)	NPS and BLM
Bridge Canyon	7,894 (numbers differ from previous)	NPS

*These acreage figures are different from the approximate acreage figures in the legislation establishing the wilderness areas. The NPS acreage figures were recalculated in 2012 using GIS and incorporate technical adjustments and corrections. The acreage figures were recalculated in the preparation of final NPS legal descriptions for the wilderness areas.

This plan covers eight of the nine wilderness areas, of which three are jointly managed by the two agencies. The Muddy Mountains Wilderness is covered under a separate plan that was jointly developed by the Bureau of Land Management and the National Park Service (BLM and NPS 2007)

HISTORY OF THIS PLANNING EFFORT

Work began on the wilderness management plan for the eight wilderness areas in 2006. In April 2010, a draft wilderness management plan / environmental assessment for the eight wilderness areas was published. However, climbers and American Indian tribes raised issues regarding the use of fixed anchors for rock climbing, and the appropriate type and level of recreational uses (including climbing equipment) in the Spirit Mountain and Bridge Canyon Wilderness areas versus how much protection of cultural resources should be provided. These issues could not be resolved at the time. Consequently, the 2010 plan was not finalized. The National Park Service and Bureau of Land Management subsequently agreed to prepare a revised wilderness management plan / environmental impact statement that addressed the issues and concerns over the management of the wilderness areas.

PURPOSE OF THE PLAN / ENVIRONMENTAL IMPACT STATEMENT

The purpose of this wilderness management plan (WMP) / environmental impact statement (EIS) for the eight wilderness areas is to provide long-term direction for

preserving the wilderness character, natural resources, and cultural resources in eight wilderness areas within Lake Mead National Recreation Area and on adjacent BLM lands, while also providing for the use and enjoyment of the areas by current and future generations. Additionally, this plan will provide accountability, consistency, and continuity for the management of the wilderness areas in the NPS and BLM wilderness management programs.

The wilderness areas receive relatively little use today. However, future changes in use and visitation patterns could occur with the growing population in the Las Vegas area and with changes in visitor desires and technology. The goal of this wilderness management plan is not to freeze the eight areas in their current state, but to provide additional opportunities for the public to enjoy these areas while also ensuring that any future changes do not result in the degradation of resource conditions and opportunities. Thus, a purpose of this management plan is to establish guidelines to help NPS and BLM wilderness area managers in maintaining desirable conditions in the wilderness areas, and in responding effectively to future changes.

NEED FOR THE PLAN / ENVIRONMENTAL IMPACT STATEMENT

This wilderness management plan / environmental impact statement is needed for several reasons:

1. NPS policy requires that each park containing wilderness maintain an up-to-date and approved wilderness management plan that "will identify desired future conditions, as well as establish indicators, standards, conditions, and thresholds beyond which management actions will be taken to reduce human impacts on wilderness resources" (NPS 2006, section 6.3.4.2). The Bureau of Land Management also requires wilderness management plans be prepared for all wilderness areas on public lands (BLM "Manual 8561 – Wilderness Management Plans," section .06A).
2. The 1986 Lake Mead National Recreation Area general management plan does not address management issues for the wilderness and backcountry, but deferred to a wilderness management plan for identification of specific issues and guidelines for addressing these issues. The general management plan specified that a wilderness management plan would be prepared following completion of the general management plan.
3. The population in Clark County is expected to continue to grow. Changes in visitation patterns have the potential to affect visitor opportunities for solitude and other characteristics of the wilderness areas.
4. Three of the wilderness areas are jointly managed by the National Park Service and Bureau of Land Management. A plan is needed to ensure consistent management of the areas and to resolve potential conflicts.
5. A plan is needed to address several wilderness-specific issues and topics that have not yet been addressed by the agencies, including access to the areas, appropriate types and levels of resource management, a minimum requirement analysis process, user capacities for the areas, education of visitors, and the ongoing occurrence of illegal uses.
6. A plan is needed to address issues raised by American Indian tribes and climbers. There is a need to determine
   - how to manage rock climbing in the wilderness areas, particularly the placement or removal of fixed anchors for rock-climbing activities
   - the type and amount of visitor use that should be permitted versus the level of cultural resource

protection that should be provided
- the use of climbing equipment (including climbing chalk) near sensitive cultural resources

SCOPE OF THE PLAN

This plan provides the primary management guidance for the Jimbilnan, Pinto Valley, Black Canyon, Eldorado, Ireteba Peaks, Nellis Wash, Spirit Mountain, and Bridge Canyon wilderness areas. The plan is jointly prepared by the National Park Service and Bureau of Land Management. Each agency has jurisdictional authority for separate portions of three of these wilderness areas (Eldorado, Ireteba Peaks, and Spirit Mountain). The plan also addresses some actions outside the wilderness areas, including information provided to the public about wilderness areas, access to the wilderness areas from adjacent nonwilderness areas, and roads that are bordered by wilderness on both sides.

All road closures proposed in the alternatives would constitute an amendment to the national recreation area's general management plan, but will not affect BLM-managed wilderness.

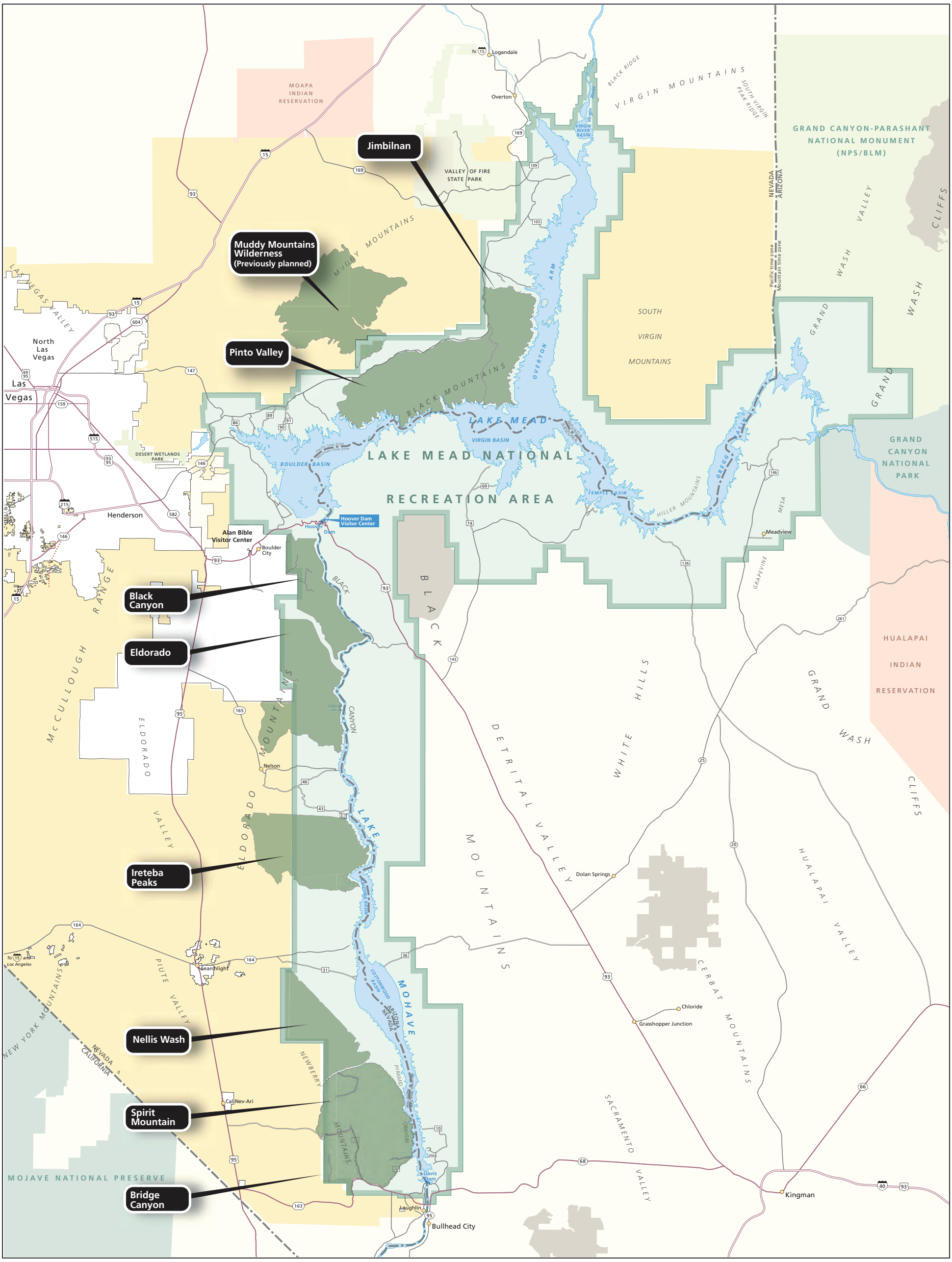
OVERVIEW OF THE WILDERNESS AREAS

Figure 2 shows the locations of the eight designated wilderness areas that are addressed in this management plan. The wilderness areas are briefly described as follows:

- **Jimbilnan Wilderness** is bounded on the north by the Echo Wash Access Road, on the east by the 300-foot setback from the high water line of Lake Mead, on the south by an access road, and on the west by Northshore Road and the Boathouse Cove Access Road. This area contains mountainous terrain representing the northeast extremities of the Black Mountains, which contrast directly with the flat surface of the waters of Lake Mead in the distance. The colorful sand dunes in this area are known habitat for two rare plants, the threecorner milkvetch and the sticky buckwheat.
- **Pinto Valley Wilderness** is composed of rugged hills and scenic valleys. This unit contains Guardian Peak, one of the highest peaks within the area. The northern side of Boulder Canyon is formed by steep cliffs and barren rock that drop to the waters of Lake Mead in a dramatic fashion. Red sandstone outcroppings merge with the green desert vegetation and the grays, browns, and yellows of the desert floor. This unique place is habitat for the rare Las Vegas bear poppy.
- **Black Canyon Wilderness** is home to the picturesque and rugged Eldorado Mountains. This wilderness unit is a maze of peaks and side canyons with vertical cliffs extending to the edge of the Colorado River. Much of the terrain was formed by volcanism. Mountain lions, bighorn sheep, bobcats, coyotes, and jackrabbits inhabit the area. Reptiles found in the area include side-blotched lizard, rattlesnakes, and desert tortoise. Archeological resources include rock art and lithic scatters. Some remnants of past mining are present. Adjacent to the wilderness, located on the river, are structures associated with Hoover Dam. A 230-kV powerline corridor separates this unit from the Eldorado Wilderness.
- **Eldorado Wilderness** also contains the Eldorado Mountains. An intricate web of peaks and side canyons with craggy cliffs extends to the waters of the Colorado River. This area is jointly managed by the two agencies. The Eldorado Wilderness access road forms the southern boundary, the Colorado River / Lake Mohave 300-foot setback constitutes the east boundary, and the north side is bounded by the Burro Wash access road and the Mead-Liberty Transmission Line. The national recreation area boundary and the Boulder City conservation easement form the northwest boundary. The southwest boundary encompasses the Eldorado

Mountains, east of Nevada State Route 165. The mountains in this area include prime bighorn sheep habitat, which contrasts sharply with the shoreline habitat along the river's edge that attracts migrating birds. This area is jointly managed by the two agencies.

- **Ireteba Peaks Wilderness** contains a portion of the Eldorado Mountains, gently rolling hills, and wandering washes extending to Lake Mohave. The northern boundary of the wilderness is formed by a powerline right-of-way. Rugged mountains, secluded valleys, and flat alluvial fans provide opportunities for seclusion and isolation. Teddy bear cholla, desert tortoise, and Townsend's western big-eared bats are just some of the unique species surviving in this part of the Mojave Desert. Also found here is one of the few populations of the rare rosy two-toned beardtongue in the national recreation area. This area is jointly managed by the two agencies.
- **Nellis Wash Wilderness** is nestled in the isolated Newberry Mountains along the western side of the national recreation area. Fingerlike drainages and alluvial fans extend eastward from the mountains toward Lake Mohave. Jackrabbits, side-blotched lizards, rattlesnakes, coyotes, and desert tortoise make their home in the area. Remnants of past mining activities are found here. Isolation and solitude can easily be found here.
- **Spirit Mountain Wilderness** is also located in the Newberry Mountains in an area containing granite boulders and rock outcrops. Spirit Mountain and the surrounding canyons are a traditional cultural property and are listed in the National Register of Historic Places. Numerous archeological resources occur in the area. The mountain plays a prominent role in the religion and beliefs of the Yuman tribes of the lower Colorado River. They believe it is their spiritual birthplace. Members of the Yuman tribes continue to use the area according to their traditions. Bighorn sheep, bobcats, coyotes, western chuckwallas, side-blotched lizards, Gila monsters, and rattlesnakes inhabit the area. The area contains important desert tortoise habitat. This wilderness area is jointly managed by the two agencies.
- **Bridge Canyon Wilderness** is also located in the Newberry Mountains. The area contains rugged granite boulders, outcrops, caves, steep canyons, and intermittent springs and seeps. Stands of cottonwood trees can be found along the Grapevine and Sacatone washes. Perennial flowing water can be found in Bridge and Upper Grapevine canyons that supports rich riparian ecosystems. This wilderness area is important desert tortoise habitat. The area also contains bighorn sheep, bobcats, coyotes, western chuckwallas, side-blotched lizards, Gila monsters, and rattlesnakes. There are also important archeological and ethnographic resources present, including rock art, and a variety of historic and prehistoric sites. The area's unique geologic formations have attracted rock climbers since prior to its designation as wilderness in 2002.



Designated Wilderness Areas

Lake Mead National Recreation Area

Bureau of Land Management

North

0 5 10 Kilometers

0 5 10 Miles

Figure 2

OVERVIEW

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
Bureau of Land Management
National Park Service

DSC • 602 • 101422 • October • 2013

FOUNDATION FOR PLANNING AND MANAGEMENT

LEGAL AND POLICY REQUIREMENTS

Many federal laws and NPS and BLM policies guide the management and planning for the eight wilderness areas in Lake Mead National Recreation Area and adjacent BLM lands. These laws and policies form the foundation for this wilderness management plan. Management of the eight wilderness areas must be consistent with these laws and policies. The following section summarizes the key laws, policies, and authorities governing management of and planning for the wilderness areas.

***The Wilderness Act of 1964 (*P.L.88-577, 16 USC 1131 et seq.)** establishes a policy for the enduring protection of wilderness resources for public use and enjoyment. The act defines wilderness as

> "*a tract of undeveloped federal land of primeval character without permanent improvements or human habitation; an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain; where the forces of nature predominate and the imprint of human activities is substantially unnoticeable; which provides outstanding opportunities for solitude or a primitive and unconfined type of recreation.*"

This act established the national wilderness preservation system, and set forth management directives that specify the preservation of wilderness character. Section 4 of the act identifies appropriate uses and inappropriate uses in wilderness areas.

Clark County Conservation of Public Land and Natural Resources Act of 2002* (P.L.107-282*) designated the nine wilderness areas in Lake Mead National Recreation Area and on adjacent BLM lands. Title II of the act also provided direction on management of the areas, including livestock grazing, water rights, military overflights, American Indian cultural and religious uses, wildlife management, and wildfire management (see appendix A).

***The National Environmental Policy Act of 1969* (P.L.91-190, 42 USC section 4321 et seq.)** establishes "a national policy which will encourage productive and enjoyable harmony between man and his environment." The National Environmental Policy Act (NEPA) requires all government agencies to develop procedures that ensure open and honest documentation of existing resources and potential effects to these resources as a result of the proposed action. The National Environmental Policy Act fosters public involvement as a key element of the decision-making process. NEPA compliance procedures are described in NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* and the accompanying *DO-12 Handbook*. See also the next section on this plan's compliance with the National Environmental Policy Act.

***The Endangered Species Act of 1973* (16 USC 1531-1543)** requires federal agencies to ensure that management activities authorized, funded, or carried out by the agency do not jeopardize the continued existence of listed endangered or threatened species, or result in the destruction or adverse modification of habitat that is critical to the conservation of the species.

***The National Historic Preservation Act of 1966*, as amended (16 USC 470).** Passage of the National Historic Preservation Act (NHPA) established a comprehensive program to preserve the historical and cultural foundations of the nation as a living part of community life. Section 110 of the act delineates broad historic preservation responsibilities for federal agencies, such as the National Park Service and Bureau of Land Management, to ensure that historic

preservation is fully integrated into all of their ongoing programs. Section 106 of the act requires federal agencies to take into account the effects of their undertakings on historic properties that are either listed in or eligible to be listed in the National Register of Historic Places. The national register includes districts, sites, buildings, structures, and objects important for their significance in American history, architecture, archeology, engineering, and culture. The goal of the section 106 review process is to seek ways to avoid, minimize, or mitigate any adverse effects to historic properties that are listed in or eligible for listing in the national register.

***American Indian Religious Freedom Act of 1978* (AIRFA) (P.L.95-341; 92 Stat. 469; 42 USC 1996)** determines that the policy of the United States is to "protect and preserve for American Indians their inherent right of freedom to believe, express and exercise the traditional religions of the American Indians, including but not limited to site access, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites."

***The Federal Land Policy and Management Act of 1976* (FLPMA) (P.L.94-579)** established policies for the BLM's administration and management of public land, including the protection, development, and enhancement of these lands. Section 102 calls for the public lands to be managed so their resources and values are protected, including preserving and protecting certain public lands in their natural condition. A land-use planning process is also called for, coordinated with other federal and state planning efforts. Section 603(c) enables the Bureau of Land Management to manage wilderness areas under the provisions of the Wilderness Act.

***The National Park Service Organic Act of 1916* (16 USC 1a-1)** created the National Park Service, and established its purpose: "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." It directs the National Park Service to promote and regulate the use of the parks by such means and measures as conform to their fundamental purposes. Congress and the courts have interpreted this act with clarification that "when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant" (NPS 2006, section 1.4.3).

***NPS* Management Policies 2006** establishes servicewide policies for preservation, management, and use of park resources and facilities, and establishes direction for the management of NPS wilderness. Section 6.1 states: "The National Park Service will manage wilderness areas for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness. Management will include the protection of these areas, the preservation of their wilderness character, and the gathering and dissemination of information regarding their use and enjoyment as wilderness. The purpose of wilderness in the national parks includes the preservation of wilderness character and wilderness resources in an unimpaired condition and, in accordance with the Wilderness Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use." More specific guidelines for application of the Wilderness Act in NPS areas are described in chapter 6 of *Management Policies 2006*, including wilderness resource management, wilderness planning, wilderness use, and public education.

***NPS Director's Order 41:* Wilderness Stewardship *and* Reference Manual 41, (2013)** provide clarification and interpretation of the NPS wilderness policies and establish specific guidelines to provide accountability, consistency, and continuity to the NPS wilderness management program. Topics include wilderness character, wilderness management planning, wilderness use management (including use by persons with

disabilities, climbing, and commercial services), minimum requirement concept (see "Application of the Minimum Requirement Concept" in chapter 2 for more information on this concept), interpretation and education, scientific activities, fire management, cultural resources, air quality, natural sounds and night skies, nonnative invasive species, and climate change.

BLM Instructional Memorandum No. 2007-84. 2007. "Use of Permanent Fixed Anchors for Climbing in Designated Wilderness Areas." This memorandum provides guidance on the use of this climbing equipment, stating when permanent fixed anchors may and may not be appropriate. Direction is also provided on undertaking closures or restrictions and on minimizing visual impacts of fixed anchors.

BLM Manual 6340 – Management of Designated Wilderness Areas (Public) provides specific policies for managing BLM wilderness areas. The manual identifies goals of wilderness management and specific activities in wilderness areas, including uses, resource management, and administrative structures and facilities.

BLM Manual 8561 – Wilderness Management Plans provides policy and instructions for preparing, approving, and implementing wilderness management plans. The manual identifies the objectives of a wilderness management plan, provides guidelines for the planning effort, describes the wilderness-planning framework, and provides direction on preparing and writing the plan.

Lake Mead National Recreation Area Enabling Legislation, October 8, 1964 established the national recreation area. The legislation includes a brief description of the original boundary, outlines the recreational purposes, and permits hunting, fishing, and trapping.

Lake Mead National Recreation Area Superintendent's Compendium, as amended, March 25, 2009 summarizes park-specific rules implemented under the discretionary authority of the NPS superintendent. The compendium provides for the superintendent to set public use limits and close areas in the national recreation area, including portions of the wilderness areas, and identifies uses that require a special use permit. The compendium provides for camping and the use of horses and pack animals in all of the wilderness areas.

Compliance of This Plan with the National Environmental Policy Act

The planning team has analyzed the development of this wilderness management plan according to the following questions to determine the appropriate level of compliance with the National Environmental Policy Act:

1. *Does the decision or action conform to the existing land use plan?*
   The proposed action (i.e., this wilderness management plan) is subject to the BLM *Las Vegas Resource Management Plan* (RMP), approved in October 1998, and the NPS *Lake Mead National Recreation Area General Management Plan,* approved in 1986. Although the wilderness areas covered by this wilderness management plan were designated after these other plans were approved, the wilderness management plan is consistent with the terms, conditions, and decisions of these plans.
2. *Is the proposal an exception from NEPA requirements?*
   This wilderness management plan is not a congressionally exempt action, an emergency action, or rejection of a proposed action. Therefore, it is not exempt from NEPA requirements.
3. *Is the proposal listed as normally requiring an environmental impact statement?*
   Approval and implementation of this wilderness management plan is an action listed in section 516 of the U.S. Department of the Interior *Departmental Manual,* part 11 (BLM)

or part 12 (NPS) as normally requiring an environmental impact statement. Although none of the alternatives considered are expected to have a significant effect on the quality of the human environment, some of the effects of the actions being proposed are expected to be highly controversial.

4. *Are existing analysis and documentation sufficient?*
   Because the wilderness areas included in this planning effort were not designated during the last BLM or NPS land-use planning efforts, the existing analysis and documentation is not sufficient. Information from other existing land use plans was used in preparation of this wilderness management plan.
5. *Is the proposal listed as a categorical exclusion?*
   The proposal is not listed as a categorical exclusion in appendix 1 of 516 Departmental Manual 2, or on agency lists (516 DM 11, BLM; 516 DM 12, NPS).

After conducting the analysis summarized above, it has been determined that an environmental impact statement is the appropriate level of compliance with NEPA and agency policies. The National Park Service is the lead agency in preparing this environmental impact statement.

Special Mandates and Administrative Commitments

Clark County Conservation of Public Land and Natural Resources Act (2002)

The federal law establishing the wilderness areas (P.L.107-282) includes several specific mandates regarding management of the areas. The act states that nothing in the law shall affect any water rights in the state of Nevada or modify the Clark County multiple species habitat conservation plan, including that plan's specific management actions for the conservation of perennial springs (section 203). Nothing in the law restricts or precludes military overflights (section 205) or diminishes American Indian tribal rights regarding access to the areas for tribal activities, including spiritual, cultural, and traditional food-gathering activities (section 206). The act also does not affect the state's management of wildlife in the areas, including the regulation of hunting, fishing, and trapping (section 208). Wildlife water-development projects, including guzzlers, may be authorized in the wilderness areas under certain conditions. (For more details on these mandates, see P.L.107-282 in appendix A.)

Master Memorandum of Understanding between the National Park Service, Lake Mead National Recreation Area and the State of Nevada Department of Wildlife (2004)

Section 208(f) of the Clark County Conservation of Public Land and Natural Resources Act of 2002 required the National Park Service to develop a memorandum of understanding concerning wildlife management in the designated wilderness within Lake Mead National Recreation Area. The agreement calls for the National Park Service and Nevada Department of Wildlife to cooperate in maintaining or restoring fish, wildlife, and their habitat in the wilderness areas. The agencies will regularly consult on actions affecting wilderness. Aerial surveys are permitted to continue over the wilderness areas. The compliance for this is addressed in the 2005 *Aerial Operations Plan/Environmental Assessment*. With the approval of the National Park Service, the state may undertake scientific research, sampling of fish and wildlife populations, wildlife habitat improvements, wildlife damage control, control of nonnative species, facility development, and habitat alteration to address human impacts. The agreement also calls for actions to limit visitor use if significant disruptions or degradation of wildlife resources is occurring. (See appendix E for the agreement.)

Memorandum of Understanding between the Bureau of Land Management and the Nevada Department of Wildlife Supplement No. 9 (2012)

The agreement provides guidance and procedures for coordination and cooperation between the Bureau of Land Management and the Nevada Department of Wildlife (NDOW) regarding the management of wildlife in designated BLM wilderness areas within Nevada. NDOW activities relevant to this planning process that may occur include fish and wildlife research and management surveys, facility development, habitat alteration, population sampling, chemical treatments, transplanting wildlife, and wildlife damage control. The agreement also calls for actions to reduce human disturbance of wildlife populations and habitat. (See appendix E for the agreement.)

Issues and Concerns to be Addressed

The planning team identified the primary issues and concerns facing the eight wilderness areas with assistance from the public, NPS and BLM staffs, various organizations, and other governmental agencies. An issue is defined as an opportunity, conflict, or problem regarding the use or management of the wilderness areas. Comments were solicited at public meetings, through planning newsletters, and in response to comments on the 2010 draft wilderness management plan / environmental assessment. Most of the issues facing the wilderness areas relate to protecting wilderness resources and values and providing for high-quality visitor experiences. This section summarizes the main issues or concerns to be addressed by the wilderness management plan.

Identifying Appropriate Uses for the Wilderness Areas. A variety of uses and activities are appropriate and permitted in wilderness areas, while other uses are prohibited (see chapter 3). However, law and policy are not always clear about some uses. Should horseback users be permitted in these desert wilderness areas? Should large groups be permitted? Some people probably believe these uses should be allowed in some or all of the wilderness areas, while others believe they should be restricted or prohibited due to potential environmental impacts or potential conflicts with other user groups. The wilderness management plan needs to provide direction on answering these questions.

Use of Fixed Anchors (e.g., bolting) in NPS and BLM Wilderness Areas. Fixed anchors associated with rock climbing are currently located within the NPS portions of Spirit Mountain Wilderness and Bridge Canyon Wilderness, although limited bouldering is occurring in those areas as well as in the BLM portion of Ireteba Peaks Wilderness. Climbing is a legitimate wilderness activity. However, there are differing views on whether the placement of fixed anchors and bolt-intensive routes should be permitted in wilderness. Some believe that fixed anchors and bolting are consistent with wilderness and protect wilderness natural conditions by limiting impacts; they do not consider bolts a "development" and they do believe that bolts support opportunities for primitive recreation. They argue that this equipment is necessary for safely climbing certain routes. Prohibiting fixed anchors and bolts would unnecessarily restrict a longtime wilderness activity and would limit or exclude climbers' use of wilderness areas. On the other hand, some argue that the presence of fixed anchors and bolts diminishes wilderness character, damaging rock faces and thus adversely affecting natural and undeveloped wilderness character qualities. Furthermore, bolt-intensive face climbs concentrate visitor use and impact solitude for other wilderness visitors, such as hikers. NPS Director's Order 41 states that fixed anchors may be appropriate but should be rare in wilderness. The wilderness management plan needs to provide direction on these questions for NPS- and BLM-administered lands to provide seamless management across agency boundaries.

Providing Access within the Wilderness Areas vs. Protecting Wilderness Character. There are relatively few well-marked access points into the wilderness areas and no designated trails within the wilderness

areas. Should additional access such as trailheads, designated routes (cairned), or designated trails (to NPS/BLM trail standards) be provided for visitors? Providing this access into the wilderness areas would provide a new opportunity for people to use and enjoy these public lands. However, increased use levels, in turn, could affect opportunities for solitude and primitive recreation, the naturalness of the area, and other wilderness qualities. Some members of the public probably would want designated trails or routes, while others, who want to see no other signs of people and want opportunities to be self-reliant, could oppose these developments. On the other hand, sometimes designated trails or routes may be needed for resource protection purposes, to avoid sensitive resources or prevent erosion and resource damage from braided, user-created, foot-worn trails. These questions need to be addressed in the plan.

Providing Information about the Wilderness Areas vs. Protecting Wilderness Character. This issue is related to the above issue. The National Park Service and Bureau of Land Management do not publicize or provide much information about the wilderness areas. Independent of the agencies, information is already available on the wilderness areas in guidebooks and on the Internet. Public education and outreach is needed to inform people about the concept of wilderness and the opportunities these areas provide, as well as to inform them about the sensitivity of the areas, Leave No Trace behavior, and other proper etiquette in wilderness. However, increasing information about the areas will also increase use levels in the wilderness areas, which in turn could result in some adverse impacts on wilderness resources and values.

Providing for Use of Wilderness Areas while Meeting Tribal Needs and Concerns. Spirit Mountain is one relatively popular area with many undesignated access points. This area receives some of the greatest amount of use in the eight wilderness areas. It is also a national register-listed traditional cultural property. A traditional cultural property can be defined generally as one that is eligible for inclusion in the national register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. The unique and supplemental value of the national register listing does not overlap with the other four qualities of wilderness but reflects the unique and supplemental character of this wilderness. Its presence is part of the area's wilderness character and must be protected as rigorously as any of the other four required qualities. Furthermore, Spirit Mountain is a sacred area for the Yuman tribes, who are concerned about the use of this area. However, use may continue to increase in this area in the future. The management plan needs to determine what uses (e.g., hiking, rock climbing), use levels, and nonstructural recreational facilities (e.g., designated trails, climbing equipment) should and should not occur here, and where and when they should occur, to meet both the needs and desires of the tribes and visitors.

Additional ethnographic resources of interest to the Yuman tribes exist in the Bridge Canyon Wilderness Area. Current use levels do not pose immediate concerns; however, use of these areas may increase in the future. The management plan needs to determine what uses (e.g., hiking, rock climbing), use levels, and nonstructural recreational facilities (e.g., designated trails, climbing equipment) should and should not occur here, and where and when they should occur, to meet both the needs and desires of the tribes and visitors.

Restoration of Disturbed Areas within the Wilderness Areas. Another issue related to wilderness is determining when and under what conditions managers should actively intervene in wilderness. As established by the Wilderness Act, the objectives to manage wilderness for ecological conditions (the forces of nature) and for wildness (minimal imprint of man's work) can be in conflict. There are signs of human disturbance in some of the wilderness areas (excluding cultural resources); these include litter and the presence of old roads. Nonnative invasive

plants also are present, as are nonnative burros. Direction is needed on how much restoration work, if any, should be done in the wilderness areas.

Coordination of Agency Management Efforts. For the three wilderness areas that are on BLM and NPS lands, coordination is needed to ensure consistent management with regard to resources, visitors, and overall administration of the areas. For instance, consistent direction is needed on visitor use management techniques including access to these areas, on interpretive materials, and on the application of the minimum requirement concept. The wilderness management policies of the two agencies vary on some topics, such as the collection of plants, animals, and rocks.

Coordination is also needed for many of the wilderness areas regarding such topics as legal and illegal access from BLM nonwilderness lands onto NPS wilderness areas, obtaining required agency permits, law enforcement, and agency-led hikes into the areas.

Issues and Concerns Not Being Addressed

Air tour operators conduct overflights of the wilderness areas, some while touring Lake Mead National Recreation Area and others while traveling to different destinations (e.g., Grand Canyon National Park). These overflights affect wilderness resources and values (e.g., opportunities for solitude, apparent naturalness of the areas) as well as wilderness visitors. A future air-tour management plan will address the management of these overflights. The air-tour management plan would only apply to NPS lands.

Other overflights by agencies and military occur infrequently and will not be addressed in this plan. The military overflights are provided for under the Clark County Conservation of Public Land and Natural Resources Act of 2002. Agency aircraft overflights for wildlife management purposes are provided for under the memoranda of understanding among the National Park Service, Bureau of Land Management, and the State of Nevada Department of Wildlife.

Identification of Impact Topics

An important part of planning is seeking to understand the consequences of making one decision over another. To this end, an environmental impact statement was prepared as part of the wilderness management plan. Environmental impact statements identify the anticipated impacts of possible actions on resources and on visitors and neighbors. Impacts are organized by topic, such as "impacts on the visitor experience" or "impacts on vegetation." Impact topics serve to focus the environmental analysis and to ensure the relevance of impact evaluation. Impact topics identified for the *Lake Mead National Recreation Area Wilderness Management Plan / Environmental Impact Statement* were identified based on federal laws and other legal requirements, Council on Environmental Quality (CEQ) guidelines, NPS management policies, staff subject-matter expertise, and issues and concerns expressed by the public and other agencies early in the planning process (see previous section). The planning team selected the impact topics for analysis based on the potential for each topic to be affected by the alternatives. Also included is a discussion of some impact topics that are commonly addressed in environmental impact statements but that are dismissed from detailed analysis in this plan for the reasons given.

The "Affected Environment" chapter contains a more detailed description of each impact topic potentially affected by the actions described in the alternatives.

Impact topics were retained for analysis if there could be appreciable impacts from the actions of the alternatives considered. Impact topics were dismissed if either (a) implementing the alternatives would have no effect or negligible effect, or (b) the resource does not occur in the wilderness areas.

Impact Topics to be Analyzed

Natural Resources.

Soils—Soils are a key resource in the wilderness areas, helping determine where native vegetative communities and wildlife occur. They affect the areas' productivity, drainage patterns, and erosion. The NPS Organic Act, the Federal Land Policy and Management Act, NPS *Management Policies 2006,* and BLM Manual 6340 call for the protection and conservation of soil resources. Soils may be affected by visitors and by the establishment and maintenance of designated routes and trailheads in the alternatives. Because some of the proposed actions could affect soils in the wilderness areas, impacts on soils are addressed.

Vegetation—The area encompassed by the wilderness management plan / environmental impact statement is located at the juncture of three of the four desert ecosystems in the United States, and thus supports a variety of plants and plant communities. Nonnative vegetation is also present, which affects the character of the wilderness areas. The NPS Organic Act, the Federal Land Policy and Management Act, NPS *Management Policies 2006,* and BLM Manual 6340 call for the protection and conservation of vegetation. Some of the plan's proposed actions, including the development of designated routes and trailheads, could affect the wilderness areas' vegetation, which would be of concern to managers, visitors, and the public. Furthermore, bolt-intensive climbing routes concentrate visitor use and result in impacts on vegetation at the base of climbs and on climbing routes.

Terrestrial Wildlife—Mammals, birds, reptiles, and other wildlife are an important resource of the wilderness areas. Desert bighorn sheep are highly valued by visitors, including hunters. The NPS Organic Act, the Federal Land Policy and Management Act, NPS *Management Policies 2006,* and BLM Manual 6340 call for the protection and conservation of wildlife. Human activities can affect wildlife species. Because some of the proposed actions in the wilderness management plan may alter the patterns of human activities and affect wildlife and wildlife habitat, these impacts are included in the environmental impact statement.

Special Status Species—The Endangered Species Act requires an examination of impacts on all federally listed threatened or endangered plant and animal species. NPS *Management Policies 2006* repeats this requirement and adds the further stipulation that the analysis examine impacts on state-listed species. BLM Manual 6340 also requires that BLM sensitive species be analyzed in environmental documents. One federally threatened species—the Mojave desert tortoise (*Gopherus agassizii*)—and three state-listed critically endangered plant species—the Las Vegas bearpoppy (*Arctomecon californica*),threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*), and sticky buckwheat (*Eriogonum viscidulum*)—inhabit Lake Mead National Recreation Area and may occur within the wilderness areas. Several BLM sensitive plant and wildlife species also may occur in the wilderness areas administered by the bureau. Changes in human activities proposed in the management plan's alternatives have the potential to affect some of these species or their habitats; thus, this topic is included in the environmental impact statement.

Natural Soundscape—NPS *Management Policies 2006* calls for the National Park Service to "preserve, to the greatest extent possible, the natural soundscapes of parks" (NPS 2006). BLM Manual 6340 addresses natural soundscapes in relation to managing for solitude, which is "the sense of being alone or remote from the sights and sounds of other people. Additionally, the preservation of wilderness character and values includes the preservation of natural sounds, minimizing the noise intrusions of modern human activities. Noise can affect the apparent naturalness and opportunities for solitude in a wilderness area. The alternatives being considered in this plan call for new facilities and may increase use levels, which in turn could affect the soundscape of the wilderness areas. Any such changes would be of concern

to managers, visitors, and the public. Thus, this topic will be analyzed in the environmental impact statement.

Wilderness Character—The Wilderness Act and management policies of both the National Park Service and the Bureau of Land Management mandate the protection of the resources and qualities of the eight wilderness areas.

The management actions in the alternatives and visitor use could affect the character of the wilderness areas, including apparent naturalness and opportunities for solitude. Any changes to wilderness character would be of concern to the land management agencies, visitors, and the public, and thus will be analyzed in the environmental impact statement.

Cultural Resources.
Archeological Resources—Archeological resources is retained as an impact topic because ground disturbance associated with proposed actions, such as for new designated routes and developed access points, could disturb currently unidentified archeological resources. This topic is also retained for further analysis as an impact topic because of potential impacts associated with increased visitation as more people use the designated wilderness areas. Law, regulation, or policy sources relevant to the impact analysis of archeological resources are section 106 of the National Historic Preservation Act of 1966 as amended; NPS Director's Order 28: *Cultural Resource Management; The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*, effective September 29, 1983, as amended; NPS *Management Policies 2006*; and the National Environmental Policy Act as amended.

Ethnographic Resources—Ethnographic resources are defined by the National Park Service 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*).

Ethnographic resources is retained as an impact topic because of potential impact on traditional cultural properties such as Spirit Mountain that may result from increased visitation. Law, regulation, or policy sources relevant to the impacts analysis of ethnographic resources are section 106 of the National Historic Preservation Act of 1966 as amended; Director's Order 28; Executive Order 13007, "Indian Sacred Sites"; NPS *Management Policies 2006*; and the National Environmental Policy Act as amended.

Visitor Use and Experience.
The NPS Organic Act, the Federal Land Policy and Management Act, and the Wilderness Act all provide for visitor use of the eight wilderness areas. Providing opportunities for visitor use is one of the primary issues being addressed by the alternatives in this plan. Actions being proposed in the alternatives, such as the development of designated routes and trailheads, would affect visitor use and experience. Management actions being considered would affect climbers in at least two of the wilderness areas. The alternatives also could affect interpretive and educational opportunities, which would affect the visitor experience. Any changes to visitor use and experience would be of interest to visitors, the land management agencies, and the public.

Impact Topics Considered but Dismissed from Analysis in Detail

The National Park Service and Bureau of Land Management have different requirements in which impact topics are considered in environmental documents. The following impact topics were dismissed by both agencies.

Air Quality. Lake Mead and the eight wilderness areas are classified as class II areas under the Clean Air Act. Air quality is considered generally good. Visible pollutants rarely diminish the vistas within the

wilderness areas. Depending on wind direction, air pollution from Las Vegas sometimes affects the air quality of the wilderness areas. In all of the alternatives, the National Park Service and Bureau of Land Management would continue to protect air quality as required under the Clean Air Act and NPS *Management Policies 2006*.

No actions are being proposed in the alternatives that would measurably alter the wilderness areas' overall air quality. Construction of new facilities would result in dust and vehicle emissions and therefore would have a short-term, negligible impact on the airshed. Use levels may increase with implementation of the alternatives but the increase is not expected to be substantial and the emissions from additional vehicles would be negligible compared to current levels. Therefore, air quality is not analyzed in detail in this environmental impact statement.

Carbon Footprint. For the purposes of this planning effort, "carbon footprint" is defined as the sum of all emissions of carbon dioxide and other greenhouse gases (e.g., methane and ozone) that would result from implementation of any of the alternatives. It has been determined that the action alternatives described in this document would only emit a negligible amount of greenhouse gases that contribute to climate change; therefore, this impact topic has been dismissed from further analysis. The reasons for dismissing this impact topic are that (1) no substantial changes in public use or motorized travel are proposed under the alternatives, and (2) minimal construction of new facilities is proposed under the alternatives. Because of the negligible amount of greenhouse gas emissions that would result from each alternative, a quantitative measurement of their carbon footprint was determined by the planning team not to be practicable.

Prime and Unique Farmlands. In 1980, the Council on Environmental Quality directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS). Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses (the land could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water). Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops (CEQ 1980). According to NRCS maps, there are no prime or unique farmlands within the wilderness areas. Therefore, prime and unique farmlands are not analyzed in this assessment.

Water Quality. Aside from a few springs, no water bodies are within the wilderness areas. No actions are being proposed in the alternatives that would be expected to increase the potential for water pollution within the wilderness areas—any impacts from increased visitor use to the springs in the alternatives would be negligible. Thus, there is no need to address this impact topic in further detail.

Water Quantity. As noted above, water is almost nonexistent resource in the wilderness areas. The springs that do exist are important for recreation and wildlife habitat. The proposed changes in the alternatives would have negligible impacts on surface water flows, primarily from regrading for parking areas; thus, the topic of water quantity is not analyzed in detail.

Floodplains. Executive Order 11988, "Floodplain Management," requires the examination of impacts on floodplains. The eight wilderness areas have dry washes but no perennial drainages. No new developments or uses are being proposed in the alternatives that would affect the floodplains of the dry washes. Thus, this topic is not analyzed in detail.

Wetlands. Executive Order 11990, "Protection of Wetlands," requires the examination of impacts on wetlands. Wetlands have not been mapped in the wilderness areas, but due to the climate and nature of the areas, only a few isolated

wetlands associated with springs, seeps, and small impoundments probably occur in the areas. No actions are proposed in the management plan that would affect these wetlands or their function. Therefore, wetlands are not analyzed in this environmental impact statement.

Lightscapes. NPS *Management Policies 2006* states that the National Park Service strives to preserve natural lightscapes of parks, which are natural resources and values that exist in the absence of human-caused light. The night sky substantially contributes to the visitor experience in the wilderness areas. No actions are being proposed in the alternatives that would affect lightscapes in the wilderness areas. Proposed development such as the addition of signs and access points would not require artificial lighting. Therefore, lightscapes are not analyzed in this environmental impact statement.

Cultural Landscapes. A cultural landscape is a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. Cultural landscapes can be associated with prehistoric, historic, and ethnographic resources. Law, regulation, or policy sources relevant to the impact analysis of cultural landscapes are section 106 of the National Historic Preservation Act of 1966 as amended; NPS Director's Order 28; *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes,* effective August 11, 1995; NPS *Management Policies 2006;* and the National Environmental Policy Act of 1969 as amended.

A cultural landscape related to Hoover Dam has been identified for Lake Mead National Recreation Area; however, currently no cultural landscapes are identified in any of the wilderness areas. Cultural landscapes is dismissed as an impact topic because changes associated with proposed actions would not affect landscape features or patterns of national register-eligible cultural landscapes or potential national register-eligible cultural landscapes.

Historic Structures. Historic structures is dismissed as an impact topic because none of the proposed actions would affect the very small number of historic structures within the wilderness areas. Laws, regulations, and policies relevant to the impact analysis of historic structures include the following: Section 106 of the National Historic Preservation Act of 1966 as amended; NPS Director's Order 28; *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings,* 1995; NPS *Management Policies 2006;* BLM Manual 6340; and the National Environmental Policy Act of 1969 as amended.

Historic structures have been located in several of the wilderness areas. They are primarily associated with past mining activities. Most have not been evaluated for their significance or integrity for listing in the national register. These structures will not be impacted, as there is no proposed treatment for any of the alternatives. Currently visitation is not impacting historic structures within the wilderness areas and this is not anticipated to change in the future. Historic structures would be inventoried and their significance and integrity evaluated under National Register of Historic Places criteria. Those qualities of the historic structures that contribute to the structures' listing or eligibility for listing in the national register would be protected in accordance with *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation,* and *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (unless it is determined through formal consultation that disturbance or natural deterioration is unavoidable).

Therefore, although a few historic structures have been documented in some of the wilderness areas, they are not found near any of the areas proposed for actions under any of

the alternatives. Therefore, this topic was dismissed from detailed analysis.

Indian Trust Resources. Secretarial Order 3175 issued by Secretary of the Interior Bruce Babbitt, November 8, 1993, requires that impacts on Indian trust resources from a proposed project or action by U.S. Department of the Interior agencies be addressed in environmental documents.

This order was reinforced by President William Clinton's April 29, 1994, memorandum to the heads of executive departments and agencies directing that tribal trust resources be considered during the development of federal plans, projects, programs, and activities.

The federal Indian trust responsibility is the fiduciary duty of the federal government emanating from treaties and statutes to protect Indian lands, resources, assets, and rights and to carry out the mandates of federal law concerning American Indian and Alaska Native tribes.

Indian trust resources is not analyzed as an impact topic in this document because the resources of Lake Mead National Recreation Area are preserved and managed for the benefit of all Americans, as are other units of the national park system. This management mandate stems from the Organic Act of August 25, 1916, establishing the National Park Service; and from President Lyndon Johnson's signing of the 1964 legislation establishing Lake Mead National Recreation Area (Public Law 88-639). The planning team has concluded that there are no Indian trust resources within the wilderness areas at Lake Mead National Recreation Area. Therefore, the subject is not included as an impact topic.

Museum Collections. Current Lake Mead National Recreation Area strategic goals call for a revision of the scope of collections statement and the continuation of a comprehensive cleanup of the catalog system. The park's museum collection consists of archives that contain records related to 60 years of park operations. The collection also includes a number of archeological and historical objects that have been recovered during surface surveys or small data recovery projects within the park's boundaries. The collection also includes geological specimens, botanical specimens, faunal specimens, and other biological specimens (insect, reptile, amphibian, bird, and mammal specimens) with associated field records. The total number of objects in the park's collection is about 100,000 items.

The topic of museum collections and archives is dismissed from further consideration because none of the alternative actions would affect museum collections.

Energy Requirements / Depletable Resource Requirements and Conservation Potential. None of the alternatives would affect the agencies' energy requirements or result in the extraction of depletable resources from the wilderness areas. No new facilities are being developed that would substantially increase the use of energy. Under all of the alternatives, ecological principles and sustainable design concepts would be applied to ensure that the wilderness areas' natural resources were maintained and protected. Therefore, this topic is not analyzed in this environmental impact statement.

Public Health and Safety. No actions are proposed in the alternatives that would result in identifiable impacts on human health or safety. Although the alternatives would identify specific designated access opportunities into the wilderness areas, information is already available to visitors about potential risks of traveling in these areas (e.g., dehydration). Thus, this topic was not analyzed in this environmental impact statement.

Environmental Justice. Executive Order 12898, "Federal 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 communities. The alternatives in this document would not result in any identified effects that would have disproportionate health or environmental effects on minority or low-income populations or communities. Increased wilderness access would be available equally to everyone. Therefore, environmental justice is not analyzed in this document.

Socioeconomics. There are no proposed actions in this plan / environmental impact statement that would change any local or regional economic patterns or affect nearby communities. Some actions in the alternatives could affect private businesses in the area through the construction of a few new developments and increased use of the wilderness areas, but any such effects on businesses would be expected to be beneficial and negligible. Thus, this impact topic was dismissed from further consideration.

Conflicts with Land Use Plans, Policies, or Controls. Whenever actions taken by federal agencies have the potential to affect planning, land use, or development patterns of adjacent or nearby lands, the effects of these actions must be considered. This plan would not affect land development or plans for areas outside of the wilderness areas. None of the alternatives would affect other land use plans, policies, or controls beyond the wilderness areas. Thus, this topic was not analyzed in detail.

NPS and BLM Operations. Managing the eight wilderness areas would require a very small amount of time, resources, and staff under the alternatives. Some of the potential actions proposed in the alternatives could affect budget needs, as well as the workloads and day-to-day operations of some staff, but compared to the two agencies' overall workloads and operations in the Lake Mead National Recreation Area, any such changes would be expected to be negligible in extent. Thus, this impact topic was not analyzed in detail.

THE BUREAU OF LAND MANAGEMENT ALSO HAS SEVERAL IMPACT TOPICS THAT IT IS REQUIRED TO ANALYZE UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT. identifies these impact topics. None of the topics would be affected by the alternatives being considered in this plan/environmental impact statement.

TABLE 2. BLM IMPACT TOPICS CONSIDERED BUT DISMISSED

Resource/Concern	Issue(s) Analyzed? (Y/N)	Rationale for Dismissal from Analysis or Issue(s) Requiring Detailed Analysis
Areas of critical environmental concern (ACEC)	N	The alternatives would not negatively affect ACEC values.
BLM natural areas	N	There are no BLM natural areas within the area covered by the BLM Las Vegas Field Office.
Fuels/fire management	N	The alternatives would not negatively affect the management of fire and/or fuels management.
Geology / mineral resources / energy production	N	Designation of wilderness, not this wilderness management plan, affects mineral resources. All BLM-managed wilderness areas are withdrawn from new mining claims.
Invasive nonnative plant species (includes noxious weeds)	N	The alternatives would not negatively affect the management of invasive nonnative plant species.
Land/access	N	There are no private inholdings, thus access is not an issue.

TABLE 2. BLM IMPACT TOPICS CONSIDERED BUT DISMISSED

Resource/Concern	Issue(s) Analyzed? (Y/N)	Rationale for Dismissal from Analysis or Issue(s) Requiring Detailed Analysis
Lands with wilderness characteristics (LWC)	N	No LWC use allocation exists within the current resource management plan.
Livestock grazing	N	The alternatives would not affect any authorized grazing allotments.
Paleontological resources	N	The alternatives would not affect areas with known paleontological resources.
Rangeland health standards	N	Negative impacts on rangeland health are not expected.
Visual resources	N	The planning area encompasses designated wilderness and adjacent nonwilderness lands, which are managed as visual resource management class I and II, respectively. The alternatives meet the objectives for visual resource management – the existing character of the landscape would be preserved and the level of change would be low to very low.
Wastes, hazardous or solid	N	No wastes are anticipated.
Wild and scenic rivers	N	No wild and scenic rivers are located in the area.
Wild horse and burro	N	The alternatives would not affect any herd management areas.
Woodland/forestry	N	Woodland and/or forestry resources are not present in the planning area.

Relationship of This Plan to Other Lake Mead and BLM Management Plans

Several agency plans have influenced or would be influenced by the approved wilderness management plan. The wilderness management plan is intended to complement and be consistent with these other plans. Some of these plans are briefly described here, along with their relationship to this management plan.

Muddy Mountains Wilderness Management Plan and Environmental Assessment (2007) provides guidance for management of the Muddy Mountains Wilderness in Lake Mead National Recreation Area and adjacent BLM lands. This plan was jointly prepared by the Bureau of Land Management and the National Park Service. The plan identifies the conditions and opportunities that will be managed within the wilderness; creates specific guidance for managing resources and activities in the wilderness; and provides direction for the preservation of the area's wilderness characteristics. Although this wilderness area is not related to the eight wilderness areas addressed in this plan, it is in close proximity to two of the wilderness areas. Management of all the areas by the two agencies should be relatively consistent from both a visitor use and an administrative standpoint.

Clark County Multiple Species Habitat Conservation Plan (MSHCP) (2000) serves to conserve many species and their habitats in Clark County, Nevada, including species and habitats found with Lake Mead National Recreation Area. The MSHCP process works in accordance with the Endangered Species Act, treating covered species as though they are listed as threatened or endangered. All of the actions in this wilderness management plan should be consistent and would strive to comply, where appropriate, with the provisions of the habitat conservation plan.

Las Vegas Resource Management Plan (1998) provides guidance for the long-term management of more than three million acres of public land in Clark and Nye counties in Nevada. These lands are administered by the Bureau of Land Management Southern Nevada District Office and include the three Lake Mead wilderness areas that are partially on BLM lands. Objective WS-2 of the

resource management plan provides management direction for new wilderness areas.

Lake Mead National Recreation Area Final Environmental Impact Statement Burro Management (1995) addressed the environmental impacts caused by nonnative burros in the national recreation area. The plan called for the elimination of burros in portions of the national recreation area. Control methods that were identified in the plan include live removal (e.g., helicopter/trap, helicopter/rope, and helicopter/net-gun) and fencing. The wilderness management plan does not affect these actions; NPS staff will continue to manage burros in NPS wilderness areas as called for in this plan and the 2005 aerial operations plan.

Lake Mead National Recreation Area General Management Plan (1986) establishes the guidelines for the overall use, preservation, management, and development of Lake Mead National Recreation Area. The general management plan articulates a management philosophy and framework for decision making and problem solving. The plan provides park purpose, significance, and emphasis statements to guide future actions. The plan divides the park into zones of activity to provide a separation of uses to enhance visitor enjoyment and to preserve the natural and cultural resources of the national recreation area. Although the general management plan does not directly address management of the wilderness areas, the directions in the wilderness management plan (which is considered an implementation plan) are consistent and compatible with the general management plan.

Lake Mead National Recreation Area Backcountry Management Plan (1989) outlines the management of recreational use in the national recreation area's backcountry. The backcountry management goals were to provide a variety of appropriate recreational opportunities in the backcountry for visitors compatible with resource protection and visitor health and safety. For the eight wilderness areas, this wilderness management plan replaces, with more detailed management, the backcountry management plan.

Lake Mead National Recreation Area and Grand Canyon-Parashant National Monument Environmental Assessment for the Implementation of the Fire Management Plan (2004) describes the approach the National Park Service takes to the management of fire in the national recreation area, including the wilderness areas. The management actions in this wilderness management plan are consistent with and support the actions called for in the fire management plan.

Southern Nevada District Office Fire Management Plan (2004) describes the approach the BLM's Southern Nevada District takes to the management of fire on lands it manages. The management actions in the wilderness management plan are consistent with and support the actions called for in the fire management plan.

Environmental Assessment for Aerial Operations Plan Within Lake Mead National Recreation Area And Grand Canyon-Parashant National Monument (2005) describes fixed-wing and helicopter flights that the National Park Service and its cooperating agencies, including the Nevada Department of Wildlife and the Bureau of Land Management, have proposed to accomplish a variety of essential management actions over or within designated, suitable, or potential wilderness areas within the national recreation area.

Lake Mead National Recreation Area Exotic Plant Management Plan (in process) describes the approaches NPS staff will take in managing nonnative plants in the national recreation area. The plan covers the wilderness areas in the national recreation area and is consistent with the Wilderness Act as well as this wilderness management plan.

Relationship of This Plan to Other BLM Decisions

Programmatic Environmental Assessment for Restoration in Wilderness (2012) describes and evaluates the impacts of actions that the BLM Southern Nevada District Office may implement to restore small-scale disturbances with designated wilderness using nonmotorized, nonmechanized methods. The actions in this wilderness management plan are consistent with the 2012 BLM decision.

Desert Tortoise *(Gopherus agassizii)* ***Translocation throughout the Species Range within Southern Nevada District and Caliente Field Office (2013)*** describes the impacts associated with allowing desert tortoise translocation into recipient sites, including designated wilderness areas, as evaluated by an interdisciplinary team and approved by the Desert Tortoise Recovery Office ,within Clark, southern Nye and southern Lincoln counties, Nevada. Translocation includes the moving of tortoises from the Desert Tortoise Conservation Center into natural populations. The actions in this wilderness management plan are consistent with the 2013 BLM decision.

THE NEXT STEPS

After the distribution of the draft wilderness management plan / environmental impact statement there will be a 60-day public review and comment period, after which the planning team will evaluate comments from other federal agencies, tribes, organizations, businesses, and individuals regarding the draft plan. After this comment period, the NPS planning team will evaluate comments from other federal agencies, tribes, organizations, businesses, and individuals regarding the draft plan and incorporate appropriate changes into a final wilderness management plan / environmental impact statement. The final plan will include letters from governmental agencies, any substantive comments on the draft document, and NPS responses to those comments.

Following distribution of the final wilderness management plan/ environmental impact statement and a 30-day no-action period, a Record of Decision approving a final plan will be signed by the NPS Pacific West regional director and the BLM Southern Nevada district manager. The Record of Decision documents the NPS-BLM selection of an alternative for implementation. With the signing of the record of decision, the plan can then be implemented.

Implementation of the Plan

The implementation of the approved plan will depend on future funding. The approval of this plan does not guarantee that the funding and staffing needed to implement the plan will be forthcoming. Full implementation of all of the actions in the approved wilderness management plan could be several years in the future.

The implementation of the approved plan also could be affected by other factors, such as changes in staffing, visitor use patterns, and unanticipated environmental changes. Once the wilderness management plan has been approved, additional feasibility studies and more detailed planning, environmental documentation, and consultations would be completed, as appropriate, before certain preferred alternatives can be carried out. For example

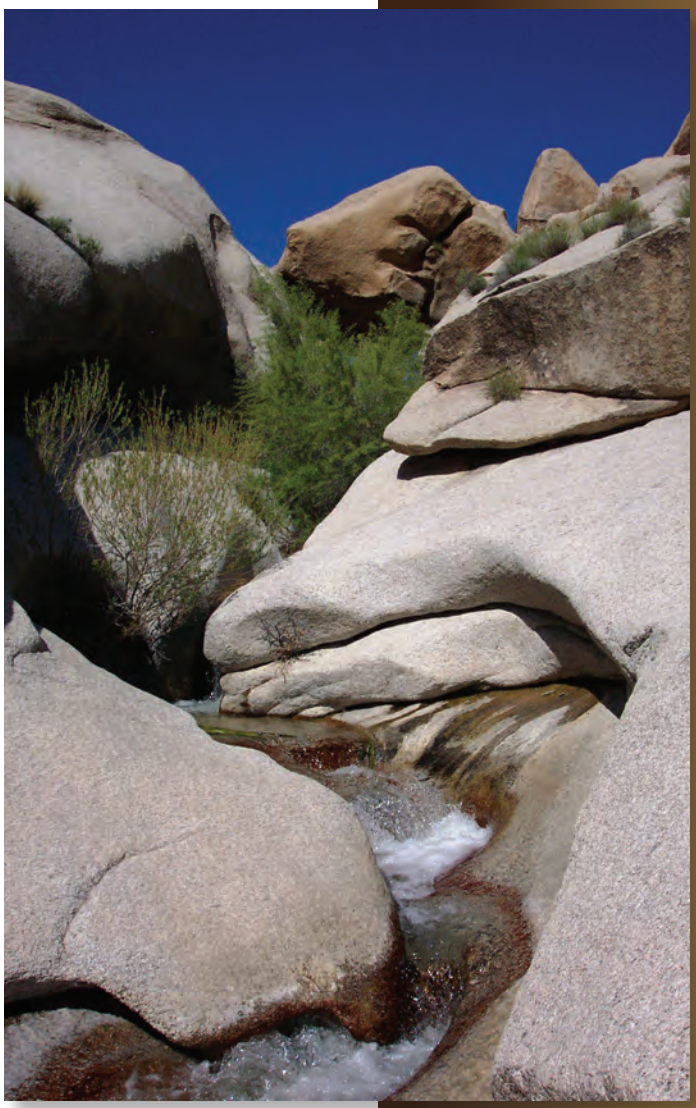
- additional environmental documentation may need to be completed
- appropriate permits may need to be obtained before implementing actions
- appropriate federal and state agencies would need to be consulted concerning actions that could affect threatened and endangered species

American Indian tribes and the Nevada state historic preservation officer would need to be

consulted, as appropriate, on actions that could affect cultural resources.

Plan Review and Update

Wilderness management is an iterative process, with ongoing monitoring informing managers of the effectiveness of their actions and identifying when changes are needed to meet management goals and objectives. This calls for some flexibility in the wilderness management plan, but the specific direction and desired future conditions established in the final plan will remain as the management guideline. Environmental, social, and political conditions change, as does the information available to most effectively manage public lands, and it is not the intent of this plan to freeze conditions. Over time, changing conditions may call for changes in the management approach to preserving or restoring wilderness resources.



Chapter Two:
Framework for Management, Use, and Administration of the Wilderness Areas

INTRODUCTION

This chapter provides general directions for management of the Lake Mead National Recreation Area and Bureau of Land Management wilderness. A variety of administrative and operational topics are covered, including the minimum requirement process, natural and cultural resource management, scientific activities and research, administration and operations, and monitoring of wilderness character. None of the management directions included here vary among the alternatives in chapter 3—the directions will be followed regardless of which alternative is selected for the wilderness management plan. The directions are based on the Wilderness Act, Clark County Conservation of Public Land and Natural Resources Act of 2002, and NPS and BLM policies, including NPS *Management Policies 2006*; Director's Order 41: *Wilderness Stewardship* and *Reference Manual 41;* white papers from the NPS National Wilderness Steering Committee; the "Wilderness Stewardship Plan Handbook. Level II Guidance: Wilderness Stewardship Plan EIS/EA Details"; BLM Manual 6340; and BLM "Manual 8561 – Wilderness Management Plans."

This chapter does not cover several topics that are addressed in chapter 3, including management zoning, access into and within the wilderness areas, and visitor use management and wilderness character measures and standards. The management zones and directions provided for these topics in chapter 3 plus the general directions provided in this chapter make up the management plan for the eight wilderness areas in Lake Mead National Recreation Area and adjacent BLM lands.

WILDERNESS MANAGEMENT GOALS AND DIRECTIONS

The eight wilderness areas in Lake Mead National Recreation Area and adjacent BLM lands will be managed in a way that is consistent with the Wilderness Act, national wilderness policies, and the Clark County Conservation of Public Land and Natural Resources Act of 2002, which designated these areas. The National Park Service and the Bureau of Land Management would manage the areas to protect physical wilderness resources as well as wilderness character, consistent with the direction of these laws and NPS and BLM policies.

WILDERNESS CHARACTER

The 1964 Wilderness Act states, "it is hereby declared to be the policy of Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." One of the central mandates of this act is to preserve wilderness character. Section 2(a) states that wilderness areas shall be administered "so as to provide for the protection of these areas, the preservation of their wilderness character." Section 4(b) states that, "Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character."

Wilderness character is not specifically defined in the 1964 Wilderness Act, nor is its meaning discussed in the act's legislative history. However, the Interagency Wilderness Character Monitoring Team has described wilderness character as "the combination of biophysical, experiential, and symbolic ideals that distinguishes wilderness from other lands. These ideals combine to form a complex and subtle set of relationships among the land, its management, its users, and the meanings people associate with wilderness" (Landres et al. 2008).

Wilderness managers have identified five key qualities of wilderness character based on the statutory language of the Wilderness Act: untrammeled; natural; undeveloped; solitude or a primitive and unconfined type of recreation; and other features of value.

- **Untrammeled**—This refers to wilderness as being essentially unhindered and free from modern human control or manipulation. Actions that intentionally manipulate or control ecological systems inside wilderness degrade the untrammeled quality of wilderness character—even if an action is taken to restore natural conditions.

- **Natural**—This means areas that are largely free from effects of modern civilization, where there is an absence of people and their activities. It also refers to the maintenance and perpetuation of natural ecological relationships and processes, and the continued existence of native wildlife and plants in largely natural conditions.

- **Undeveloped**—The Wilderness Act states that wilderness is "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation," "where man himself is a visitor who does not remain," and "with the imprint of man's work substantially unnoticeable." Thus wilderness is essentially without permanent improvements or modern human occupation.

- **Solitude or a Primitive and Unconfined Type of Recreation**—This quality is

about the opportunity for people to experience wilderness. Solitude means encountering only a few people, if any, and experiencing privacy and isolation. There is an absence of distractions, such as large groups of people; mechanization; and unnatural noises, signs, and other modern artifacts. There is freedom from the reminders of modern society.

Primitive and unconfined recreation refers to the freedom of visitors to explore with few or no restrictions, and the ability to be spontaneous. It means self-sufficiency without support facilities or motorized transportation, and directly experiencing weather, terrain, and other aspects of the natural world with minimal shelter or assistance from devices of modern civilization.

- **Other Features of Value**—These are features that are not covered by the other four qualities, including cultural resources, paleontological resources, and other scientific, educational, scenic, or historical value to wilderness character. This feature is unique to an individual wilderness based on the features that are inside that wilderness and typically occur only in specific locations.

At its essence, wilderness character is unseen and immeasurable—creating a unique challenge to wilderness management. Wilderness character includes the natural and scenic condition of the land; natural numbers, cycles, and interactions of wildlife; and the integrity of ecological processes. At its core though, wilderness character, like personal character, is much more than a physical condition. The character of wilderness is an unseen presence capable of refocusing peoples' perception of nature and their relationship to it.

The National Park Service and Bureau of Land Management recognize the intangible values of wilderness. In the implementation of this plan and with future management actions the agencies would, with every decision, forego actions that might have no seeming physical impact but that would detract from the idea of wilderness as a place set apart—a place where human uses, convenience, and expediency do not dominate; a place where we can know ourselves as part of something beyond our modern society and its creations.

OVERALL PHILOSOPHY AND DIRECTIONS FOR WILDERNESS MANAGEMENT

The following list identifies the philosophy and overall directions the agencies intend to pursue in managing the eight wilderness areas:

- Provide for the long-term protection and preservation of the areas' wilderness character under a principle of nondegradation. Nature will be the primary influence and human works will be minimal and substantially unnoticeable. The areas' natural condition, opportunities for solitude and primitive and unconfined types of recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical values present will be managed so that they will remain unimpaired.
- Repair where possible degradation from past nonconforming uses that have diminished wilderness character.
- Manage the wilderness areas for the use and enjoyment of visitors in a manner that will leave the areas unimpaired for future use and enjoyment as wilderness. Human use will be managed so visitors will have opportunities to experience solitude, remoteness, challenge, self-sufficiency, and discovery as appropriate in wilderness. Wilderness character and wilderness resources will be dominant in all management decisions where a choice must be made between preservation of wilderness character and visitor use.
- Manage cultural resources in the wilderness areas so they will be preserved and appreciated through appropriate protection, research, education,

monitoring, and treatment methods and techniques.

- Promote and perpetuate public and managers' awareness of, and appreciation for, wilderness character, resources, and ethics through interpretation and education. To foster a better understanding and awareness of wilderness preservation issues and goals, managers will work with other agencies, institutions, governments, tribal governments, and the public.
- Manage the wilderness areas using the minimum tools and equipment necessary to successfully, safely, and economically accomplish the objective. The chosen tools and equipment should be the ones that least degrade wilderness values temporarily or permanently.
- Manage nonconforming but accepted uses permitted by the Wilderness Act and subsequent laws in a manner that will prevent unnecessary or undue degradation of the areas' wilderness character. Nonconforming uses are the exception rather than the rule; therefore, emphasis is placed on maintaining wilderness character.
- Manage the NPS and BLM portions of the wilderness to provide a maximum amount of management consistency across administrative boundaries. Where possible, management, including any regulation of visitor uses, will appear seamless to the public. Where differences in agency management occur, the plan will endeavor to use recognizable natural features instead of agency boundaries to demark differing management prescriptions (as allowed by law, regulation, or policy). The National Park Service and Bureau of Land Management will assist one another in wilderness management activities including education and public outreach, emergency management, law enforcement, and monitoring.

SUMMARY OF USES, DEVELOPMENTS, AND MANAGEMENT ACTIONS PERMITTED AND PROHIBITED IN WILDERNESS

The Wilderness Act and agency policies identify uses, facilities, and management actions that are and are not permitted in wilderness areas.

Recreational uses, management actions, and facilities permitted in wilderness areas under the Wilderness Act and NPS and BLM policies include the following:

- nonmechanized recreational uses (e.g., hiking, backpacking, picnicking, camping)
- hunting and trapping (where otherwise permitted by law) and fishing
- American Indian religious activities and other actions recognized under treaty-reserved rights
- guided interpretive walks and on-site talks and presentations
- wheelchair use by individuals whose disability requires its use if that wheelchair meets both parts of the definition of a wheelchair as stated in the Americans with Disabilities Act, section 508(c): "the term wheelchair means a device designed solely for use by a mobility impaired person for locomotion that is suitable for use in an indoor pedestrian area."
- scientific activities, research, and monitoring (provided the activities are appropriate and use the minimum tool required to accomplish project objectives)
- management actions taken to address impacts of human use; examples of management actions include restoration of extirpated species, controlling invasive alien species, managing endangered species, and protection of air and water quality
- fire management activities (including fire suppression) as approved in the fire management plan

- preservation of historic properties eligible for listing in the National Register of Historic Places
- designated routes necessary for resource protection or for providing for visitor safety
- campsites that are essential to resource protection and preservation or that meet other specific wilderness management objectives
- certain administrative facilities if necessary to carry out wilderness management objectives (e.g., temporary storage or support structures, ranger station)
- uses and facilities permitted for landowners with valid property rights in a wilderness area

Certain uses and developments are specifically prohibited under the Wilderness Act. Under the definition of wilderness in section 2(c) of the act permanent improvements or human habitation are prohibited.

Section 4(c) specifically prohibits the following:

- commercial enterprises
- permanent roads
- temporary roads
- use of motor vehicles
- motorized equipment or motorboats
- landing of aircraft
- other forms of mechanical transport
- structures or installations

With the exception of permanent roads and commercial enterprises, the Wilderness Act does recognize that the above uses *may be permitted* if necessary to meet the minimum requirements for the administration of the area as wilderness or for emergency purposes. Other sections of the Wilderness Act also provide for some exceptions, including the preservation of features of historical value in section 2(c) and certain recreational commercial services in section 4(d)(6).

Additionally, NPS and BLM policies prohibit some developments, which include the following:

- new utility lines
- permanent equipment caches (however, NPS policies, unlike BLM policies, provide an exception for caches if they are necessary for health and safety purposes or determined to be necessary through a minimum requirements analysis)
- borrow pits (except for small quantity use of borrow material for trails)
- new shelters for public use
- picnic tables
- interpretive signs and waysides (unless necessary for visitor safety or to protect wilderness resources)

COOPERATIVE MANAGEMENT OF JOINTLY MANAGED WILDERNESS AREAS

NPS and BLM staff will work together and assist each other in the Eldorado, Ireteba Peaks, and Spirit Mountain wilderness areas. The managing agencies will facilitate an integrated and consistent management approach in the three wilderness areas. Agency staff will keep each other informed about activities that could affect the wilderness areas; will meet regularly to identify problems and issues of mutual concern; and will work together to anticipate, avoid, and resolve potential conflicts, protect wilderness resources, and ensure high quality visitor experiences. Whenever possible, the agencies will work together in supporting and conducting patrols, enforcing laws and regulations, and managing resources and visitor use.

RELATIONS WITH PRIVATE AND PUBLIC ORGANIZATIONS AND GOVERNMENTAL AGENCIES

To foster a spirit of cooperation with neighbors and encourage compatible adjacent land uses, wilderness managers will keep landowners, other land managers, local governments, and the public informed about management activities in the wilderness areas. Periodic consultations will occur with landowners who might be affected by visitors and management actions. Wilderness managers will respond promptly to conflicts that arise over NPS or BLM activities, visitor access, and proposed activities and developments on adjacent lands that could affect the wilderness areas.

Wilderness managers will work closely with adjacent landowners, local, state, and federal agencies, and tribal governments whose programs affect, or are affected by, activities in the eight wilderness areas.

APPLICATION OF THE MINIMUM REQUIREMENT CONCEPT

The Wilderness Act of 1964 states in section 4(c) that

> *"except as necessary to meet the minimum requirement for the administration of the area for the purpose of the Act (including measures required in emergencies involving the health and safety of persons within the area) there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing aircraft, no other form of mechanical transport, and no structure or installation…within a wilderness area."*

The act allows for the administrative exception, but it is an exception not to be abused and to be exercised very sparingly and only when it meets the test of being the minimum tool necessary for wilderness management. NPS and BLM policies dictate that all management decisions affecting wilderness must be consistent with the minimum requirement concept. The minimum requirement concept is

> *"a documented process used to determine if administrative actions, projects, or programs undertaken by the National Park Service or its agents and affecting wilderness character, resources, or the visitor experience are necessary, and if so how to minimize impacts." (NPS 2006)*

When determining the minimum requirement, the potential disruption of wilderness resources and character will be considered before, and given more weight than, economic efficiency and convenience. If a compromise of wilderness resources or character is unavoidable, only those actions that preserve wilderness character in the long term or have localized, short-term adverse impacts will be accepted.

The second part of this minimum requirement process is identifying the minimum tool—defined as the least intrusive tool, equipment, device, force, regulation, or practice—that would achieve the wilderness management objective safely and with the least impact on wilderness resources. This process however, does not preclude impacts; for example, helicopters could be determined to be the minimum tool under certain circumstances.

To apply the minimum requirement concept, a minimum requirement analysis will be completed for proposed management actions within the wilderness areas, including, but not limited to, natural and cultural resource projects, placement of administrative facilities, and campsite projects. Completion of the minimum requirement analysis is part of the environmental screening process and accompanies the appropriate environmental compliance and may be subject to public review prior to approval.

The minimum requirement analysis is a two-step process. Step 1 helps determine whether the proposed management action is necessary for administration of the area as wilderness, and whether the action poses a negative

impact on wilderness resources and character. Step 2 describes alternatives and evaluates each to determine the techniques, tools, and equipment (minimum tool) needed to ensure that overall impacts on wilderness resources and character are minimized. Minimum requirement analysis worksheets for lands managed by the National Park Service and by the Bureau of Land Management are included in appendixes B and C respectively. (For details on filling out the BLM worksheet and for examples, see www.wilderness.net.)
A minimum requirement analysis also is required for research proposed in the wilderness areas. Methods and tools proposed for the research must consider impacts on and appropriateness for wilderness. Although research may be appropriate for wilderness or may be essential for managing and protecting wilderness, some proposed research projects might be better suited to nonwilderness settings or designed with alternative low-impact field methods. Additionally, analysis of existing datasets may be a better option than collecting new field data. These types of considerations will be used in assessing research proposals for the wilderness areas, weighing the benefits of what can be learned against the impacts on wilderness resources and values.

NATURAL RESOURCES MANAGEMENT

The 1964 Wilderness Act defines wilderness as a place that "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable." Although these ideas have much in common, they are not the same. As established by the act, the objectives to manage wilderness for ecological conditions (the forces of nature) and for wildness (minimal imprint of man's work) can be in conflict.

In the eight wilderness areas, there are some past signs of human use, including trash and unofficial user-created trails and campsites. Although hands-off management was probably once sufficient to keep wilderness both natural and wild, land managers now realize that human use of the landscape has left evidence of that use: areas with invasive plants; diminishing populations of threatened, endangered, and extirpated plants and animals; compacted soils; artificial fire regimes; and even trash piles. The National Park Service and the Bureau of Land Management are fully committed to the preservation of the tangible remnants that are historically significant (an equally challenging concept, also defined in federal law). However, in other cases, wilderness area managers are faced with the dilemma of whether to attempt to restore natural conditions or leave an area alone. If the latter path is selected, some areas will naturally restore themselves over time, but other areas are likely to remain in an unnatural state.

With regard to natural resource management in wilderness, NPS wilderness policies state the following:

> *The principle of non-degradation will be applied to wilderness management, and each wilderness area's condition will be measured and assessed against its own unimpaired standard. Natural processes will be allowed, in so far as possible, to shape and control wilderness ecosystems. Management should seek to sustain natural distribution, numbers, population composition, and interaction of indigenous species. Management intervention should only be undertaken to the extent necessary to correct past mistakes, the impacts of human use, and the influences originating outside of wilderness boundaries. Management actions…should be attempted only when the knowledge and tools exist to accomplish clearly articulated goals* (NPS *Reference Manual 41: Wilderness Stewardship*).

The Bureau of Land Management follows the Minimum Requirements Decision Guide (MRDG) and Manual 6340. Section 1.2 of Manual 6340 states that the BLM objectives for wilderness management are:

A. Manage and protect BLM wilderness areas in such a manner as to preserve wilderness character.
B. Manage wilderness for the public purposes of recreational, scenic, scientific, education, conservation, and historic use while preserving wilderness character.
C. Effectively manage uses permitted under section 4(c) and 4(d) of the Wilderness Act of 1964 while preserving wilderness character.

Thus, conservation and restoration activities should occur only when necessary, and the threshold for taking management actions (intervention) is particularly high in wilderness. Managers should be certain that only those activities that sustain or improve wilderness character are authorized.

In considering whether to take action, managers should define as precisely as possible what outcomes are desired. The following questions (as well as the minimum requirement process criteria) can help guide managers in their decision:

- Is the extent and significance of diminished naturalness known?
- Is action needed to maintain ecological integrity—the presence of all appropriate elements and processes operating at appropriate rates?
- Is the action needed to promote resilience of the wilderness—the capacity of the system to absorb change and still persist without undergoing a fundamental loss of character? Is action needed because little semblance of natural conditions is possible without intervention?
- What is the intensity of the proposed action—how big an area will be affected over how long a time? Is the intervention short or long term?
- Is there sufficient understanding about reference conditions and processes, as well as the long-term effects of the action?
- What are the benefits and risks of taking action versus not taking action? Is the threat or change facing the wilderness considered a high priority? Does the action have the most potential to make a difference?
- Is there public understanding and support for the action?

(Additional questions and ideas can be found in Cole et al. 2008, Landres 2004, and Landres 2002.)

In its "Guidance White Paper Number 2," the NPS National Wilderness Steering Committee has provided a guide for evaluating the appropriateness of restoration and other conservation activities in wilderness managed by the National Park Service (NPS 2004d). Recognizing that identifying which action should be taken versus which action should be avoided will be location-specific and subjective, the following three-tiered framework can help managers in structuring their decision:

Class I: Activities that cause short-term wilderness disturbance and result in long-term wilderness character enhancement.

This class of activity entails one-time reversals of anthropogenic changes that, once accomplished, are self-sustaining. Users of wilderness might well encounter restoration activities that would typically result in impacts on wilderness character lasting a season to perhaps several years. Often, these impacts include temporary markers such as flagging, or placing tags and radio collars on animals. Some of these types of activities, such as dam removal, may require heavy equipment. Upon completion, however, traces of the restoration activity would be extinguished over a short period of time, while the benefits of "re-wilding" and returning naturalness to wilderness character would be long term.

Examples: Reintroducing self-sustaining native species or extirpating invasive nonnative species.

Class II: Activities that require long-duration or recurring entry, where benefits and costs to wilderness character must be weighed.

Many ecosystems that include wildernesses suffer anthropogenic disturbances for which managers lack the knowledge, the legal authority, or the financial resources to correct permanently at the present time. For example, introduced weedy plants often invade natural areas from adjacent lands, and require regular removal and frequent monitoring. These nature-maintenance activities reflect the reality that many designated wildernesses are simply too small or disconnected to sustain their full suite of ecosystem functions without intervention. NPS managers must ultimately weigh the restoration benefits to the ecosystem against the impacts on other aspects of wilderness character.

Examples: Periodic control of persistent introduced species or reintroduced species requiring continuing support.

Class III: Activities in support of laws or NPS policies and don't directly enhance wilderness character.

These activities represent substantial impacts on wilderness character. They clearly violate the intent of the Wilderness Act. Some of these, such as pest control, reflect the incapacity of some landscapes designated as wilderness to function as such, either ecologically or politically. On the other hand, some severe interventions, such as the removal of native organisms for restoration elsewhere, illuminate the fundamental and unavoidable connections between many wildernesses and their surrounding, more modified landscapes. Ultimately, decisions in this category may require a public review for their resolution.

Examples: Habitat modification for endangered species; control of native pests or dangerous species to protect life or property outside wilderness; removal of native organisms in support of restoration elsewhere.

Finally, as noted in Hendee and Dawson 2002, it is important to keep in mind that "some changes are irreversible and must simply be accepted as fundamental changes in the condition of wilderness ecosystems. Loss of keystone plant species to exotic pathogens and establishment of exotic plants and animals that alter fundamental processes . . . are examples."

Air Quality

The Clean Air Act (42 USC 7401 et seq.) gives federal land managers the responsibility for protecting air quality and related values, including visibility, plants, animals, soils, water quality, cultural resources, and public health, from adverse air pollution impacts. NPS *Management Policies 2006* (section 4.7) and *Natural Resource Management Reference Manual 77* provide further direction on the protection of air quality and related values for park units.

NPS staff would continue to work with appropriate federal and state government agencies and nearby communities to maintain and improve the national recreation area's regional air quality. NPS staff would participate in regional air quality planning, research, and the implementation of air quality standards.

Air quality in the eight wilderness areas would be periodically monitored to gain baseline information and to measure any significant changes (improvement or deterioration) to the areas' airshed.

Nonnative (Exotic) Vegetation

Several invasive, nonnative species are present in the wilderness areas, including red brome (*Bromus madritensis* ssp. *rubens)*, tamarisk *(Tamarix* spp.*),* Sahara mustard (*Brassica tournefortii*), and cheat grass (*Bromus tectorum*). The highest priority is to control tamarisk growing by springs in the wilderness areas. Control of the other three species noted above is also a high priority. Medium priority species include African mustard (*Malcomia africana*), tree tobacco (*Nicotiana glauca*), London rocket (*Sisymbrium irio*), and hedgemustard (*S. orientale*).

In the prevention and control of nonnative species, the management ideal is to sustain only native species in the wilderness. To achieve this, active weed management will occur to prevent, control, or eradicate weeds from the native plant communities within the wilderness. Activities that facilitate the introduction or spread of nonnative species will be scrutinized to determine if the activity should be disallowed, or if special stipulations will be satisfactory to mitigate the activity. Other management actions, such as seasonal closures or weed free forage requirements may be employed.

Where nonnative plants are found, emphasis will be placed on controlling small infestations, those weeds likely to spread and displace native plants, or those plants that may disrupt ecosystem function. The Nevada noxious weed classification system also will be consulted in setting control priorities for specific weed species. Monitoring for nonnative plants will occur on a regular basis.

Weed treatment will focus first on reducing infestation size and ultimately seek complete eradication of weed species. Treatment activities will use the current knowledge of effective treatment methods, as well as treatment strategies appropriate for the target plant and compatible with the wilderness setting. The level of treatment intensity and the minimum tool necessary will be determined prior to site-specific weed treatment activities.

Hand pulling weeds in wilderness areas will not be subject to minimum requirements analysis, as long as no prohibited use is implemented, fewer than 12 people are in the work crew, and Leave No Trace principles are followed. If there were a need for herbicide application, a separate minimum requirements analysis would be completed as part of project-related environmental analyses and followed by agency review, as necessary. This process assures that the proposed project activity is necessary for management of the area as wilderness and that the minimum tool has been selected. It also assures consistency with other wilderness-related planning documents and provides a record of management activities involving prohibited uses important in wilderness monitoring purposes.

Recognizing that treatment combinations may be necessary in some situations, the following methods could be used for treatment and control:

- Hand grubbing may be used with or without hand tools if plants will not resprout and where infestations are of a size manageable by small hand crews (this may occur concurrent with monitoring).
- In accordance with a site-specific pesticide use proposal, herbicides may be applied by backpack or horse pack spraying equipment (or other wilderness compatible methods) when grubbing is not effective. Treatment may include the use of hand or power tools to cut plants down prior to treatment.
- Herbicides may be applied with or in conjunction with motorized/mechanized equipment, in accordance with a site-specific pesticide use proposal, where the infestation is of such size that treatment by hand tools and herbicides are impractical, and secondary impacts from the control activity are minor and easily rehabilitated. Treatment may include cutting plants down prior to treatment. No ground vehicles would be driven into wilderness. Reseeding control areas with native species, with a preference for local genetic stocks, will be incorporated where on-site seed sources are not adequate for natural recruitment.
- Biological control agents approved by the Animal and Plant Health Inspection Service may be employed where infestations are of such size that eradication is not feasible. Additional environmental compliance would be required before release of a biological control agent by the National Park Service and Bureau of Land Management could occur.

Ecological Restoration and Removal or Rehabilitation of Human Disturbances and Inappropriate Traces of People

If a decision is made to actively rehabilitate or restore an area, active rehabilitation will occur at sections visible from key observation points, while other sections will be left to rehabilitate naturally. Where soils are compacted, the surface may be loosened with hand or power tools anywhere along the rehabilitated route. Use of power tools or any other mechanical equipment would be of last resort.

Active rehabilitation will include visually obscuring the surface disturbance by breaking up compaction, "planting" dead vegetation collected near the site or brought in from offsite salvage areas (only native vegetation), and by scattering rock to mimic the form and texture of the surrounding landscape. Hand tools will be used for the work. Obscuring the site will help prevent continuing human-caused disturbance and will help trap native seeds to foster natural recruitment. The seeding or planting of live vegetation may also be used in those sites where there is a poor likelihood of native vegetation recruitment or a high likelihood of infestation by a noxious weed.

When seeding is necessary, native species—with a preference for local genetic stocks—will be used exclusively. A mix of species will be selected that closely represents the plant composition for the site being reseeded. Active rehabilitation of any future disturbance that involves digging (for example, fire line construction) will include recontouring to restore slopes.

Structures and installations will be removed if they are not historically significant or are not the minimum necessary for administration of the area as wilderness.

As called for in the alternatives, portions of roads on NPS lands would be closed (e.g., parts of Approved Road 21) and the land rehabilitated and restored. (These closures do not apply to BLM lands in the wilderness areas as they contain no accessible roads.) Another high priority would be restoring the land affected by old road cuts along the western edge of Approved Road 30 along the Nellis Wash Wilderness. Heavy equipment may be needed in these and other similar locations to restore affected areas.

Management of Unofficial User-created Hiking Trails and Routes

Unofficial user-created hiking trails and routes are present within the wilderness areas. These are paths that have resulted from repeated and continuous use by visitors, but are not maintained or recognized by the agencies. Examples of adverse impacts on wilderness character from these unofficial trails and routes include excessive erosion (for example, creation of a gully or making a tread surface difficult to maintain footing on), excessive impacts (such as trail braiding or widening), or other unacceptable impact on the wilderness resource. User-created trails will not be signed, displayed on agency maps or brochures, or normally receive maintenance. They may be available for use upon discovery by hikers simply because numerous hikers are visiting the same location, but creation of user-created trails will be discouraged if possible.

Flat-bottomed sandy or gravely washes will not be defined as user-created trails. Field monitoring will be combined with a periodic review of private sector published route descriptions. As new user-created trails are discovered, they will be evaluated for impact on wilderness character (including cultural or biological) and the management objectives of this plan. New user-created trails may lead to popular sites and receive regular use to the extent that rehabilitation may not be possible. These may be retained. Rock cairns will be dispersed unless needed to minimize visitor impacts on a single retained path. Where user-created trails are retained, but the trail is found to be unstable or causing an adverse impact, the trail may be rerouted, improved, or maintained in the problem section only

(following designated trail guidelines). This work will be designed to make the trail compatible with protecting resources; but not to attract use or make the trail easier to travel.

An inventory of user-created trails and routes will be maintained and monitored for resource damage. Field monitoring will identify paths that have cut vegetation, lead to camping areas, or show other evidence of use. Monitoring of user-created trails and routes will specifically occur at Pinto Valley and Redstone, Spirit Mountain, Sacatone Canyon and the Catacombs area, Boy Scout Canyon, and Tule Spring.

Fire Management

The Lake Mead National Recreation Area's *Fire Management Plan/Environmental Assessment* (NPS 2004b) and the Bureau of Land Management's *Las Vegas Field Office Fire Management Plan* (BLM 2004) provide guidance on management of fires in wilderness areas.

Appropriate management responses would be developed following the initial report for wildland fires in the planning area and would include a range of specific actions including monitoring, confinement, initial attack and suppression / extinguishment, or wildfire suppression with multiple strategies, and may include use of mechanized equipment and retardant after authorization from the appropriate official. Appropriate management responses would be determined for each wildland fire based on site factors (including fuel loading and fire behavior, protection of natural and cultural resources), and the circumstances under which a fire occurs, while ensuring the safety of firefighter, the public, and protection of private property.

All of the wilderness areas are located in the BLM Tortoise Area of Critical Environmental Concern South Fire Management Unit and the NPS Lower Lake Mead Fire Management Unit. Portions of both the Eldorado and Ireteba Peaks wilderness areas are located in the Tortoise Area of Critical Environmental Concern South Fire Management Unit or the Tortoise Moderate Density Fire Management Unit. Fire suppression will occur on all wildland fires and all escaped prescribed fires. All wildland fires in the wilderness areas will be managed to include the application of minimum impact suppression techniques, and the consideration of firefighter safety, public safety, cultural resources, and sensitive habitat resource concerns. Motorized vehicles used in fire suppression efforts within wilderness will remain on preexisting roads. Off-highway vehicle use and heavy equipment is prohibited in these fire management units unless approved by the NPS superintendent and/or BLM district manager. Air resources including helicopters and single engine air tankers will be included in the WILDCAD system for all wilderness fire suppression activities. The use of retardant must be approved by the NPS superintendent and/or BLM district manager. However, if retardant is not approved, water may be dropped from aircraft on authorization of the incident commander.

Wildfire management priorities include maintaining a diversity of native vegetation by managing fire size to minimize the spread and density of noxious or invasive weeds, such as red brome.

Prescribed burns and mechanical fuel treatments could be proposed in wilderness to restore "natural conditions," although no prescribed burns or mechanical fuel treatments are foreseen as being necessary at this time.

A resource advisor will be notified for all fires occurring in or threatening a wilderness area.

Wildlife

The agencies will continue to work closely with the Nevada Department of Wildlife in managing wildlife populations in the wilderness areas. Wildlife management activities within BLM-managed wilderness areas would be conducted in conformance with the current and subsequent BLM-NDOW Memorandum of Understanding

(2012). A similar NDOW memorandum of understanding on wildlife management was signed with the National Park Service in 2004. Actions may include, on a case-by-case basis, the occasional and temporary use of motorized vehicles or mechanized equipment (see appendix E).

Wildlife will be protected as much as possible from the general harassment of human interactions. This will mainly be accomplished through visitor education. If necessary, temporary closures or use limits may be set in specific areas to protect wildlife during critical periods of time or in critical habitats.

Wildlife Relocation. Transplanting (i.e., removal or reintroduction of terrestrial wildlife species) may be permitted if necessary to accomplish either of the following: (1) perpetuate or recover a threatened or endangered species; or (2) restore the population of indigenous species eliminated or reduced by human influence. Sites and locations outside of the wilderness will be used first, and if not available, transplants may be made to or from the wilderness in a manner most compatible with preserving the wilderness character of the area. Only the species whose indigenous range includes the eight wilderness areas will be considered for relocation into the respective wilderness area. When a species is in need of augmentation in the wilderness, and until the population is thriving on its own, the National Park Service and the Bureau of Land Management will consult with the Nevada Department of Wildlife in taking actions to suspend or reduce activities contributing to the condition until the population is self-sustainable.

In furtherance of the values of the wilderness areas to the larger region, and when a species is sufficiently in excess of its viable population level in the wilderness areas, wildlife relocation from the wilderness areas may be approved to restore the population of the species at indigenous habitat elsewhere where long-term measures to mitigate the conditions affecting the species have been implemented.

Relocation activities may be supported by motorized equipment or transport where it is the minimum necessary for the administration of the area as wilderness as determined by the National Park Service or the Bureau of Land Management. Staging will occur outside the wilderness boundary. Timing will consider visitor use of the area—whenever possible activities will be scheduled during periods when visitor use is low. In order to inform visitors of impending activity, relocation days will be posted on the NPS and BLM websites well in advance of the activity.

Bighorn Sheep Management. The wilderness areas provide habitat for and support bighorn sheep. Wilderness managers will work closely with the Nevada Department of Wildlife to ensure state managers know what activities can and cannot occur in the wilderness areas. A minimum requirement analysis will be completed to make sure state operations are consistent with wilderness requirements.

Wildlife Water Developments (Guzzlers). Currently, there are no wildlife water developments (guzzlers) within the wilderness areas. On NPS lands, wildlife water developments may be considered only when essential to preserve the wilderness areas' resources. Wildlife water developments would only be used when necessary to maintain the local indigenous wildlife population where human activity has caused loss of water within the local population's indigenous range, and an artificial water source cannot be located outside the wilderness areas to achieve the same purpose.

The Clark County Conservation of Public Land and Natural Resources Act of 2002 permits existing and future structures and facilities for wildlife water development projects in BLM wilderness. New wildlife water developments may be authorized by the Bureau of Land Management if the structures and facilities will enhance wilderness values by promoting healthy, viable, and more naturally distributed wildlife populations and the visual impacts can reasonably be minimized to meet BLM visual resource

management class I objectives. Any proposals for the construction of new wildlife water developments will be subject to future site-specific NEPA and MRDG analyses.

Burro Management. Burros are present in the wilderness areas, particularly in the Jimbilnan and Pinto Valley wilderness areas. NPS legislative mandates and policies dictate that the long-term goal of burro management is to manage for zero burros within Lake Mead National Recreation Area, including the wilderness areas. NPS wilderness managers will follow the guidelines provided in Lake Mead National Recreation Area's 1995 burro management plan, and BLM wilderness managers will follow the guidelines in the *Las Vegas Resource Management Plan* and subsequent plans and amendments (BLM 1998).

Threatened and Endangered Species

Management of the federally threatened Mojave desert tortoise will continue to be closely coordinated with the U.S. Fish and Wildlife Service; management of state protected species (including, but not limited to Las Vegas bear poppy, banded Gila monster, burrowing owl, Swainson's hawk, and ferruginous hawk) will continue to be coordinated with the Nevada Department of Wildlife. The agencies will continue to monitor these populations. If disruptions to the populations occur because of visitor use, appropriate management actions, including use restrictions, will be taken to protect these species.

Soundscapes

It is the intent of the National Park Service to maintain or improve the baseline of natural sounds in designated wilderness. Lake Mead National Recreation Area collected baseline data in the wilderness areas from 2007 to 2012 (see appendix F). The data included audio recordings of overflights and all other sounds within the wilderness areas. This study provided valuable information that will allow NPS and BLM managers to better understand the acoustical environment and manage human-caused sounds. As recommended in the report, acoustic monitoring will be a priority; the areas will be monitored for trends every 2–5 years or more frequently if any negative impact is expected. Additional monitoring sites will also be established closer to Lakes Mead and Mohave. Continuing monitoring in the future will inform the agencies of changes to soundscape conditions over time.

Paleontological Resources

Paleontological sites containing significant fossils of invertebrates, vertebrates, plants, and traces are an important nonrenewable resource, possessing scientific and educational values. The Lake Mead National Recreation Area and surrounding lands contain paleontological resources. The majority of the sites inventoried for paleontological resources in the national recreation area are located in areas just outside of wilderness. Although the eight wilderness areas have not been extensively studied, the potential for new paleontological discoveries within the wilderness areas is great. Currently, the only documented paleontological site is located in the Pinto Valley Wilderness: one documented petrified wood site is present (NPS 2004c).

The following strategies will be followed to better understand and protect paleontological resources consistent with the Wilderness Act:

- Paleontological resources in the wilderness areas will be surveyed and assessed to determine their extent and scientific significance, and to ensure that these nonrenewable resources are not lost. Permits will be issued for the surveys.
- Collection of any paleontological materials will be permitted only with the approval of the superintendent and BLM district manager, as appropriate. Approval will be granted only for scientific research or public education. All collection must be

conducted in a fashion that leaves the site in a substantially unnoticeable condition. All collected material must be housed in an approved repository.

- Excavation permits to collect fossil material will be issued only on a case-by-case basis and after an environmental assessment determines that the proposed action will not degrade the overall wilderness character.
- Any research will be conducted under the minimum requirement concept.

CULTURAL RESOURCE MANAGEMENT

Several types of cultural resources are located in the eight wilderness areas. Cultural resources are included under the Wilderness Act as part of wilderness and historic values to be protected. In addition, laws intended to preserve the nation's cultural heritage, including the National Historic Preservation Act, Archeological Resources Protection Act, and American Indian Religious Freedom Act, among others, all fully apply in wilderness. Management will be consistent with these laws as well as the Wilderness Act; NPS *Reference Manual 41: Wilderness Stewardship;* NPS Director's Order 28: *Cultural Resource Management;* and BLM Manual 6340.

As called for in section 6.3.8 of NPS *Reference Manual 41* and section.1.6(C)(5) of BLM Manual 6340, historic properties in the wilderness areas that are listed in or eligible for listing in the National Register of Historic Places will be protected and maintained according to the pertinent laws and policies governing cultural resources. Cultural resources (such as historic sites, structures, and objects) in the eight wilderness areas will be preserved through a range of management actions (such as inventories, documentation, photographic record, and stabilization). However, the methods used to protect and maintain cultural resources must be consistent with the preservation of wilderness character and values—cultural resource management activities, including inventory, monitoring, treatment, and research, must be done in compliance with the provisions of the Wilderness Act. If these management actions are proposed in the wilderness areas, they must be evaluated in the minimum requirement process and the Minimum Requirements Decision Guide, with advance public involvement, to avoid or minimize impacts on wilderness character and values.

In particular, proposals for the use of motorized and mechanical equipment for cultural resource work (e.g., archeological coring and excavations, use of remote control airplanes, maintenance of historic structures) within the wilderness areas will be reviewed through the minimum requirement analysis process (see "Application of the Minimum Requirement Concept" in chapter 2). Thus, whether conducting inventories or documenting objects and sites before allowing them to "melt into the land," wilderness and cultural resource managers will work closely to ensure that both wilderness and cultural resources are effectively documented and protected in ways that best preserve the integrity of both resources. No national register-listed or national register-eligible structure would be allowed to decay naturally ("molder") without prior review.

Any adverse impacts on cultural resources within the wilderness areas will be avoided if at all possible, as the protection of these resources is a critical facet of wilderness management. Any actions that involve ground disturbance or possible disturbance of cultural structures or landscapes must involve mitigation measures developed by the agencies in consultation with the Nevada State Historic Preservation Office, the Advisory Council on Historic Preservation, and the appropriate tribal cultural office or tribal historic preservation office.

Much work still needs to be done to understand the human history of the wilderness areas. Any proposed surveys or excavations will go through the minimum requirement analysis to determine the minimum tool and determine how best to avoid or minimize wilderness impacts.

To better understand and manage cultural resources in wilderness areas, cultural resource inventories will continue to be developed and research will continue to be conducted along with continued consultations with cultural associated American Indian tribes.

With the exception of Spirit Mountain and Bridge Canyon, where there is evidence of visitor use, cultural resources in the wilderness areas do not show impacts from visitation. Cultural sites will continue to be monitored and management actions taken if visitor use begins to affect sites.
It is important to stress that any action affecting cultural resources in the wilderness area will be undertaken only after appropriate consultations with the Nevada State Historic Preservation Office, any affiliated American Indian tribes, other interested agencies or organizations, and the general public.

Traditional Cultural Properties

The Yuman tribes, which include the Mohave, Hualapai, Yavapai, Havasupai, Quechan, Pai pai, and Maricopa, have traditional ties to the wilderness areas. Some mountains and canyons located along the Colorado River have been identified as traditional cultural properties and are listed in the National Register of Historic Places because of their significance to the Yuman tribes. This area is sacred to the members of these tribes, and they continue to use the area according to their traditions. The agencies will honor these traditional ties.

The Spirit Mountain traditional cultural property will continue to be protected from illegal activities such as vandalism and unauthorized collecting of artifacts. Managers will continue to consult with the tribes to ensure their concerns are being met. It is anticipated that visitor use would continue to increase, and expanded educational efforts and law enforcement efforts will occur if needed to address visitor use problems that may arise. Information about the protection and interpretation of the resources may be conveyed through brochures and wayside exhibits at entrances to the wilderness areas as well as through public outreach. Managers will also monitor the expected increase in visitor use in the wilderness areas, including the traditional cultural properties.

Historic Structures

Present in the wilderness areas are a small number of historic structures, primarily associated with past mining activity that predates wilderness designation. Most of these sites have not been evaluated for listing in the National Register of Historic Places, although several are considered potentially eligible. In general, historic properties eligible for the National Register of Historic Places that have been included in wilderness would be protected and maintained according to the pertinent laws and policies governing cultural resources, using management methods that are consistent with preservation of wilderness character and values (NPS 1999a). If appropriate, public outreach, expanded law enforcement, and educational efforts will be undertaken to address problems such as vandalism or illegal collection of historic items.

Archeological Sites

The wilderness areas have not been extensively surveyed for archeological sites. Archeological research, including excavations, collection of specialized soil samples from cores or excavation units, and the use of remote sensing devices, may be permitted after review through a minimum requirement analysis.

Any ground-disturbing activities, such as the construction of access points, have the potential to affect archeological resources. NPS or BLM archeologists will review all such proposals before such activities occur. Proposed facilities may be relocated, if found to have the potential for adverse impacts on

cultural resources and wilderness values due to location or visitor use.

American Indian Concerns

The locations of American Indian sites or areas will be identified and recorded as ethnographic resources. Such recording is important for addressing management and treatment of resources that might be included under the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, and Executive Order 13007, "Indian Sacred Sites," or as traditional cultural properties under the National Historic Preservation Act.

DESIGNATED WILDERNESS ROUTES AND TRAILS

In the context of this plan a designated route is an agency-approved primitive path that is not designed or engineered, receives little maintenance, does not have a hardened, maintained treadway, may have informal markings (i.e., cairns), and may require navigation skills to use. Typically routes are initially created by visitors. They may or may not be shown on maps. Designated routes in this plan are intended only for hikers and in some cases horses and pack stock.

If designated routes are established in the wilderness areas, they will receive minimal maintenance. Cairns may be used as necessary to define a route (e.g., where animal trails cause confusion) or for public safety; however, the construction of new cairns will be minimized and be discernible from historic cairns. Cairns should be no bigger than one foot high. (Specific design standards for agency-identifiable cairns will be developed.) The locations of all cairns will be recorded by global positioning system (GPS). If cairns are found off designated routes they will be dismantled. Visitors' use of spray paint to mark routes will be strongly discouraged. Flagging and other temporary markings in any area will be prohibited except during emergency operations or as approved for research and monitoring. If used in any of these ways, the markings must be removed once the activity has concluded.
Designated routes will be watched for degradation and may be modified to minimize impacts. Where degradation is occurring on routes, the following actions will be considered through the minimum requirement process:

- minimal maintenance to correct the problem
- minor construction to correct the problem
- reroute portions or all of the route
- closure and rehabilitation of portions or all of the route

Designated maintained trails generally will not be built in the wilderness areas unless they are determined to be necessary for resource protection or for providing appropriate use of wilderness. If trails are provided, they will meet NPS and BLM standards for wilderness trails. The trails will be unsurfaced, narrow, modest in character (except where a more durable surface is needed), and generally unimproved except for clearing and some work on dangerous areas. Tread width should generally be 18 inches.

VEHICLE ACCESS POINTS

If new vehicle access points are developed for visitors to enter the wilderness areas, they will be on existing roads at or near the wilderness boundaries. Routine maintenance of the approved backcountry road system will continue. Many of the backcountry roads provide access to wilderness areas. Vehicle access points will be defined by creating turnarounds at suitable locations at or before the wilderness boundary to help direct vehicles from continuing into the wilderness. Turnarounds will be located at already established, sufficiently sized pullouts that exist within 0.25 mile of the wilderness boundary. Otherwise, new turnarounds will be created near the boundary in appropriate

locations. Turnarounds will occupy approximately 0.1 acre and have adequate space for two vehicles to park parallel to the road without blocking the turnaround. Vehicle barriers will be constructed where natural barriers are not adequate to keep vehicles from traveling past the turnaround. The following barrier types, listed in order of least intrusive to most intrusive, may be used:

1. wilderness sign, berm associated with the turnaround, small rocks, or vegetation placement or restoration
2. large boulders moved by heavy equipment
3. post and cable
4. fence or gates

The least intrusive method appropriate for the location will be used. Tread Lightly practices will be encouraged through literature and other contacts.

Access points may be classified as either primitive or developed. Primitive access points are only small pull-outs or parking areas. Developed access sites also include signs or signboards, and waysides with orientation, interpretive, or regulatory information, as appropriate. Both primitive and developed access sites may include registers to monitor visitor use.

VISITOR USE MANAGEMENT

Backcountry Permits

Permits are not needed to access the wilderness areas, although they may be considered in the future if conditions warrant. To get a sense of use levels and to track use patterns, voluntary self-registration boxes may be installed at access points. Other possible methods of obtaining use levels information include monitoring the number of vehicles at key access points, installing agency-monitored registers on selected mountain summits, and estimating visitor use of areas during park overflights.

Individual visitors do not need a permit to access the wilderness areas. However, permits are required for authorized guided groups (i.e., guides for hunters, academic/educational groups, and disabled visitors). Permits may also be required for noncommercial, noncompetitive organized groups or events and recreational use of special areas on BLM lands in accordance with 43 CFR 2932.

In the future, the use of permits could change if necessary to ensure levels of wilderness use are consistent with a high-quality visitor experience, safety, and resource protection. Permits can have many uses, including the following:

- providing education concerning resource protection and Leave No Trace practices
- providing education concerning safety issues
- providing a means to track visitor use
- identifying a starting point for search and rescue efforts
- regulating use

Climbing, Mountaineering, and Canyoneering

NPS Director's Order 41: *Wilderness Stewardship* and BLM Manual 6340 and Instructional Memorandum 2007-084 ("Use of Permanent Fixed Anchors for Climbing in Designated Wilderness Areas Managed by BLM") provide direction for management of climbing on NPS and BLM lands. The National Park Service and Bureau of Land Management recognize that climbing is a legitimate and appropriate use of wilderness. In the Lake Mead wilderness areas rock climbing and scrambling are allowed without the placement of fixed anchors. The use of removable anchors also will continue to be allowed. However, these activities will be restricted or prohibited if they result in unacceptable impacts on wilderness resources or character, or interfere significantly with the experience of other park visitors. Wilderness climbing education and impact monitoring

will be pursued to minimize impacts on wilderness character. Like all visitors, climbers are encouraged to adopt Leave No Trace principles and practices.

"Clean climbing" techniques with the least negative impact on wilderness resources and character will always be encouraged in the wilderness areas. Clean climbing involves the use of temporary equipment and anchors that can be placed and removed without altering the environment (e.g., slings, cams, nuts, chocks, and stoppers). Climbing is prohibited within 50 feet of archeological sites. Practices such as gluing or chipping holds, and damaging or removing vegetation on or at the base of climbing routes are prohibited by NPS regulations (36 CFR 2.1). The use of motorized equipment (e.g., power drills) is prohibited by the Wilderness Act and NPS and BLM regulations (36 CFR 2.112, 43 CFR 6302.14 and 6302.20).

It is recognized that the occasional placement of a fixed anchor for belay, rappel, or protection purposes may be necessary and does not necessarily impair the future enjoyment of wilderness or violate the Wilderness Act. But fixed anchors or fixed equipment should be rare in wilderness. In addition, the establishment of bolt-intensive face climbs is considered incompatible with wilderness preservation due to the concentration of human activity that they support and the types and levels of impacts associated with such routes.

Authorization will be required by the NPS park superintendent and BLM district manager, as appropriate, for the placement of new fixed anchors or fixed equipment on lands in the wilderness areas. NPS or BLM authorization may be required for the replacement or removal of existing fixed anchors or fixed equipment. Authorization will depend on natural and cultural resource issues, including wilderness resources, and recreation opportunities. If unacceptable impacts are determined to be occurring in wilderness, the park superintendent or BLM district manager may deem it necessary to restrict or prohibit the placement of fixed anchors.

Camping and Campfires

Camping is allowed in the wilderness areas. Visitors are asked to use Leave No Trace minimum impact principles. Backpackers may camp anywhere in the wilderness areas. If monitoring indicates that unacceptable impacts are occurring to resources or visitors, specific campsites may be closed or become designated campsites. Campsites must be at least 0.5 mile off designated roads and 100 feet from any spring, waterhole, seep, or other watering device. They also must be located farther than 100 feet from any archeological site including rock art. Some areas may be closed to camping or restricted if there are sensitive resources present. Sites will not be designated for camping unless there are resource protection concerns. Camping is allowed for up to 14 consecutive days in any one area.

In the future, if designated campsites need to be established, new sites would be located based on the following criteria:

- Resource protection would be of primary importance.
- Campsites would be placed out of view of trails and routes, and not within 100 feet of sensitive resources.
- Campsites would be placed far enough apart so that campers cannot hear other campers from their site (campsites would be at least 0.25 mile apart).
- Campsite placement would be subject to cultural resource mitigation.
- Campsites would be placed in areas with slopes, buried rocks, or other features that limit the unintended expansion of sites.

Campfires are permitted. Visitors must bring their own wood, unless they use driftwood found below the high water line. All traces of campfires are to be removed, including ashes and unburned wood, and fire rings should be scattered before leaving. Because of the lack of

firewood, visitors will be encouraged to use camp stoves. Fire restrictions may be in place as part of local fire closures when fire risk is greatest. Southern Nevada fire restrictions are typically May through September.

Shooting, Hunting, and Trapping

Hunting, including bird hunting, and trapping are permitted within the wilderness areas in accordance with state and federal law. Commercial hunting and trapping in the wilderness areas is prohibited under the Wilderness Act.

The creation or construction of permanent blinds in the wilderness areas is not allowed. Portable or "pop-up" blinds also are not allowed on NPS lands. However, portable or pop-up blinds may be temporarily allowed on BLM lands in the wilderness areas for hunting, photography, wildlife observation, and similar purposes for a period of 14 days if they are packed or carried in and out and do not require the disturbance or destruction of native soil, rock, or vegetation. Portable and "pop-up" blinds must be attended or occupied at least some portion of a 10-day period within the 14-day period of use. If blinds are not attended or occupied for 10 days, they will be considered unattended property or permanent structures and will be subject to removal and subject to disposition under the Federal Property and Administrative Services Act of 1949, as amended, and 43 CFR 8365.1-2(b). It is suggested that anyone who packs or carries a portable or "pop-up" blind into a wilderness area affix to the blind their name, address, phone number, the date the blind was placed, and the dates the blind will be unattended or unoccupied.

NPS- and BLM-administered wilderness lands would be closed to target shooting.

Horses and Pack Stock

The use of horses or pack animals (i.e., burros and mules) is generally allowed in the wilderness areas. However, goats and llamas will be prohibited due to their potential to transmit diseases to bighorn sheep. In the Pinto Valley, horse and pack animal use will be limited to washes due to the presence of sensitive cryptogamic soils. In other areas, pack stock will be encouraged to use washes and may be excluded in other sensitive soil areas. Other than incidental browsing, riding and pack stock animals may be fed only with packed-in, certified, weed-free feed.

Geocaches and Other Physical Evidence of Human Activity

Geocaching will not be permitted in the wilderness areas, with the exception of virtual geocaching activities. Leaving signs of human use in a wilderness area is inconsistent with the purpose of wilderness areas.

Wilderness rangers will be given instruction on the identification of human artifacts 50 years old or older. When human artifacts 50 years old or older are identified, the resources staff will be contacted. Items that are obviously less than 50 years old will be considered unattended personal property or refuse. Unattended personal property not associated with an active camp, including geocaches, will be removed by NPS or BLM personnel upon discovery, and will be held at the appropriate office. If possible, the owner of the personal property will be contacted to retrieve it. In the case of a geocache, the National Park Service or the Bureau of Land Management will request the geocache sponsor to remove the site listing from the Internet. Human effects for which questions of age exist will be photographed for further consideration by the archeologist.

Paint or marks on rock from graffiti, paintballs, or other forms of vandalism will be removed from the surface in a timely manner. The process of removal will vary according to

the types of paint or marks and the type of rock affected. For example, water-soluble paints on hard rock surfaces may be removed with only water and a sponge, whereas markers used on sandstone may require more invasive procedures such as sandblasting. The least invasive methods will be used following a minimum tool analysis and the following priorities:

1. water with soft washing implement
2. water with scrubbing or scraping implement
3. solvent with scrubbing or scraping implement
4. wet or dry sandblasting equipment (where compressor is located outside wilderness and a hose can reach to the site in the wilderness)
5. dry sandblasting equipment transported into the wilderness by wheeled cart or pack animal.

Except for dry sandblasting as noted above, all equipment and personnel would be transported into the wilderness by foot or pack animal. If the natural patina is lost during paint removal, an oxidizing process such as Permeon® would be applied to restore the patina and more closely replicate the surrounding rock. The objective would be to remove graffiti or other vandalism in as short a time as possible after its discovery, but to schedule the activity for a weekday during low use periods to avoid disruption of visitors. The site will be examined to ensure that cultural resources are not present on the affected site. Removal of graffiti within 100 feet of rock art will require separate, site-specific analysis and consultation with an American Indian representative. If graffiti or other vandalism is found within a cultural resource site or within the viewshed of rock art, the NPS or BLM cultural resource specialist or archeologist will be contacted to determine removal method or required consultation.

Accessibility

The National Park Service, under section 504 of the Rehabilitation Act and 29 CFR part 17, has legal obligations to ensure that no person who has a disability is denied the opportunity to participate in a program solely because they have a disability; this includes the opportunity to participate in wilderness experiences. All participants, including people who have disabilities, are to be allowed to participate as long as they "meet the essential eligibility requirements" applied to all people for participation in a given program or activity and they are able "to achieve the purpose of the program or activity without modification to that program or activity that fundamentally alters the nature of that program or activity."

Title V, section 507c of the Americans with Disabilities Act specifies that in federally designated wilderness, a person who has a mobility impairment may use a wheelchair that is 1) designed solely for use by a mobility impaired person for locomotion and 2) suitable for use in an indoor pedestrian area. Wheelchairs that meet both parts of that definition are legally recognized as wheelchairs when used for personal locomotion by a person who has a mobility impairment; these devices may be used anywhere foot travel is allowed, and are not to be considered as forms of mechanical transport.

While providing for the use of wheelchairs in wilderness, section 507c also states that "no agency is required to provide any form of special treatment, or accommodation, or to construct any facility or modify any conditions of lands within a wilderness area in order to facilitate the use of a wheelchair." In addition, the Architectural Barriers Act (ABA) requires that when a federal agency constructs or alters a facility, it is to be accessible. Therefore, for example, if the decision is made for environmental purposes to construct a facility such as a pit toilet in a wilderness area, that structure is to be appropriate to the setting and to comply with the height and clear adjacent space specifications required by the current ABA accessibility guidelines.

The use of service animals is provided for under NPS policy and would be allowed within these eight wilderness areas, except where wildlife sensitivity would necessitate prohibition of service animals. Persons with disabilities requiring the aid of service animals are encouraged to contact the park staff for help in planning their outing.

In the case of the eight wilderness areas, all visitors will be encouraged to enjoy the wilderness areas on their own terms.

Public Use of Motorized and Mechanical Transport

Consistent with the Wilderness Act and NPS and BLM management policies for wilderness management, public use of motorized and mechanical transport, including bicycles and portage wheels, will not be permitted within the eight wilderness areas. At Lake Mead National Recreation Area, some existing approved roads allow vehicle access along the boundary of wilderness areas, but no off-highway vehicle travel is permitted. The *Code of Federal Regulations* states

> *Public use of motorized equipment or any form of mechanical transport will be prohibited in wilderness except as provided for in specific legislation. Operating a motor vehicle or possessing a bicycle in designated wilderness . . . is prohibited [36 CFR 4.30(d)(I)].*

Off-road/Off-highway Vehicle Use

Off-road/off-highway vehicle (OHV) use by the public is not permitted in the wilderness areas. However, illegal OHV use is occurring along several wilderness area boundaries, such as Black Canyon and Nellis Wash. The agencies will continue to monitor the areas for signs of OHV use. Signing the wilderness areas' boundaries should help reduce this illegal use. Wilderness managers will work with Boulder City and other appropriate local officials, as well as other adjacent landowners, to inform OHV users where they can and cannot drive.

Wilderness managers will also increase efforts to educate user groups about the presence of the wilderness areas and identify areas where OHVs are and are not permitted. If necessary, increased ranger patrols will occur to enforce the prohibition on this use. In some areas, access points may need to be closed to eliminate impacts from OHV use.

Special Events

Under NPS *Management Policies 2006* (section 6.4.5) special events are not permitted in wilderness areas if they are inconsistent with wilderness resources and character or if they do not require a wilderness setting to occur. Permits for commercial enterprises or competitive events (e.g., races) are not permitted under both NPS *Management Policies 2006* (6.4.5) and BLM Manual 6340 (section 1.6(C)(4v) and 1.6(C)(13)(d)(iii).

INTERPRETATION AND EDUCATION

Public information is a critical component of any wilderness management program. Education is important for visitors, the public who do not visit the wilderness areas, and agency and partner employees. With regard to wilderness, education and interpretation efforts will focus on the following:

- promoting and perpetuating public awareness and appreciation for wilderness character, resources, and ethics while providing for acceptable use limits
- fostering an understanding of the concept of wilderness that includes respect for the resource and willingness to exercise self-restraint in demanding access to it
- encouraging the public to use and accept wilderness on its own term, recognizing wilderness is an undeveloped, primitive environment and that there are potential

risks and responsibilities involved in using and enjoying wilderness

- fostering public stewardship, Leave No Trace ethics, and minimizing adverse human impacts on wilderness resources and values
- presenting information on wilderness safety

Wilderness character and resources, as well as the above points, will be included in the agencies' interpretation and educational programs and included as an integral element in the park's long-range interpretation plan and annual implementation plan. Appendix I of NPS *Reference Manual 41* provides a description of primary interpretive themes for NPS wilderness areas.

A variety of educational and interpretive outreach approaches may be used to provide visitors and the public with information on the eight wilderness areas and appropriate uses, such as talks and other presentations to user groups and schools, waysides, publications, exhibits in visitor centers, websites, and curriculum-based educational programs. Wilderness information should be provided to boaters and marina visitors. Information can also be provided on safety and Leave No Trace principles when people go into the areas. All education and interpretive efforts will be consistent with the Southern Nevada Interagency Wilderness Education Plan. According to this plan, delivery methods include outreach, entry point, and field-based wilderness education techniques (*Southern Nevada Interagency DRAFT Wilderness Education Plan,* 2007).

Agency-published maps accurately depicting hiking opportunities, applicable regulations, and interpretive information will be produced. Interpretive information will address wilderness character, wilderness ethics, protection of resources (especially avoiding impact on cryptogamic soil crusts, Las Vegas buckwheat, Las Vegas bear poppy, threecorner milkvetch and archeological resources), appropriate recreation (especially directing use to where it is most sustainable), and visitors' acceptance of risk when entering wilderness. Interpretive information may be included on kiosks (at trailheads outside wilderness), websites, or brochures. No interpretive trails will be designated.

Interpretation will be primarily on maps to foster protection of the resource by explaining regulations (including closure of the site to camping).

Staff education is also an important part of the wilderness education effort. Wilderness awareness training will be incorporated into all appropriate training programs, such as orientation training for seasonal and new staff, concession staff, and volunteers. Wilderness training will be a priority for staff with significant work responsibilities within the wilderness area, managing resources, or involving significant time working with the wilderness visitors.

Education may also be used as a tool for addressing wilderness use and management problems, and will generally be applied before more restrictive management actions.

Signs within the Wilderness Areas

Signs detract from wilderness character and make the imprint of people and management more noticeable. Consequently, NPS *Management Policies 2006* (section 6.3.10.4) and BLM Manual 6340 (section 1.6(C)(5)(e), 6(b), and 13(c)(iii)) state that only signs necessary for visitor safety or to protect wilderness resources (e.g., boundary signs) are permitted in wilderness. Signs that provide extensive information, such as natural and cultural history, will not be located within the wilderness area. If needed, signs in the wilderness areas would be the minimum size and number necessary and would be compatible with their surroundings. BLM and NPS signs in the three wilderness areas that are jointly managed will be consistent in their dimensions, appearance, and content.

Agency-led Hikes

Agency-led trips may be permitted when and where appropriate in the wilderness areas to interpret, inform, and educate visitors about wilderness. Agency-led hikes will primarily travel over washes, rock, and routes in order to limit impacts on soils and vegetation. If use levels increase such that visitor encounter standards are exceeded, agency-led hikes will be limited to no more than two per month, and will be alternated between routes. Interpretive hikes will have a maximum group size of 12. All agency-led trips will be subject to the same wilderness character and visitor use managment standards as other groups. If the number of trips increases or resource or visitor experience conditions are determined to be degrading, the agencies will manage more closely how many groups go into the wilderness areas, which wilderness areas the groups visit, and when they go.

WILDERNESS PATROLS, EDUCATION, AND LAW ENFORCEMENT

A visible patrol and education/enforcement program is necessary to ensure all elements of this management plan are successfully implemented. An important aspect of the patrol function is the incorporation of education, research, monitoring, and impact mitigation. Wilderness patrols are predicated on the commitment to protect the resource, educate visitors, guard against illegal activities, provide necessary assistance, and perform search and rescue functions in case of emergency incidents.

In the eight wilderness areas addressed in this plan, patrols will focus primarily on (1) the education of visitors about resource impact issues, minimum impact techniques, and preventative search and rescue, and (2) enforcement of applicable laws and regulations when necessary and appropriate.

Patrols would be conducted within wilderness on foot or via fixed-wing aircraft. Pending NPS superintendent or BLM district manager approval, as appropriate, motorized equipment, including helicopters may be allowed within wilderness when necessary to meet temporary emergencies involving violations of criminal law, including the pursuit of fugitives or operations involving search and rescue.

SCIENTIFIC ACTIVITIES AND RESEARCH

The Wilderness Act, NPS *Management Policies 2006* (section 6.3.6), NPS Director's Order 41, and BLM Manual 6340 (section 1.6(C)(14) provide for and encourage appropriate scientific activities in wilderness when they are consistent with the agencies' responsibilities to preserve and manage wilderness. NPS Director's Order 41 states:

> *"Scientific activities are to be encouraged in wilderness, provided that the benefits of what may be learned outweigh the negative impacts of other wilderness values…The increase of scientific knowledge, even if it serves no immediate management purpose, may be an appropriate wilderness research objective when it does not compromise wilderness resources and character."*

Thus, scientific activities that potentially impact wilderness resources or values, including access, ground disturbance, use of equipment, and animal welfare, may be permitted provided the activities cannot be performed outside of wilderness and the benefits of the gained knowledge outweigh the impacts on wilderness resources or values.

Conducting basic and specific inventory, monitoring, and research is important to wilderness management and to attain the benefits wilderness may provide as a benchmark area. In other words, collecting information about wilderness resources and visitors may be permitted provided the activity is carried out in a manner compatible with the preservation of wilderness character and resources. Researchers will be required to provide a copy of their findings to the National Park Service and Bureau of Land

Management, and data will be collected in a manner consistent with section 4(c) of the Wilderness Act. The Nevada Department of Wildlife may fly over (but not land within) the wilderness for wildlife monitoring without authorization from the National Park Service or Bureau of Land Management.

Scientific research must be conducted in accord with wilderness preservation principles. All scientific activities, including the installation, servicing, removal, and monitoring of research devices, must be evaluated using the minimum requirement concept and include documented compliance that assesses impacts against benefits to wilderness. Applications for research and scientific work in the wilderness area must include a minimum requirements analysis of the project's methodologies. Scientific activities that involve activities or structures prohibited in section 4(c) of the Wilderness Act (e.g., motorized equipment, mechanical transport) may occur in wilderness if several requirements are satisfied (see section 6.3.6.1 in NPS *Management Policies 20*06 and section 1.6(C)(14)(c) in BLM Manual 6340).

Research and monitoring devices may be installed and operated in the eight wilderness areas if both of the following conditions occur:

- The desired information is essential for the administration and preservation of wilderness and cannot be obtained from a location outside wilderness without a significant loss of precision and applicability.
- The proposed device is the minimum requirement necessary to accomplish the research objective , as determined through an appropriate environmental compliance process.

The devices will be removed when it is determined that they are no longer essential. Permanent equipment caches are prohibited in wilderness; temporary caches may be permitted if they satisfy the minimum requirement concept.

COMMERCIAL SERVICES

NPS Lands

Under the Wilderness Act, commercial enterprises are not permitted in wilderness areas with the exceptions of commercial services deemed necessary for realizing the recreational or other wilderness purposes of the area.

Commercial services in wilderness need to pass several tests before they can be authorized on NPS lands. Under the National Parks Omnibus Management Act of 1998 wilderness-oriented commercial services may be authorized if they are "necessary and appropriate." In addition, commercial services must meet the conditions in section 4(d)(6) of the Wilderness Act: "Commercial services may be performed within the wilderness areas designated by this Act to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the areas." The "purposes" referred to are those enumerated in section 4(b): recreational, scenic, scientific, educational, conservation, and historical use.

NPS *Management Policies 2006* (section 6.4.4) further states

> *"Wilderness-oriented commercial services that contribute to public education and visitor enjoyment of wilderness values or provide opportunities for primitive and unconfined types of recreation may be authorized if they meet the "necessary and appropriate" tests of the National Park Service Concessions Management Improvement Act of 1998 and section 4(d)(6) of the Wilderness Act. . .and if they are consistent with the wilderness management objectives contained in the park's wilderness management plan."*

The only commercial services operating in the Lake Mead wilderness areas at the present time are guided hiking and guided desert bighorn sheep hunting.

Appropriate Commercial Services in Lake Mead National Recreation Area Wilderness. With regard to the NPS "necessary and appropriate" test in the National Parks Omnibus Management Act of 1998, commercial guiding must meet all of the following criteria to be considered appropriate:

- Services are consistent with the purposes and values for which the national recreation area and wilderness area were established, as well as with applicable laws, regulations and policies.
- Services are consistent with laws, regulations, and policies.
- Services do not compromise public health, safety, or well-being.
- Services do not result in unacceptable impacts on wilderness resources and values.
- Services do not unduly conflict with other authorized park uses and activities or services outside the national recreation area.
- Services do not monopolize limited recreational activities at the expense of the general public.

The National Park Service has determined that commercial guiding for hiking and for desert bighorn sheep hunting meet the criteria for being appropriate commercial services in the lands it administers in the Lake Mead wilderness.

Proper Activities for Realizing the Recreational or Other Wilderness Purposes of the Area. Both commercial and noncommercial public use must be proper activities in wilderness. Section 4(d)(6) of the Wilderness Act only allows commercial services that are "proper for realizing the recreational or other wilderness purposes of the areas." Proper uses of wilderness are further limited by section 4(c) of the Wilderness Act, which prohibits public use of motor vehicles, other forms of mechanical transport, motorized equipment, and landing of aircraft. NPS policy states that recreational uses in wilderness will be of a nature that

- enables the areas to retain their primeval character and influence
- protects and preserves natural conditions
- leaves the imprint of man's work substantially unnoticeable
- provides outstanding opportunities for solitude or primitive and unconfined types of recreation
- preserves wilderness in an unimpaired condition

Big Game Hunting (Desert Bighorn Sheep)—Hunting is an appropriate activity under the Wilderness Act. Big game hunting guides are a proper option for realizing the recreational benefits of a wilderness dependent hunt. This finding is guided by the park's enabling legislation: Section 5 of Public Law 88-639 states that hunting shall be permitted in the recreation area in accordance with the applicable laws and regulations of the United States and the state of Nevada (for the wilderness areas in this environmental impact statement). Guides can assist sheep hunters have a safe, high-quality once-in-a-lifetime experience in the rugged mountains in the wilderness areas, which they might otherwise find difficult to access and to locate sheep. In addition, some individual hunters may not thoroughly understand animal behavior, seasonal movements of animals, feeding areas, nor possess pack animals, gear, or the skills needed to locate, take, and, once harvested, care for a big game carcass. Thus, desert bighorn sheep guided hunting is a proper and necessary activity in the Lake Mead wilderness areas.

Hiking—Hiking is an appropriate activity under the Wilderness Act—this activity is generally traditionally associated with wilderness, is the most common method of travel in wilderness areas, and is in keeping with the definition and purposes of wilderness. Furthermore, section 6.4.4 of NPS *Management Policies 2006* states that guided services for hiking trips may be appropriate in wilderness.

W.A. Worf (1993) notes generally that guided services are necessary for achieving the public purposes of the Wilderness Act. He states that, "They (guides)… have an important role in setting the example for other visitors…. It is important for … guides to give their clients advance information about what to expect when they visit a Wilderness. They must point out that all visitors are expected to pack in what they need and pack it out when they leave…. Most professional guides… are committed to the wilderness concept and will be setting the example for others to follow."

Determining when the recreational purpose is "realized" for hiking is an exercise in management discretion. This determination depends on balancing the need to realize the recreational purpose with the mandate to prevent the impairment of wilderness character.

Guided hiking in the Lake Mead wilderness areas is recreational in nature, providing visitors with opportunities for relaxation, exercise, photography, enjoyment of the wilderness areas, and getting away from the urban environment. Guided hiking tours also provide an opportunity for people to enter the wilderness area who are not experienced and/or do not have outdoor skills. Some people also are more likely to enter the wilderness areas because they feel safe being with a knowledgeable, trained guide. Without guided hiking, it is probable that many of these visitors would not have an opportunity to recreate in the wilderness areas. Given the ruggedness of the Lake Mead wilderness areas, their remoteness, and other environmental factors (e.g., lack of water), guided hiking is a proper, necessary activity to ensure that visitors have safe, high-quality experiences.

Extent Necessary Determinations. A second requirement under section 4(d)(6) of the Wilderness Act is to determine the minimum amount of commercial service that is necessary to achieve the wilderness purposes. A determination of the minimum extent necessary level of commercial services necessary to achieve wilderness purposes (as well as the allocation of this use) involves science and policy considerations, including mandates of the Wilderness Act and NPS policy, existing and desired resource conditions and visitor experiences in the wilderness, available data on use levels, likely future use levels, and best professional judgment of NPS managers and planners.

Guided Desert Bighorn Sheep Hunting—Bighorn sheep hunting is limited to the number of hunting tags issued for the area by the Nevada Department of Wildlife, which in turn limits how many guides are permitted to operate in the wilderness areas. Big game hunt areas are geographically defined by the state. Units 264–267 cover the Lake Mead wilderness areas in Nevada. Because the number of tags is limited, the number of guides that may operate in the area is also limited. On average, 3 to 5 tags are issued for bighorn sheep hunting in the wilderness areas. On NPS lands the number of tags that are issued will determine the minimum amount of commercial service necessary to achieve the wilderness' purpose—the number of commercial hunters permitted will not exceed the number of tags issued. This number is expected to stay relatively low and, assuming the guides are spread out over the wilderness areas, should not adversely affect the wilderness character of the areas.

Due to the current and anticipated relatively low number of visitors in the eight wilderness areas, there is no need to limit the number of noncommercial or commercial visitors in the areas, nor is there a need to allocate between commercial and private use. Thus, there is no need at this time to quantify the minimum number of guided hiking services necessary to achieve wilderness purposes. But as noted in chapter 3, the National Park Service and Bureau of Land Management would continue to monitor the wilderness character / visitor use management indicators and measures to ensure wilderness character is maintained and protected. If monitoring determines that conditions are changing, user capacity is close to or being exceeded, and unacceptable impacts on wilderness character are likely to occur, the agencies would reevaluate this

extent necessary determination. If appropriate, commercial use limits may be considered at that time.

BLM Lands

BLM Manual 6340, section 1.6(C)(4)(a) states

> *Commercial services are allowed to the extent necessary for realizing these wilderness purposes* [in section 4(d)(6) of the Wilderness Act]. *Allowable commercial services may include those provided by packers, outfitters, and guides, and may also include commercial filming. . .or restoration stewardship contracts.*

Commercial guiding services will be permitted on the BLM managed portions of these wilderness areas for: (1) big game hunting (within an area open to hunting). A report of visitor use days within wilderness will be required of permittees for each calendar year.

- Permits may be issued for big game hunting guides and are limited by the availability and number of hunting tags issued by the Nevada Department of Wildlife for a particular hunt unit. The number of annual guided big game hunt permits has not been defined but is limited to one tour per day and only during hunting season in areas where hunting is allowed. The number of commercial big game hunting guides permitted will not exceed the number of tags issued by the Nevada Department of Wildlife for hunt units that overlap the wilderness areas described in this plan.
- Permits may be issued for academic organizations for educational use in wilderness and would be evaluated on a case-by-case basis. Stipulations may include group size limits, camping outside wilderness, seasonal restrictions, and/or collection limits.
- Permits may be issued for organizations whose primary purpose supports people with disabilities. If use levels increase so that visitor encounter standards are exceeded, these permits will be limited to no more than two per month within the wilderness.

All commercial services will be permitted through the appropriate permitting regulations, such as a BLM Special Recreation Permit (SRP) and subject to SRP stipulations. Regulations for guides and outfitters will be in conformance with the Wilderness Act and the Clark County Conservation of Public Land and Natural Resources Act (2002). Limits on the number of commercial guides may be implemented if monitoring identifies excessive impacts on wilderness character or resources.

General Management of Commercial Services in Wilderness

Commercial use authorization permits are required of all businesses, groups, organizations, or individuals that provide guided trips or services for hire, compensation, or reimbursement within Lake Mead National Recreation Area. The Bureau of Land Management issues special recreation permits for these uses on their lands.

The use of permanent equipment and supply caches by commercial operators is prohibited within wilderness. Commercial operators also must adhere to the minimum requirement concept in all aspects of their activities in wilderness.

All guides operating in the wilderness areas will receive information from the agencies regarding wilderness character and wilderness ethics, including Leave No Trace practices, to provide to clients.

To ensure that wilderness character is not being adversely affecting by guides, the National Park Service and Bureau of Land Management will monitor the guided operations, using the indicators and measures described in the management zones and wilderness character monitoring and visitor use management sections in chapter 3.

MINERAL DEVELOPMENT

All NPS and BLM lands in the wilderness areas are closed to the location of new mining claims. There are existing mining claims on BLM lands in the Ireteba Peaks Wilderness. Should they be determined to be valid locations under the mining laws, they would be managed under a separate plan of operations in a manner that does not cause unnecessary or undue degradation of the wilderness lands.

ADMINISTRATION/OPERATIONS

Emergency Services

Protecting human health and safety is a priority for wilderness managers. Although wilderness is to be experienced on its own terms with inherent risks and challenges, agency staff will continue to provide emergency services for all visitors. During emergency incidents, consideration will be given to protecting wilderness resources. While hazard mitigation may be required, under no circumstances will pure convenience dictate the destruction of any wilderness resources. Leave No Trace minimum impact techniques will be incorporated into incident action plans and used whenever possible to lessen impacts on wilderness resources during emergency operations.

NPS *Management Policies 2006* (section 6.3.5) and the BLM Manual 6340 (section 1.6(B) provide for the administrative use of motorized equipment or mechanical transport, including helicopters, in emergencies involving human health and safety. For the purposes of this plan, emergencies include the following:

- response to those in need of medical or physical assistance when threats to human health and safety are reasonably assumed
- response to those who are determined to be unjustifiably overdue and threats to human health and safety are reasonably assumed
- any response to downed aircraft
- any response to an "unknown emergency" (e.g., mirror flash, second-hand visitor report, radio distress signal)
- any reported disaster
- special law enforcement operations when threats to human health and safety are reasonably assumed
- responses to wildland fires that threaten life, property, cultural or natural resources

In an emergency, temporary radio repeaters may be installed in the wilderness areas, provided they meet the minimum requirement process criteria.

Administrative Use of Motorized and Mechanized Equipment and General Maintenance Activities

Administrative use of motorized or mechanized equipment must meet the requirements identified in the Minimum Requirement Decision Process (see appendixes B and C). Use of motorized or mechanized equipment for administrative purposes can only occur when this use has been determined to be the least intrusive method on wilderness character and values.

Following completion of this plan, maintenance projects in the wilderness will be categorized with appropriate minimum tools for each type of project. Thus, the minimum tool process will not have to be applied to each individual project.

Use of Native Materials

In keeping with wilderness character, local natural materials are preferred for the repair or construction of wilderness facilities (e.g., water bars, campsites) or to restore desired conditions to impacted areas. Any proposed rehabilitation or construction will need to go through the environmental screening process, including the completion of the minimum

requirement analysis, and be approved by the agency managers.

Administrative Facilities

As stated in NPS *Management Policies 2006* (section 6.3.10), and BLM Manual 6340 (section 41), administrative facilities (e.g., radio repeater sites, storage or support structures), will not be built in wilderness areas unless they are essential to meet the minimum requirements for the administration of the wilderness area. Permanent storage caches are prohibited in wilderness unless necessary for health and safety purposes or when they are determined to be necessary through a minimum requirements analysis.

No administrative facilities are present in the wilderness areas, and none are foreseen as being needed to administer the wilderness areas. However, if such a facility is determined to be necessary in the future, it must meet the following requirement: "A decision to construct, maintain, or remove an administrative facility will be based primarily on whether or not the facility is required to preserve wilderness character or values, not on considerations of administrative convenience, economic effect, or convenience to the public or . . .staff" (NPS *Management Policies 2006*, section 6.3.10).

Aircraft Overflights

In 2005, the National Park Service prepared an aerial operations plan, which provided interim guidance for administrative aircraft overflights and landings within wilderness areas in Lake Mead National Recreation Area. All of the actions in the preferred alternative of that plan, identified in the 2005 Finding of No Significant Impact, will continue to be followed. Appropriate uses of overflights for NPS and cooperating agency operations include wildfire monitoring, emergency and safety services, and limited wildlife monitoring where such flights are determined to be the minimum tool. Specifically, the following actions will continue:

- Fixed-wing aerial patrols (2 flights per week/maximum 104 flights per year, excluding emergencies)
- Wildlife surveys, monitoring, and removal, including
  - burro and horse management activities
  - desert bighorn sheep management activities
  - native fish monitoring
  - raptor surveys
  - Nevada Department of Wildlife monitoring flights
- Other resource management activities that occur in remote locations of the national recreation area, with no road access, and require the use of helicopters to haul equipment to and from the project site (e.g., spring restoration, tamarisk removal, native plant replanting, and mine closures and restoration)

Boundary Identification

With the recent completion of legal descriptions of the wilderness areas, a priority will be signing the boundaries. The wilderness boundaries will be identified by fiberglass wilderness signs at key locations. Signs will not be located to identify the boundary between NPS and BLM lands within the wilderness areas. Wilderness boundary signs at entry points may be larger, aesthetically pleasing signs that include the name of the wilderness.

Monitoring of Wilderness Character

This plan has combined the wilderness character monitoring and visitor use management frameworks to streamline monitoring efforts for wilderness (see chapter 3 section on wilderness character monitoring and visitor use management). See table 6 for indicators, measures, standards,

related monitoring, and potential future management strategies that would be implemented as a result of this planning effort. These measures and standards help translate the broader qualitative descriptions of desired conditions into measurable conditions.

The 1964 Wilderness Act, NPS *Management Policies 2006*, and the BLM Manual 6340 require the monitoring of conditions and long-term trends in wilderness character.

Wilderness Management Coordination

Continued close coordination between the National Park Service and the Bureau of Land Management is important for the successful management of the three shared wilderness areas. Regular meetings will be held between the coordinators to ensure effective and efficient management of the areas; resolve issues, concerns, and conflicts that arise; and address opportunities to protect wilderness resources and provide for visitor enjoyment of the areas.

General coordination also will be done for the five areas that are exclusively located within the national recreation area.

Chapter Three:
Management Alternatives

INTRODUCTION

This chapter presents three alternatives, including the agencies' preferred alternative, for management of the eight wilderness areas within and adjacent to Lake Mead National Recreation Area, administered by the recreation area and Bureau of Land Management Southern Nevada District Office. The three alternatives embody the range of management options that the public and agency staff want to see regarding the wilderness areas. The alternatives primarily focus on different ways to provide visitor access into and within the wilderness areas and to manage visitor use. Alternative A, the no-action alternative, presents a continuation of current management direction and is included as a baseline for comparing the consequences of implementing each alternative. Alternative B is the agencies' preferred alternative for the eight wilderness areas. Alternative C presents slightly different ways to manage visitor use in the areas. All of the alternatives are consistent with laws and NPS and BLM policies governing wilderness.

As noted in the "Foundation for Planning and Management" section of chapter 1, the National Park Service and Bureau of Land Management would continue to follow relevant laws and policies, special mandates, and administrative commitments that pertain to management of the wilderness areas regardless of which alternative in this wilderness management plan / environmental impact statement is selected for implementation. These special mandates, laws, and policies are not repeated here. Likewise, the wilderness management directions and policies described in chapter 2 also are not repeated here.

Before describing the alternatives, this chapter explains how the alternatives were developed and how the preferred alternative was identified. Other sections describe the management zones (a key element of the alternatives) and the approaches taken to address visitor use management. After the alternatives are described, mitigative measures that would be used to reduce or avoid impacts are listed and the environmentally preferable alternative is identified. At the end of the chapter there are tables that summarize the key differences among the alternatives, and the differences in impacts that would be expected from implementing each alternative based on the analysis in "Chapter 5: Environmental Consequences."

FORMULATION OF THE ALTERNATIVES

The alternatives included in this chapter were developed by an interdisciplinary team with members from both the National Park Service and the Bureau of Land Management. The two action alternatives were based on issues and concerns identified by the public and NPS and BLM staff during the scoping period (see the "Scope of the Plan" section in chapter 1). The alternatives also were based on ensuring protection of the areas' wilderness character, providing opportunities for visitor access and use of the wilderness areas, including access to key attractions, and on relevant demographic trends in the region.

The alternatives in the 2010 environmental assessment were modified to address issues regarding the use of traditional cultural properties and the use of fixed climbing anchors in NPS wilderness areas. Rock-climbing management options were identified and then public input was sought on the options. The rock-climbing options were then integrated with the three alternatives.

Each alternative in this environmental impact statement is intended to effectively and efficiently manage the wilderness areas and address issues. All of the alternatives seek to balance protection of wilderness qualities with visitor opportunities: they all were developed to be functional and viable. However, the alternatives vary in their focus with regard to opportunities for visitor experiences in the wilderness areas and for facilities within and adjacent to the wilderness areas.

The implementation of any alternative depends on future funding and environmental compliance. This plan does not guarantee that funding will be forthcoming. The plan establishes a vision of the future that would guide day-to-day and year-to-year management of the wilderness areas, but full implementation could take many years.

IDENTIFICATION OF THE AGENCIES' PREFERRED ALTERNATIVE

The preferred alternative was developed through a process called "Choosing by Advantages" (CBA). Using this process, the planning team identified and compared the relative advantages of each alternative according to a set of factors. The benefits or advantages of each alternative were compared for each of the following CBA factors:

- protection of wilderness character
- protection of natural resources
- protection of cultural resources
- improvement of the visitor experience
- improvement of agency operations

The planning team examined each wilderness area, identifying advantages regarding each of the above factors. Each alternative was then ranked based on the advantages. The planning team determined that alternative B gives the National Park Service and Bureau of Land Management the greatest overall benefits based on the factors listed above.

Actions to address climbing were developed with input from the public and guidance from NPS Director's Order 41. The actions are the same for both action alternatives and are consistent with policy.

MANAGEMENT ZONES

Management zones apply to different areas of the wilderness areas and consist of descriptions of the desired conditions for natural and cultural resources, visitor experiences, and facilities in those different areas. Together, they identify the widest range of potential resource conditions, visitor experiences, and facilities for the wilderness areas. Zoning in wilderness is an accepted management approach that is used to help maintain diversity and enhance protection of wilderness as well as improve the quality of wilderness experiences (Haas et al. 1987).

Two potential management zones were identified for the eight wilderness areas. These management zones are described in table 3. Both of these management zones would be managed to preserve wilderness character—the zones do not differ in maintaining wilderness character or in reducing the protection that would be afforded to wilderness lands in the zones. However, zone 1 would receive relatively more use than zone 2 and therefore would be more closely monitored to ensure wilderness character is not adversely affected.

In formulating the two action alternatives, the management zones were placed in different locations or configurations on a map of the wilderness areas. The management actions described later in this chapter are consistent with these two management zones.

NPS *Management Policies 2006* (section 6.3.4.2) requires wilderness management

plans to establish indicators, standards, conditions and thresholds "beyond which management actions will be taken to reduce human impacts on wilderness resources." Likewise, BLM Manual 6340 requires the monitoring of conditions and long-term trends in wilderness character.

Visitor Use Management

This plan has combined the wilderness character monitoring and visitor use management frameworks (see section below) to streamline monitoring efforts for wilderness. See table 6 for indicators, measures, standards, related monitoring, and potential future management strategies that would be implemented as a result of this planning effort. These measures and standards help translate the broader qualitative descriptions of desired conditions into measurable conditions.

The National Park Service defines visitor use management as the proactive and adaptive process of planning for and managing characteristics of visitor use and the physical, social, and managerial setting through a variety of strategies and tools to sustain desired resource conditions and visitor experiences. Visitor use characteristics may include amount, type, timing, and distribution of visitor use, including activities and behaviors. In short, visitor use management strives to maximize the benefits of visitor use while meeting resource and experiential protection goals. This planning and management process provides the framework within which visitor capacity should be addressed, when it is necessary. As part of the visitor use management process, visitor capacity is the maximum amount and type of visitor use that an area can accommodate while sustaining desired resource conditions and visitor experiences consistent with the values for which the area was established.

TABLE 3: POTENTIAL MANAGEMENT ZONES FOR LAKE MEAD NATIONAL RECREATION AREA / BLM WILDERNESS AREAS

TOPIC	ZONE 1	ZONE 2
Concept	▪ Largely natural, unmodified landscape, with natural processes predominating; natural ecological functions, components, and processes would not be influenced by human use except for a few minimal modifications in localized areas. ▪ Provides a diversity of opportunity for wilderness activities that are relatively accessible to day users and to those who have limited wilderness travel skills or equipment.	▪ Essentially an untouched environment appearing to have been affected primarily by the forces of nature; natural ecological functions, components, and processes would be minimally influenced by human use. ▪ Provides opportunities for wilderness activities suitable for day users and overnight users in areas that are remote and require self-reliance; high amount of outdoor skill needed.

TABLE 3: POTENTIAL MANAGEMENT ZONES FOR LAKE MEAD NATIONAL RECREATION AREA / BLM WILDERNESS AREAS

TOPIC	ZONE 1	ZONE 2
Natural Resource Conditions	▪ The areas would appear to be largely undisturbed, with natural processes and surroundings predominating. ▪ Tolerance for degradation of natural resources and processes due to use would be low. ▪ Some resources may be manipulated along travel routes to direct visitors and avoid resource impacts, but they would be subtle and harmonize with the natural environment; the natural setting may be modified for visitor access but in ways that protect resources and have minimal visual impact. ▪ Management decisions would support healthy, viable, and naturally distributed wildlife and plant populations. ▪ Some natural resources and processes may be altered to preserve/maintain significant cultural resources, but such changes would be kept to the minimum extent possible.	▪ The areas would generally appear to have been primarily affected by the forces of nature. ▪ Tolerance for degradation of natural resources and processes due to human use would be very low. ▪ A few resources may be slightly manipulated along travel routes to direct visitors and avoid resource impacts, but they would be subtle and harmonize with the natural environment; the natural setting would not be modified for visitor access. ▪ Management decisions would support healthy, viable, and naturally distributed wildlife and plant populations. ▪ Some natural resources and processes may be altered to preserve/maintain significant cultural resources, but such changes would be kept to the minimum extent possible.
Natural Resource Restoration	▪ Resources may be altered or manipulated if necessary to restore areas that have been disturbed or impacted by people or nonnative species.	▪ Resources may be altered or manipulated if necessary to restore areas that have been disturbed or impacted by people or nonnative species.
Cultural Resources	▪ Cultural resources would be documented and protected. ▪ Treatment methods would be consistent with the preservation of wilderness character and values.	▪ Cultural resources would be documented and protected. ▪ Treatment methods would be consistent with the preservation of wilderness character and values.
Stock Use (Pack and Saddle) and Recreational Riding	▪ Recreational riding and public use of stock for noncommercial use would be permitted on designated washes.	▪ Recreational riding and public use of stock for noncommercial use would be permitted on designated washes.

TABLE 3: POTENTIAL MANAGEMENT ZONES FOR LAKE MEAD NATIONAL RECREATION AREA / BLM WILDERNESS AREAS

TOPIC	ZONE 1	ZONE 2
Visitor Use and Experience	▪ There would be opportunities to experience solitude and quiet; visitors would feel apart from other people, but not entirely alone; some sights and sounds of human activity would be present and the areas would feel less remote than zone 2. ▪ Visitors would often not see or hear other visitors; the probability of encountering other people, including large groups, would be low throughout the year. ▪ Use of on-site management and site modification may be evident. ▪ Visitor contacts by agency staff would be rare.	▪ There would be an opportunity of feeling being alone in a remote area with few if any sights and sounds of human activity; visitors could have a sense of being immersed in a totally natural landscape. ▪ The probability of encountering other people would be very low throughout the year; visitors would rarely see or hear other visitors; visitors would not usually expect to encounter any other groups. ▪ Direct on-site management of visitors would not be practiced (unless required to reduce degradation); there would be little or no evidence of site management. ▪ Visitor contacts by agency staff would be very rare.
Party (Group) Size	▪ Group sizes would be limited to 12 or fewer people; groups larger than 12 would be divided.	▪ Group sizes would be limited to 12 or fewer people; groups larger than 12 would be divided.
Designated Routes (Cairns); Route Standards; Designated Trails	▪ If designated routes are established to provide recreation opportunities and to prevent resource damage, they would be narrow and unpaved; new designated routes would generally follow user-created trails where appropriate. ▪ Designated routes would be identified with cairns. ▪ Designated trails would not be built unless necessary for resource protection or for providing appropriate use. Trails would meet trail standards.	▪ There would be no designated routes unless required to prevent/reduce resource degradation. ▪ Designated routes would be defined and marked with agency-identifiable cairns if necessary to prevent resource damage. ▪ Designated trails would not be built in zone 2.
Signs	▪ Signs may be provided for resource protection and visitor safety purposes; no interpretive or orientation signs (other than at boundary of the wilderness).	▪ No signs provided.

TABLE 3: POTENTIAL MANAGEMENT ZONES FOR LAKE MEAD NATIONAL RECREATION AREA / BLM WILDERNESS AREAS

TOPIC	ZONE 1	ZONE 2
Campsites	▪ No campsites would be designated unless necessary for resource protection. ▪ Dispersed camping would be permitted on durable surfaces; visitors would rarely see previously used sites. ▪ Campfires would be permitted if conditions allow, although stoves would be encouraged; all fire rings would be removed when discovered. ▪ Leave No Trace ethics would be promoted.	▪ No campsites would be designated unless necessary for resource protection. ▪ Dispersed camping would be permitted on durable surfaces; visitors would rarely see previously used sites. ▪ Campfires would be permitted if conditions allow, although stoves would be encouraged; all fire rings would be removed when discovered. ▪ Leave No Trace ethics would be promoted.
Commercial Services (guides and outfitters)	▪ Subject to the commercial use permitting authorization process, big game hunting services would be permitted.	▪ Subject to the commercial use permitting authorization process, big game hunting services would be permitted.
Administrative Access	▪ Use of aircraft – see aerial operations plan and fire management plan.	▪ Use of aircraft – see aerial operations plan and fire management plan.
Administrative Facilities and Structures	▪ Limited administrative facilities may be maintained if they are needed for management of the wilderness area or for parkwide or field areawide management (e.g., radio repeaters, weather stations) per a minimum requirement analysis; any necessary facilities would be temporary and located where rarely viewed by visitors.	▪ There would be no new administrative facilities with the possible exceptions of research equipment and monitoring devices per a minimum requirement analysis.

ALTERNATIVE A (NO ACTION)

CONCEPT AND SUMMARY

Alternative A provides a baseline for evaluating changes and impacts in the other alternatives. In this alternative, the no-action alternative, the National Park Service and Bureau of Land Management would continue to provide minimal management of the eight wilderness areas as has been the case since the wilderness areas were established in 2002. For the foreseeable future, there would be no major change in the management of the wilderness areas. NPS and BLM managers would continue to strive to protect and maintain current natural and cultural resource conditions in the areas and provide for high-quality visitor experiences.

Existing visitor uses (e.g., hiking, rock climbing) would continue. Dispersed access into the areas would continue. The agencies would not change access to or within the wilderness areas, or current efforts in educating visitors and the public about the areas. One existing trail that enters the Pinto Valley Wilderness—the Redstone Dune Trail—would continue to be maintained. No cairns that mark routes would be maintained. Existing access points at Pinto Valley (e.g., Redstone picnic area), Spirit Mountain (Pipe Spring Road trailhead), and Bridge Canyon (the parking area at Sacatone Wash and Christmas Tree Pass Road and the Grapevine Canyon trailhead) would continue to be maintained. Existing signs on the wilderness boundary and within the wilderness areas would be maintained. There would continue to be little effort expended by the agencies on orienting, interpreting, informing, and educating visitors and the public about the wilderness areas.

Natural and cultural resource management efforts would continue as they are, without substantial changes. Natural resource efforts would continue to focus on resource protection and the restoration of noticeably disturbed areas and on inventorying and monitoring. No actions would be taken with regard to user-created trails, such as the user-created route at the end of Approved Road 59 in the Black Canyon, unless sensitive resources were being adversely affected. Cultural resource management efforts also would continue to focus on surveying and monitoring cultural resources and protecting historic structures. Natural and cultural resources would continue to be managed under existing approved plans (e.g., fire management plan, the Clark County *Multiple Species Habitat Conservation Plan*, *Las Vegas Resource Management Plan)*. As appropriate, archeological surveys or monitoring would precede any ground disturbance associated with excavation or construction, and national register-eligible or national register-listed archeological resources would be avoided to the greatest extent possible. To appropriately preserve and protect national register-listed or national register-eligible historic structures, all stabilization, preservation, and rehabilitation efforts, as well as daily, cyclical, and seasonal maintenance, would be undertaken in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995).

MANAGEMENT ZONING

Currently, there are management zones existing in the NPS portions of the wilderness areas. These zones that describe future desired resource and visitor experience conditions have not been applied to the wilderness areas. Thus, under the no-action alternative, there would be no new management zoning that would provide guidance for management of the areas.

VISITOR USE MANAGEMENT

In this alternative, NPS and BLM managers would continue managing visitors as they have in the past, relying on approved plans. The agencies would continue to respond to visitor use management issues on a case-by-case basis. No major new initiatives would be pursued to manage visitor use or establish a wilderness character monitoring and visitor use management approach (i.e., monitoring measures to ensure standards are not exceeded).

There would continue to be no limit on the size of groups entering the wilderness areas.

CLIMBING, MOUNTAINEERING, AND CANYONEERING

Under alternative A climbing and bouldering would continue to be permitted throughout all the wilderness areas, as provided for under the Wilderness Act and NPS and BLM management policies. No new actions would be taken by the agencies under this alternative to manage climbing and bouldering in the wilderness areas. However, as stated in the beginning of this chapter for all visitor uses, climbing would be managed as appropriate to ensure wilderness character is maintained. Wilderness character and wilderness resources would be dominant in all management decisions where a choice must be made between preservation of wilderness character and climbing or bouldering. See also the overall climbing management directions in chapter 2.

VOLUNTEER WILDERNESS STEWARDSHIP PROGRAM

Although some volunteers may occasionally assist agency managers in their work in the wilderness areas, in this alternative there would be no formal wilderness stewardship program.

COLLECTION OF NATURAL RESOURCES

In the wilderness areas managed solely by the National Park Service, collection of natural resources, including wildlife, plants, rocks, or fossils (including petrified wood), would continue to be prohibited without a valid scientific research and collecting permit.

In the portions of the three wilderness areas managed by the Bureau of Land Management (the Eldorado, Ireteba Peaks, and Spirit Mountain wilderness areas), the collection of natural resources, including plants and rocks, for noncommercial purposes would continue to be allowed.

PETS IN WILDERNESS AREAS

Under alternative A dogs and other pets would continue to be permitted in the wilderness areas. Pets on NPS lands are required to be on a leash.

ALTERNATIVE B (PREFERRED ALTERNATIVE)

CONCEPT AND SUMMARY

Alternative B is the National Park Service's and Bureau of Land Management's preferred alternative for managing the eight wilderness areas. In this alternative, the emphasis would be on preserving wilderness character while providing a few more opportunities for visitors to access some of the wilderness areas as compared to alternative A. The agencies would provide a variety of opportunities for appropriate wilderness activities, including provisions for both day users and overnight users, and for those who have limited wilderness skills as well as those who are experienced and self-reliant. Additional efforts would be made to inform and educate both visitors and the public about the presence of the wilderness areas and the opportunities that are available, as well as appropriate behaviors and uses in these areas. All signs, kiosks, and information would be provided close to or at the boundary of the wilderness areas. Dispersed use would continue to be encouraged, while the establishment of a few designated routes would concentrate use in some areas.

Access to the wilderness areas would be improved primarily through the improvement of access points at various locations. These access points would be very basic and limited in extent, and would generally consist of a small vehicle-parking area, informational kiosk, and/or signs.

In this alternative, the Black Canyon Wilderness would receive additional NPS attention because it is close to Boulder City and receives relatively high OHV use and other inappropriate uses, resulting in wilderness values being lost. More proactive management also would be given to the Pinto Valley, Spirit Mountain, and Bridge Canyon wilderness areas to ensure their values are protected and unacceptable impacts do not occur.

As in all of the alternatives, NPS and BLM managers would continue to strive to protect and maintain current natural and cultural resource conditions in the wilderness areas. Natural and cultural resource management would primarily focus on restoration of disturbed areas, long-term inventory and monitoring, and mitigation where appropriate.

MANAGEMENT ZONING

Under alternative B, the potential management zones would be applied to the eight wilderness areas (see figures 3–6). Most of the wilderness area would be included in zone 2. Higher use areas, or potentially popular use areas with improved access, would be included in zone 1; these areas would include Cleopatra Wash in Jimbilnan, the route to Hamblin Mountain in Pinto Valley, the northwestern side of Black Canyon closest to Boulder City, the route from Oak Creek Canyon to Lonesome Wash in Eldorado, the route from Christmas Tree Pass to the top of Spirit Mountain, and the eastern end of Grapevine Canyon in Bridge Canyon.

VISITOR USE MANAGMENT

As described in the management zones and in this chapter, NPS and BLM staff would monitor wilderness character and visitor use management measures, evaluate current conditions against standards, and take appropriate steps to ensure the protection of wilderness character, including opportunities for solitude and primitive and unconfined types of recreation in wilderness. See table 6 for the wilderness character and visitor use management indicators, measures, standards, and management strategies that would be employed under this alternative.

Group Size Limits

To avoid impacts on opportunities for solitude and resources, all groups using the wilderness areas, including hikers, researchers, tour groups, etc., would be limited to no more than 12 people per group, including the leader of the group. Agency-led hikes (including hikes led by groups that partner with the agency) also would be limited to 12 people per group. (Group size limits are often used in wilderness areas to reduce environmental impacts and conflicts between groups. In federal wilderness areas the most common group size for people is 10, with a median of 12 people, in areas that limit group sizes (Dawson and Hendee 2009).

CLIMBING, MOUNTAINEERING, AND CANYONEERING

In alternative B climbing and bouldering would continue to be permitted in all wilderness areas, and would be managed as described in the overall climbing management directions in chapter 2. In addition, in this alternative the use and replacement of fixed anchors and equipment would be managed in certain climbing areas (see the discussion of Spirit Mountain and Bridge Canyon wilderness areas).

Areas close to sensitive resources, such as bird nesting areas, would be closed to climbing or scrambling during nesting periods. For occupied raptor nests, rock climbing would be prohibited up to 0.5 mile from the nest sites. Use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would be prohibited. Climbing, scrambling, or walking on rock art surfaces would be prohibited.

VOLUNTEER WILDERNESS STEWARDSHIP PROGRAM

The Bureau of Land Management and National Park Service, in cooperation with the other federal land management agencies, and with start-up support from the Southern Nevada Agency Partnership, would establish a wilderness stewardship program. This program would be intended to enhance the capacity of the two agencies and create a sense of ownership on the part of the public, as well as aid in the implementation of this plan. The wilderness stewardship program would train volunteers with an interest in wilderness management to assist the agencies in the monitoring and implementation of certain actions outlined in the wilderness management plan. Volunteer wilderness stewards would be trained to monitor cultural and natural resources and visitor use in the areas, as well as help complete resource condition assessments, minor route work, nonnative plant surveys, wildlife observations, sign monitoring and sign installation.

Volunteers would be selected for specific tasks and trained to fully carry out the requested work. They would have an electronic reporting protocol to submit their findings following each of their field visits.

COLLECTION OF NATURAL RESOURCES

In the wilderness areas managed solely by the National Park Service, collection of natural resources, including wildlife, plants, rocks, or fossils (including petrified wood), would continue to be prohibited without a valid scientific research and collecting permit.

In the portions of the three wilderness areas managed by the Bureau of Land Management (the Eldorado, Ireteba Peaks, and Spirit Mountain wilderness areas), the collection of natural resources, including plants and rocks, for noncommercial purposes would continue to be allowed.

PETS IN WILDERNESS AREAS

Specific to these wilderness areas, pets can intimidate and harass two important wildlife species—the desert bighorn sheep and the

desert tortoise. With the exception of dogs under voice control that are used in support of hunting, pets would be required to be under leash control at all times in wilderness areas according to the requirements of 36 CFR 2.15 – Pets.

NEW DESIGNATED ROUTES

Several new routes would be designated in alternative B (see table 4). A total of approximately 23 miles of routes would be designated in the wilderness areas. Rock cairns marking routes would be maintained. Otherwise the routes would not be maintained. For the route through Boy Scout Canyon occasional fixed anchors would remain in place.

TABLE 4. PROPOSED DESIGNATED ROUTES IN ALTERNATIVE B.

Route	Wilderness Area	Length (miles)
Pinto Valley (former road)	Pinto Valley	3.9
Cottonwood/ Pinto Valley	Pinto Valley	5.9
Boy Scout Canyon/Hot Springs Route	Black Canyon	3.5
Hamblin Mountain Route	Pinto Valley	1.4
Lower Grapevine Canyon (old Approved Road 13)	Bridge Canyon	2.0
Oak Creek/ Lonesome Wash Route	Eldorado	6.7
TOTAL		23.4

MANAGEMENT OF SPECIFIC AREAS

Jimbilnan Wilderness

No new visitor facilities would be provided in the wilderness area under alternative B. Self-discovery and self-reliance would continue to be encouraged for visitors going into this area. However, to provide visitors with information regarding the area (as well as Pinto Valley) a kiosk and information sign would be installed outside the wilderness area at the intersection of Northshore Road and Boathouse Cove Road (Approved Road 97). The kiosk would provide information on Cleopatra Wash, Cathedral Canyon, and Mangonese Wash.

The Boathouse Cove Road that forms the border of the wilderness area receives very little use. It is an extremely rugged road and requires use of a 4x4 vehicle as it travels through an active drainage area. This road is outside the wilderness area and contains designated camping areas.

Pinto Valley Wilderness

Pinto Valley is one of the most accessible and popular of the eight wilderness areas. In this alternative, several actions would be taken to provide more opportunities for use of the area, while also protecting the area from resource damage. The Redstone picnic area currently can be used as an access point to the wilderness area. Two additional access points would be established off the Northshore Road. At milepost 18.2, an information sign about Pinto Valley, including directions to Hamblin Peak, would be provided at the pull off. An information sign also would be provided at milepost 25.5.

Under this alternative, the existing Redstone Dune Trail would continue to be maintained. In addition, the former Pinto Valley road, from mile post 25.5 to the head of Boulder Wash, would be established as a stock/hiker route, providing horseback riders an opportunity to travel into the wilderness area. The old road from milepost 18.2 to the head of Boulder Wash would be converted into a hiking route. The footprint of the road would be made smaller to trail width, with the rest of the area restored to native vegetation.

To prevent resource damage from user-created trails, a designated route up Hamblin Peak would be established with cairns in areas

where the route is unclear, while all other unofficial routes would be removed and the landscape restored. Visitors would be directed to walk along the wash from milepost 18.2 to Cottonwood Spring and then follow the cairned route up the peak. A loop option also could be provided.

An old mine site in the Pinto Valley area shows signs of human use. An evaluation of the mine is needed to determine if it is eligible for listing in the National Register of Historic Places. If the mine is not determined to be historically significant, the old mine site would be restored to natural conditions. If the mine is found to be eligible for listing, NPS managers would consult with the Nevada State Historic Preservation Office on the appropriate action to take.

Black Canyon Wilderness

Several actions would be taken under alternative B to address the inappropriate uses and resource impacts that have occurred in this area, particularly in Boy Scout Canyon. To inform and educate visitors about the wilderness status of this area, information signs would be placed on Boy Scout Canyon Road (Approved Road 59) and all other roads that provide access to the Black Canyon Wilderness. National Park Service staff would work with Boulder City staff to place information signs on adjacent Boulder City lands to help reduce illegal OHV use of the area.

To formalize and better manage access into Boy Scout Canyon, an access point with information signs would be established off Boy Scout Canyon Road, outside of the wilderness area, where visitors start hiking on the route to the head of the Boy Scout Canyon. Another trailhead would be established at the end of North Boy Scout Canyon (Approved Road 75D), which is an alternate route to Boy Scout Canyon via an unnamed wash. Both access points would provide information on appropriate uses of wilderness areas, including Leave No Trace practices, to help avoid and minimize impacts at the hot springs—the primary destination of visitors.

In Boy Scout Canyon, from the end of Boy Scout Canyon Road to the river, there are old signs and fixed anchors for rappelling into the canyon that were used in the past to assist access. The fixed anchors would be left in place. The old signs would be removed to restore the wilderness character.

A sign also would be placed at the Canyon Point Road overlook, which provides a view into the wilderness area. This area also has had a trash problem in the past. It is hoped that the sign would help prevent this problem in the future.

Eldorado Wilderness

Additional access and information about the area would be provided by managers under this alternative. Two actions would be taken in this regard:

- An access point with an information kiosk would be developed off Nevada State Route 165, leading into the wilderness area. The kiosk would provide information on a designated route that follows Oak Creek Canyon and Lonesome Wash.
- Another access point with information signs would be established at the end of Yucca Camp Road (Approved Road 51).

Ireteba Peaks Wilderness

Ireteba Peaks is probably the most remote and isolated of the eight wilderness areas. Access into this area is challenging for both visitors and managers. The intent of alternative B is for this area to continue providing opportunities for visitors seeking high-quality solitude and primitive recreation experiences. Consequently, no actions would be taken to improve visitor access into this area.

The Tule Spring area has received relatively heavy past use and has some user-created campsites. Restoration work would be done in this area to restore the wilderness character.

Nellis Wash Wilderness

Nellis Wash is an area that NPS managers do not have much data on. The area does not have prominent features or destinations that would draw people in. On the other hand, there are excellent opportunities for those seeking solitude. Consequently, under alternative B, NPS managers would continue to provide minimal management of this area, primarily focusing on restoration work, including work associated with the impacts of off-highway vehicles, as needed. Access into the area would not be encouraged or discouraged.

Spirit Mountain Wilderness

Spirit Mountain is a popular destination that is receiving relatively high visitation and, as a result, more impacts than the other wilderness areas. The area probably will receive increasing use in the future. Consequently, more proactive management is needed in this area to ensure that wilderness values are protected and to meet the needs of both visitors and the tribes who recognize this as a sacred area.

In this alternative, car camping along Christmas Tree Pass would continue to be prohibited within Lake Mead National Recreation Area. Dispersed overnight backcountry camping and day use would continue to be permitted on NPS and BLM lands.

As a designated traditional cultural property, Spirit Mountain has special significance. The use of fixed anchors is a sensitive issue in this area and is not compatible with tribal cultural values. Thus, no fixed anchors and equipment would be permitted in this wilderness area. All existing fixed anchors and equipment would be removed if it can be done so without damaging the rock face. If the anchors cannot be removed without damaging the rock, the bolt hangers would be removed and the bolt ends would be painted to match the color of the surrounding rock. Removal would be completed with the use of nonmotorized equipment. NPS and BLM staff would cooperate and work with the climbing community and tribes in taking these actions.

In alternative B, no action would be taken to encourage or discourage people from hiking up Spirit Mountain—no actions would be taken to establish a route up Spirit Mountain. Visitors would continue to follow existing user-created trails to the summit. However, an information kiosk would be located in the vicinity of Spirit Mountain that would mention the importance of the area to the local tribes.

To improve wilderness information for visitors, signs may be installed as needed at the existing parking area at Sacatone Wash and Christmas Tree Pass Road (Approved Road 20). Another information sign may be placed on the Pipe Spring Road, where there already is a parking area, on the route to Pipe Spring. Another information kiosk would be placed in the lower Grapevine Canyon parking area off Approved Road 20. The Spirit Mountain informational kiosks at the junction of U.S. Highway 95 and Christmas Tree Pass Road (Approved Road 20), at the intersection of Approved Road 20 and Nevada State Route 163 in the national recreation area, and at the Spirit Mountain trailhead would also include information on the Bridge Canyon Wilderness.

An information sign also would be placed at the intersection of Nevada State Route 163 and Nevada Telephone Cove Road (Approved Road 9). The Spirit Mountain access point at Christmas Tree Pass would continue to be available as an access point, and a kiosk and an interpretive panel on Spirit Mountain would also be developed at the parking area.

Two roads, surrounded by the wilderness area, would be closed under alternative B.

Neither of these areas receives much use and the roads are in poor condition. One of the roads also is used for illegal access into the wilderness area by off-highway vehicles. The road to White Rock Mine (Approved Road 21) would be closed at the point where the road becomes impassable, or at another point where there is a turnaround. To protect a sensitive resource, smoke trees (*Dalea spinosa*), that occur only in this wilderness area in Lake Mead National Recreation Area, the Lower Grapevine Canyon Road (Approved Road 13) would be closed. Both of these road closures would constitute an amendment to the national recreation area's general management plan.

Bridge Canyon Wilderness

As with Spirit Mountain, Bridge Canyon is a popular destination that probably will receive more use in the future and potentially could see more impacts compared to the other wilderness areas. Consequently, more proactive management is needed in this area to ensure that wilderness values are protected and the needs of visitors are met.

Under alternative B, the Grapevine Canyon Trail outside the wilderness area would be improved to more clearly direct visitors into the wash and the multiple user-created trails would be restored to natural conditions.

Approved Road 18 would be closed at the point where the road is surrounded by the wilderness. This area receives little vehicular use, is in poor condition, and is used for illegal access into the wilderness area by off-highway vehicles. This road closure would constitute an amendment to the recreation area's general management plan.

Climbing areas within Bridge Canyon Wilderness would be managed to preserve wilderness character. The National Park Service would partner with the climbing community and local tribes to minimize impacts of fixed anchor use and protect cultural and natural resources and wilderness character.

Under alternative B no new fixed anchors or fixed equipment, with the exception of permitted replacement anchors, would be allowed in the Bridge Canyon Wilderness. In recognition of the area's cultural importance and to meet the intent of NPS Director's Order 41, the concentration of existing bolt-intensive face climbs would be reduced. The purpose of this action recognizes the area's cultural importance and further supports the NPS stance that while climbing is a legitimate and appropriate use of wilderness, fixed anchors or fixed equipment should be rare in wilderness.

An inventory would be completed in the wilderness area of all routes with fixed anchors and fixed equipment, making specific notation of those routes that may be considered bolt-intensive face climbs. Bolt-intensive face climbs may be considered any climb that includes "more than the occasional placement of a fixed anchor for belay, rappel, or protection purposes" per the intent of Director's Order 41.

The agency staff would then work with tribes and partners to reduce the concentration of bolt-intensive face climbs in certain climbing areas within the Bridge Canyon Wilderness. Reducing the concentration of bolt-intensive face climbs refers to reducing the concentration of routes in a climbing area, not necessarily the number of fixed anchors per individual route. Factors that would be considered in reducing the concentration of bolt-intensive face climbs include climber safety; impacts on sensitive natural and cultural resources; and impacts on wilderness character and resources (e.g., opportunities for solitude).

When anchors are removed as part of this process, park staff would work with partners who are skilled in rock-climbing fundamentals and safety protocols to remove and camouflage fixed anchors. Any chains, rappel rings, or other fixed equipment would be removed first. Then, if possible, only bolt hangers would be removed from the remaining bolt/hanger hardware and the bolt ends would be painted to match the color of

the surrounding rock. This method would remove the most visible piece of the anchor without damaging surrounding rock by physically ripping the bolt out of the rock.

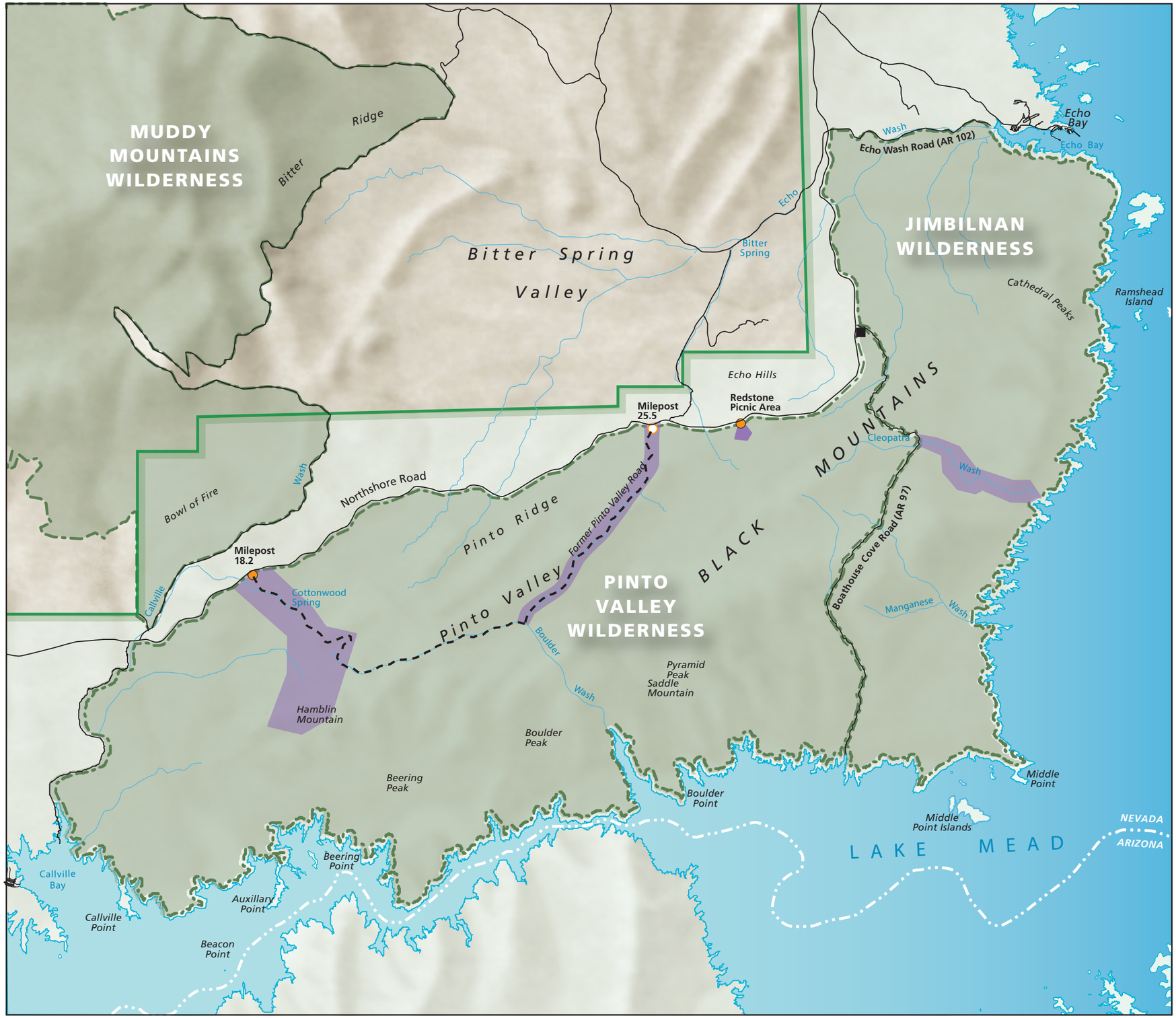
Climbers would be permitted, on a case-by-case basis, to replace old, unsafe anchors on existing routes within the wilderness unit.

If unacceptable impacts occur in the wilderness area as a result of climbing in spite of the above actions, the superintendent may take additional action to restrict or prohibit the placement of fixed anchors.

STAFFING

One permanent employee from the National Park Service and one permanent employee from the Bureau of Land Management would continue to serve as wilderness coordinators for the eight areas, and would supervise the wilderness stewardship program. This program would develop a volunteer base for activities associated with inventory and monitoring programs, the restoration of habitat, and sign placement, as well as other needs.

The coordinators would be specialist positions, if funding allows, or be filled as a collateral duty. The wilderness coordinators would have direct responsibility for the development, coordination, communication, implementation, and accountability for the wilderness program in the eight areas. As mandated by NPS Director's Order 41, all NPS positions having significant wilderness responsibilities would be supported by position descriptions that detail these responsibilities. The coordinators would work with the Lake Mead National Recreation Area and BLM district staff, including resource management, protection, interpretation and education, planning, and facility management staff, to implement this plan and evaluate new proposals, provide mitigation when necessary, and make recommendations to modify the plan. The wilderness coordinators would also serve as a liaison to NPS regional and national wilderness programs.



DEVELOPMENT

- Education/Information Sign
- Developed Access Point
- Primitive Access Point
- Designated Route
- Public Roads
- Wilderness Boundary
- Lake Mead NRA Boundary

ZONING

- Zone 1
- Zone 2

North

0 1 2 4 6 Miles

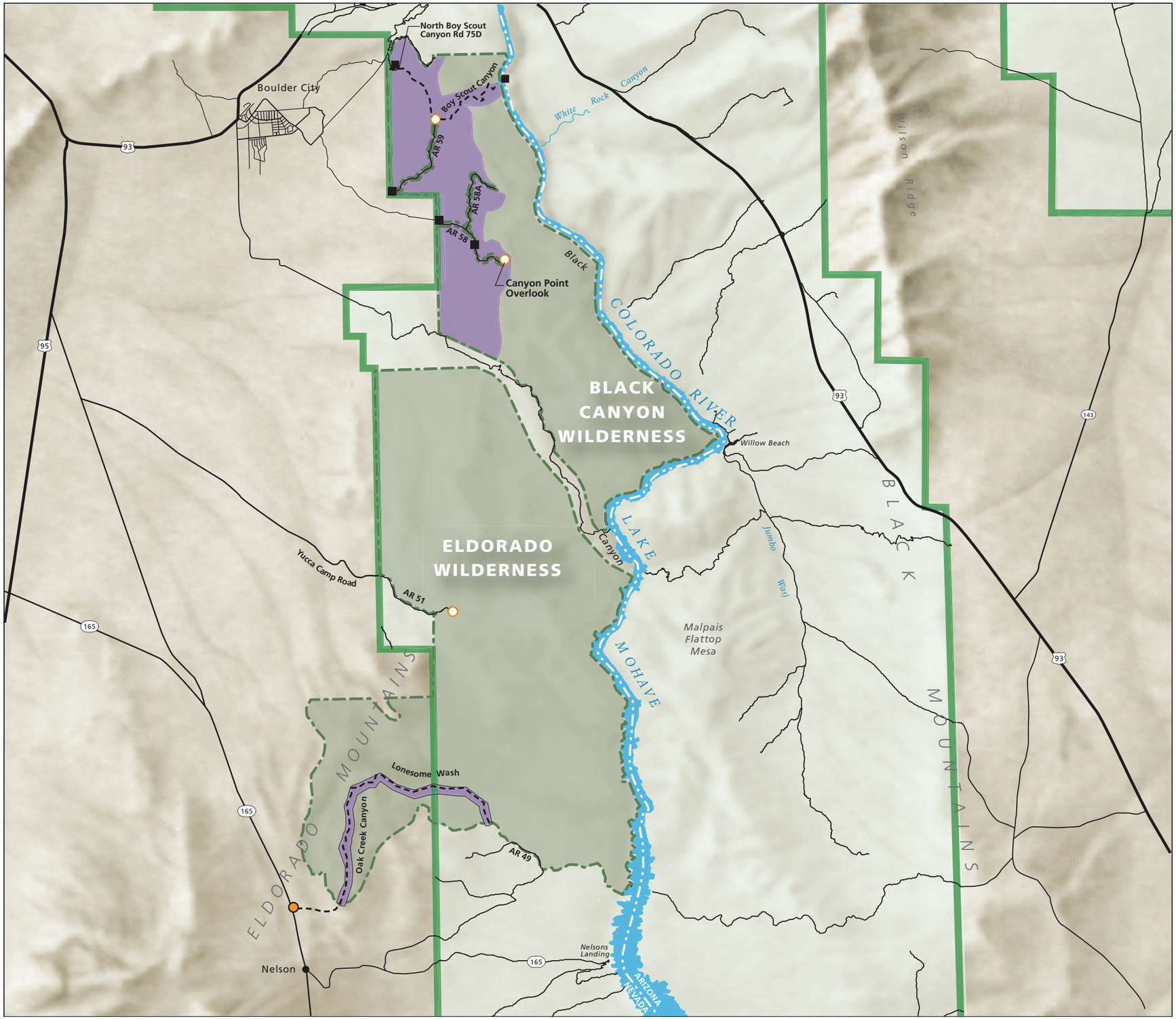
Figure 3

PINTO VALLEY AND JIMBILNAN WILDERNESS

Alternative B Preferred Alternative

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
Bureau of Land Management
National Park Service
October • 2013



DEVELOPMENT

- Education/Information Sign
- Developed Trailhead
- Primitive Trailhead
- Designated Routes
- Public Roads
- Wilderness Boundary
- Lake Mead NRA Boundary

ZONING

- Zone 1
- Zone 2

North

0 1 2 4 6 8 Miles

Figure 4

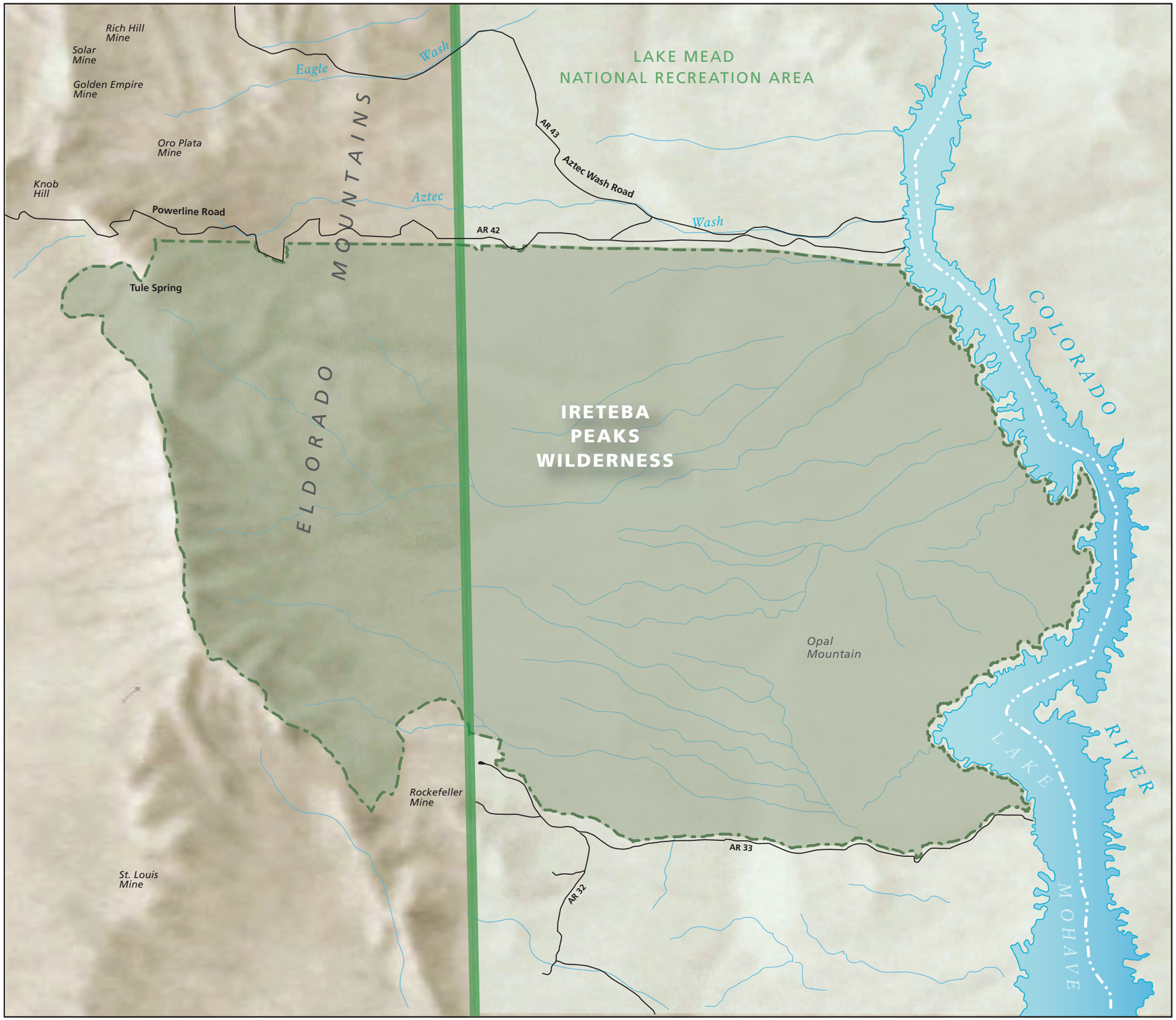
BLACK CANYON AND ELDORADO WILDERNESS

Alternative B Preferred Alternative

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
Bureau of Land Management
National Park Service

DSC • 602 • 101426 • October • 2013



DEVELOPMENT

- Education/Information Sign
- Developed Trailhead
- Primitive Trailhead
- Public Roads
- Wilderness Boundary
- Lake Mead NRA Boundary

ZONING

- Zone 1
- Zone 2

North

0 1 2 4 Miles

Figure 5

IRETEBA PEAKS WILDERNESS

Alternative B
Preferred Alternative

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
Bureau of Land Management
National Park Service

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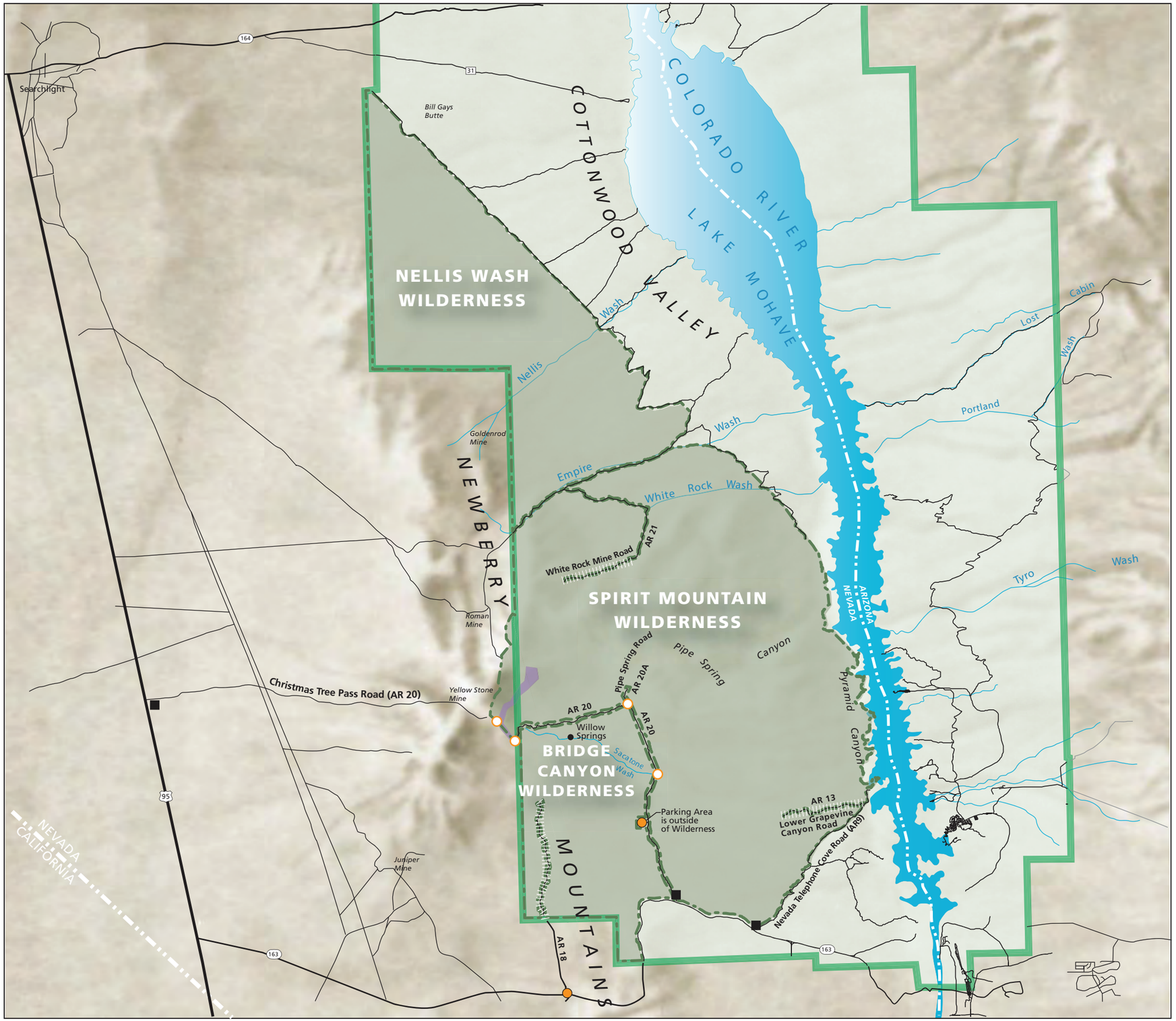


DEVELOPMENT

- Education/Information Sign
- Developed Access Point
- Primitive Access Point
- Public Roads
- Road Closure
- Wilderness Boundary
- Lake Mead NRA Boundary

ZONING

- Zone 1
- Zone 2

North

0 1 2 4 6 8 Miles

Figure 6

NELLIS WASH, SPIRIT MOUNTAIN AND BRIDGE CANYON WILDERNESS

Alternative B Preferred Alternative

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
Bureau of Land Management
National Park Service

DSC • 602 • 101428 • October • 2013

ALTERNATIVE C

CONCEPT AND SUMMARY

In alternative C, the emphasis would be on continuing to preserve wilderness resources while providing additional opportunities for visitors to access several of the wilderness areas, particularly in the Pinto Valley and Spirit Mountain wilderness areas. The agencies would provide for a variety of opportunities for appropriate wilderness activities, including both day use and overnight use, and for those who have limited wilderness skills as well as those who are experienced and are self-reliant. Additional efforts would be made to inform and educate both visitors and the public about the presence of the wilderness areas and opportunities that are available, as well as appropriate behaviors and uses in these areas. As in alternative B, all kiosks and information signs would be provided close to or at the boundary of the wilderness areas. Dispersed use would continue to be encouraged, while the establishment and maintenance of designated routes would concentrate use in some areas.

Access to the wilderness areas would be improved primarily through the establishment of trailheads at various points. These trailheads would be limited in extent, and generally consist of a small parking area, informational kiosk, or signs. However, a greater number of designated routes would be provided in alternative C than in alternative B in some wilderness areas, whereas for others the trailheads would simply be an entrance or access point in the wilderness areas.

As in alternative B, in alternative C additional NPS attention would be provided to Black Canyon because it is close to Boulder City, receives relatively high OHV use, and is receiving other inappropriate uses, resulting in wilderness values being lost. As in alternative B, in alternative C more proactive management would be given to the Pinto Valley, Spirit Mountain, and Bridge Canyon wilderness areas to ensure their values are protected and unacceptable impacts do not occur. In alternative C, however, this protection is accomplished through intensive visitor management and a different application of the management zones.

As in all of the alternatives, NPS and BLM managers would continue to strive to protect/maintain current natural and cultural resource conditions in the wilderness areas. Natural and cultural resource management would primarily concentrate on restoration of disturbed areas, long-term inventory and monitoring, and mitigation where appropriate.

MANAGEMENT ZONING

Under alternative C, the potential management zones described in table 3 would be applied to the eight wilderness areas (see figures 7–10). Most of the wilderness area would be included in zone 2. Higher use areas, or potentially popular use areas with improved access, would be included in zone 1. These areas would include Cleopatra Wash, Cathedral Peaks, and Manganese Wash in Jimbilnan; the route to Hamblin Mountain, Boulder Wash, and Pinto Valley in Pinto Valley; the route from Christmas Tree Pass to the top of Spirit Mountain, the route to Pipe Spring, and the area between Sacatone Wash and Grapevine east of Approved Road 20 in Spirit Mountain; and the eastern end of Grapevine Canyon in Bridge Canyon.

VISITOR USE MANAGMENT

As described in the management zones and in this chapter, NPS and BLM staff would monitor wilderness character and visitor use management measures, evaluate current

conditions against standards, and take appropriate steps to ensure the protection of wilderness character, including opportunities for solitude and primitive and unconfined types of recreation in wilderness. See table 6 for the wilderness character and visitor use management indicators, measures, standards, and management strategies that would be employed under this alternative.

Group Size Limits

To avoid impacts on opportunities for solitude and resources, all groups using the wilderness areas, including hikers, researchers, tour groups, etc., would be limited to no more than 12 people per group, including the leader of the group. Agency-led hikes (including hike lead by groups that partner with the agency) also would be limited to 12 people per group.

CLIMBING, MOUNTAINEERING, AND CANYONEERING

In alternative C, climbing and bouldering would continue to be permitted in all wilderness areas, and would be managed as described in the overall climbing management directions in chapter 2. In addition, in this alternative the use and replacement of fixed anchors and equipment would be managed in certain climbing areas (see the discussion of Spirit Mountain and Bridge Canyon wilderness areas).

Areas close to sensitive resources, such as bird nesting areas, would be closed to climbing or scrambling during nesting periods. For occupied raptor nests, rock climbing would be prohibited up to 0.5 miles from the nest sites. Use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would be prohibited. Climbing, scrambling, or walking on rock art surfaces would be prohibited.

VOLUNTEER WILDERNESS STEWARDSHIP PROGRAM

The Bureau of Land Management and the National Park Service, in cooperation with the other federal land management agencies, and with start-up support from the Southern Nevada Agency Partnership, would establish a wilderness stewardship program. This program would be intended to enhance the capacity of the two agencies and create a sense of ownership on the part of the public, as well as aid in the implementation of this plan. The wilderness stewardship program would train volunteers with an interest in wilderness management to assist the agencies in the monitoring and implementation of certain actions outlined in the wilderness management plan. Volunteer wilderness stewards would be trained to monitor cultural and natural resources and visitor use in the areas, as well as help complete resource condition assessments, minor route work, nonnative plant surveys, wildlife observations, sign monitoring, and sign installation.

Volunteers would be selected for specific tasks and trained to fully carry out the requested work. They would have an electronic reporting protocol to submit their findings following each of their field visits.

COLLECTION OF NATURAL RESOURCES

In the wilderness areas managed solely by the National Park Service, collection of natural resources, including wildlife, plants, rocks, or fossils (including petrified wood), would continue to be prohibited without a valid scientific research and collecting permit.

In the portions of the three wilderness areas managed by the Bureau of Land Management (the Eldorado, Ireteba Peaks, and Spirit Mountain wilderness areas), the collection of natural resources, including plants and rocks, for noncommercial purposes would continue to be allowed.

PETS IN WILDERNESS AREAS

Specific to these wilderness areas, pets can intimidate and harass two important wildlife species—the desert bighorn sheep and the desert tortoise. With the exception of dogs under voice control that are used in support of hunting, pets would be required to be under leash control at all times in wilderness areas according to the requirements of 36 CFR 2.15 – Pets).

NEW DESIGNATED ROUTES

Several new routes would be designated in alternative C (see table 5). A total of approximately 32 miles of routes would be designated in the wilderness areas. Rock cairns marking routes would be maintained. Otherwise, the routes would not be maintained. For the route through Boy Scout Canyon occasional fixed anchors would remain in place.

TABLE 5. PROPOSED DESIGNATED ROUTES IN ALTERNATIVE C

Route	Wilderness Area	Length (miles)
Pinto Valley (former road)	Pinto Valley	3.9
Cottonwood/ Pinto Valley	Pinto Valley	5.9
Boulder Wash Route	Pinto Valley	2.2
Hamblin Mountain Route	Pinto Valley	1.4
Boy Scout Canyon/Hot Springs Route	Black Canyon	3.5
Oak Creek/ Lonesome Wash Route	Eldorado	6.7
Pipe Spring Route	Spirit Mountain	1.3
Spirit Mountain Route	Spirit Mountain	1.6
Lower Grapevine Route	Spirit Mountain	3.5
Sacatone Wash Route	Bridge Canyon	2.0
TOTAL		32.0

MANAGEMENT OF SPECIFIC AREAS

Jimbilnan Wilderness

No new visitor facilities would be provided in the wilderness area under alternative C. However, several designated routes would be established and maintained, including routes along Cleopatra Wash, Cathedral Cove/Canyon, and Manganese Wash (via an old road). A new trailhead, including a parking area and informational kiosk, also would be established at Echo Wash (Approved Road 102) to provide access into the northern end of the wilderness area.

To provide visitors with information regarding the area (as well as Pinto Valley) a kiosk and information sign would be installed outside of the wilderness area at the intersection of Northshore Road and Boathouse Cove Road (Approved Road 97).

As in alternative B, in this alternative, designated camping areas just outside of the wilderness along the Boathouse Cove Road would be marked to minimize camping impacts within the wilderness area.

Pinto Valley Wilderness

Under this alternative, several actions would be taken to provide more opportunities for use of the area while also protecting the area from resource damage. The Redstone picnic area currently can be used as an access point to the wilderness area. Under alternative C, an informational kiosk would be placed in this area. As in alternative B, two additional access points would be established off Northshore

Road. At milepost 18.2, a sign and information on Pinto Valley—including directions to Hamblin Peak—would be provided at the pull off. A sign and information on the wilderness area, including the Boulder Wash route, also would be provided at milepost 25.5.

Under this alternative, the existing Redstone Dune Trail would continue to be maintained. In addition, after appropriate compliance, the former Pinto Valley road would be partially restored, and maintained as a designated route. A portion would be a stock/hiker route, providing horseback riders an opportunity to travel into the wilderness area. Visitors could also hike along this designated route through the wilderness area to milepost 18.2.

Also in alternative C, in addition to the above areas, information on the wilderness area would be provided at the pullouts along Northshore Road. At milepost 18.2, information would be provided on both the Pinto Valley Wilderness and the Bowl of Fire, part of the Muddy Mountains Wilderness.

To prevent resource damage from user-created trails, a designated route up Hamblin Peak would be established with cairns in places where the route is unclear, while all other unofficial routes would be removed and the landscape restored. If appropriate, the route could be a designated trail. Visitors would be directed to walk along the wash from milepost 18.2 to Cottonwood Spring and then follow the cairned route up the peak. A loop option also could be provided.

An old mine site in the Pinto Valley area shows signs of human use. An evaluation of the mine is needed to determine if it is eligible for listing in the National Register of Historic Places. If the mine were not determined to be historically significant, the old mine site would be restored to natural conditions. If the mine were found to be eligible for listing, NPS managers would consult with the Nevada State Historic Preservation Office on appropriate action to take.

Black Canyon Wilderness

Many of the same actions described in alternative B would also occur in alternative C to address the inappropriate uses and resource impacts that have occurred in this area, particularly in Boy Scout Canyon. To inform and educate visitors about the wilderness status of this area, information signs would be placed on Boy Scout Canyon Road (Approved Road 59) and all other roads that provide access to the Black Canyon Wilderness. Information signs also would be placed on adjacent Boulder City lands to help reduce illegal off-highway vehicle use of the area.

To formalize and better manage access into Boy Scout Canyon, an access point and information signs would be established off Approved Road 59, outside of the wilderness area, where visitors start hiking on the route to the head of the Boy Scout Canyon. Another access point would be established at the end of North Boy Scout Canyon Road (Approved Road 75D), which is an alternate route to Boy Scout Canyon via an unnamed wash. Designated routes would begin at these access points. Both access points would provide information on appropriate uses of wilderness areas, including Leave No Trace practices, to help avoid and minimize impacts at the hot springs—the primary destination of visitors.

The old signs in Boy Scout Canyon, from the end of Approved Road 59 to the river, would be removed to restore the wilderness character. Existing ropes also would be removed.

An educational kiosk would be placed at the Canyon Point Road overlook, which provides a view into the wilderness area. This area also has had a trash problem in the past. It is hoped that the kiosk would help prevent this problem in the future.

Eldorado Wilderness

Compared to alternative A, alternative C would provide additional access and

information about the area. Three actions would be taken to provide this additional access and information:

- An access point with an information kiosk would be developed off Nevada State Route 165, just north of Nelson, to provide access to the wilderness area. The information kiosk would provide visitors with an opportunity to learn about the area. The kiosk would provide information on a route that follows Oak Creek Canyon and Lonesome Wash.
- Another access point with information signs would be established at the end of Yucca Camp Road (Approved Road 51).
- Finally, an informational sign would be erected at the end of Approved Road 49 where the wilderness area begins.

Ireteba Peaks Wilderness

As with alternative B, in this alternative, restoration work would be done in the Tule Spring area to restore the wilderness character.

Nellis Wash Wilderness

Relatively few people are aware of this wilderness area, which has many opportunities for those seeking solitude and primitive recreation opportunities. Because little is known about this area, NPS managers would be cautious in encouraging changes in the use of the area. However, in alternative C, an access point and information signs would be placed off Approved Road 22 to provide visitors with an opportunity to learn about the area.

Spirit Mountain Wilderness

Under alternative C, additional opportunities would be available at Spirit Mountain compared to the previous alternatives. However, as in alternative B, more proactive management would be provided to ensure that wilderness values are protected to meet the needs of both visitors and tribes in this area.

To reduce the potential for impacts, only day use would be permitted on both the NPS and BLM lands that make up the wilderness area. Kiosks with information on the wilderness area and Leave No Trace principles would be established at the junction of U.S. Highway 95 and Christmas Tree Pass Road (Approved Road 20) and at the intersection of Approved Road 20 and Nevada State Route 163. An informational sign would be placed at the intersection of Nevada State Route 163 and Nevada Telephone Cove Road (Approved Road 9). The Spirit Mountain access point at Christmas Tree Pass would continue to be maintained, and a kiosk and interpretive panel on Spirit Mountain would also be developed at the parking area.

To improve wilderness information for visitors, signs would be installed at the existing parking area at Sacatone Wash and Christmas Tree Pass Road. Another information sign would be placed on the Pipe Spring Road, where there already is a parking area.

As a designated traditional cultural property, Spirit Mountain has special significance. The use of fixed anchors is a sensitive issue in this area and is not compatible with tribal cultural values. Thus, no fixed anchors and equipment would be permitted in this wilderness area. All existing fixed anchors and equipment would be removed if it can be done so without damaging the rock face. If the anchors cannot be removed without damaging the rock, the bolt hangers would be removed and the bolt ends would be painted to match the color of the surrounding rock. NPS and BLM staff would cooperate and work with the climbing community and tribes in taking these actions.

In alternative C, designated routes would be established in Sacatone Wash, lower Grapevine Canyon, and to Pipe Spring to improve access into these areas.

Unlike the other alternatives, in this alternative, two designated routes to the summit of Spirit Mountain would be established and maintained. One route would start from the trailhead on Christmas Tree Pass Road. The other route would go up the southeast side of Spirit Mountain from the Pipe Spring access road. Other unofficial trails to the summit would be removed and the landscape restored.

One road, surrounded by the wilderness area, would be closed under alternative C. The road to White Rock Mine does not receive much use and the road is in poor condition. The road also is used for illegal access into the wilderness area by off-highway vehicles. The road to White Rock Mine would be closed at the point where the road becomes impassable, or at another point where there is a turnaround. This road closure would constitute an amendment to the national recreation area's general management plan.

In alternative C, the Lower Grapevine Canyon Road (Approved Road 13) would continue to be open to vehicular use.

Bridge Canyon Wilderness

As in alternative B, in alternative C more proactive management would be provided in the Bridge Canyon Wilderness to ensure that wilderness values are protected and visitor needs are met.

As in alternative B, the Grapevine Canyon Trail outside of the wilderness area would be improved to more clearly direct visitors into the wash, and the multiple unofficial routes would be restored to natural conditions.

The same information signs and kiosks noted in alternative B would be installed in alternative C. Information signs would be installed at the existing parking areas at Sacatone Wash and at the upper Grapevine Canyon on Christmas Tree Pass Road (Approved Road 20). A new access point (parking area and kiosk) would be established at the junction of Nevada State Route 163 and Approved Road 18. Another informational kiosk would be placed in the lower Grapevine Canyon parking area off Approved Road 20. The Spirit Mountain informational kiosks noted above at the junction of U.S. Highway 95 and Christmas Tree Pass Road (Approved Road 20), at the intersection of Approved Road 20 and Nevada State Route 163 in the national recreation area, and at the access point to Spirit Mountain on Christmas Tree Pass would include information on the Bridge Canyon Wilderness as well.

In this alternative, a designated route would be maintained from the upper Grapevine Canyon trailhead.

Approved Road 18 would be closed at the point where the road enters the national recreation area. This area receives little vehicular use, is in poor condition, and is used for illegal access to the wilderness area by off-highway vehicles. This road closure would constitute an amendment to the national recreation area's general management plan.

Climbing areas within Bridge Canyon Wilderness would be managed to preserve wilderness character. The National Park Service would partner with the climbing community and local tribes to minimize impacts of fixed anchor use and protect cultural and natural resources and wilderness character.

Under alternative C no new fixed anchors or fixed equipment, with the exception of permitted replacement anchors, would be allowed in the Bridge Canyon Wilderness. In recognition of the area's cultural importance and to meet the intent of NPS Director's Order 41, the concentration of existing bolt-intensive face climbs would be reduced. The purpose of this action recognizes the area's cultural importance and further supports the NPS stance that while climbing is a legitimate and appropriate use of wilderness, fixed anchors or fixed equipment should be rare in wilderness.

An inventory would be completed in the wilderness area of all climbing routes with

fixed anchors and fixed equipment, making specific notation of those routes that may be considered bolt-intensive face climbs. Bolt-intensive face climbs may be considered any climb that includes "more than the occasional placement of a fixed anchor for belay, rappel, or protection purposes" per the intent of Director's Order 41.

The agency staff would then work with tribes and partners to reduce the concentration of bolt-intensive face climbs in certain climbing areas within the Bridge Canyon Wilderness. Reducing the concentration of bolt-intensive face climbs refers to reducing the concentration of routes in a climbing area, not necessarily the number of fixed anchors per individual route. Factors that would be considered in reducing the concentration of bolt-intensive face climbs include climber safety, impacts on sensitive natural and cultural resources, and impacts on wilderness character and resources (e.g., opportunities for solitude).

When anchors are removed as part of this process, park staff would work with partners who are skilled in rock-climbing fundamentals and safety protocols to remove and camouflage fixed anchors. Any chains, rappel rings, or other fixed equipment would be removed first. Then, if possible, only bolt hangers would be removed from the remaining bolt/hanger hardware and the bolt ends would be painted to match the color of the surrounding rock. This method would remove the most visible piece of the anchor without damaging surrounding rock by physically ripping the bolt out of the rock.

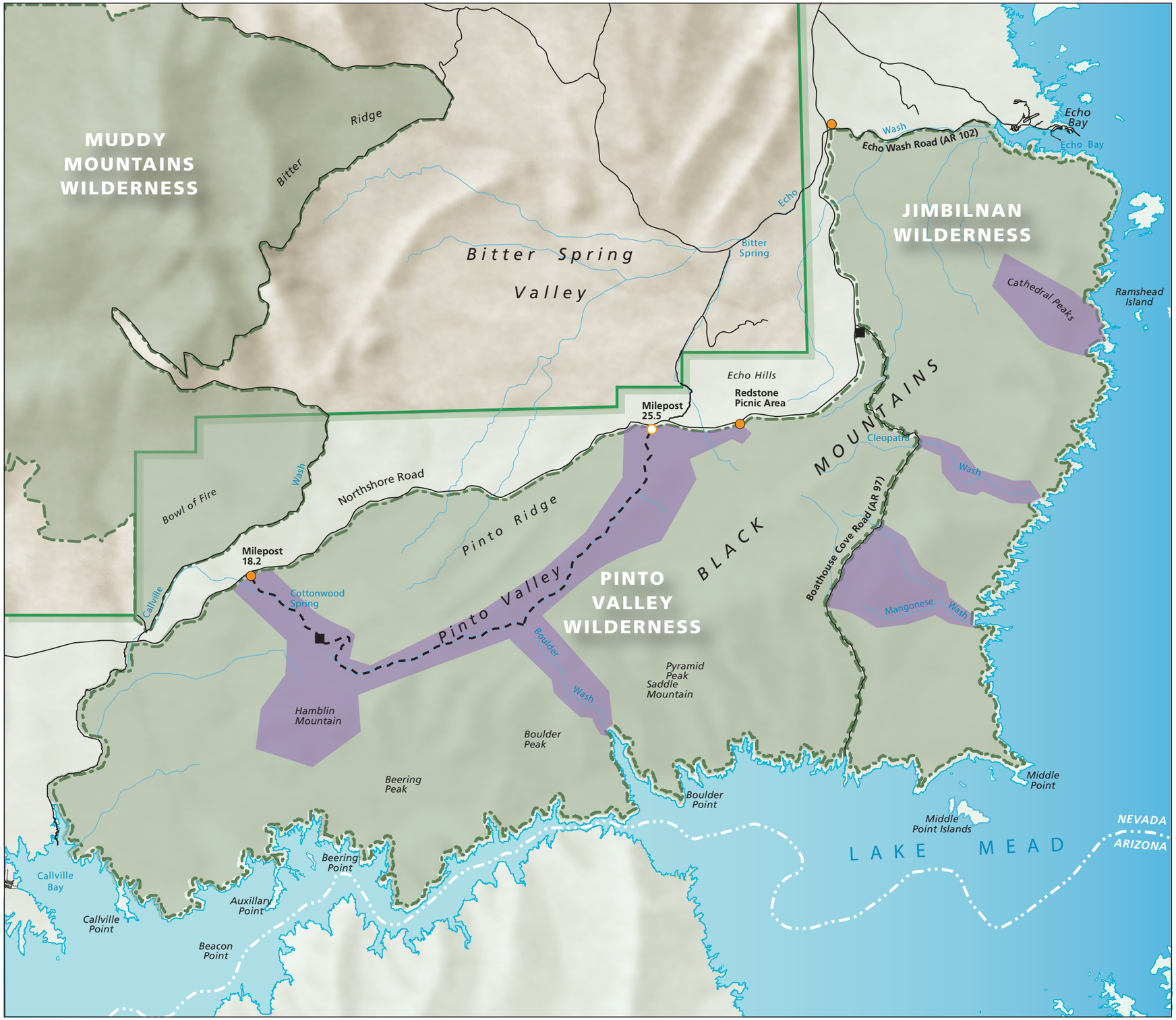
Climbers would be permitted, on a case-by-case basis, to replace old, unsafe anchors on existing routes within the wilderness unit.

If unacceptable impacts occur in the wilderness area as a result of climbing in spite of the above actions, the superintendent may take additional action to restrict or prohibit the placement of fixed anchors.

STAFFING

One permanent NPS employee and one permanent BLM employee would continue to serve as the wilderness coordinators for the eight areas, and would supervise the wilderness stewardship program. This program would develop a volunteer base for activities associated with inventory and monitoring programs, the restoration of habitat, and sign placement, as well as other needs.

The coordinators would be specialist positions, if funding allows, or be filled as a collateral duty. The wilderness coordinators would have direct responsibility for the development, coordination, communication, implementation, and accountability for the wilderness program in the eight areas. As mandated by NPS Director's Order 41, all NPS positions having significant wilderness responsibilities would be supported by position descriptions that detail these responsibilities. The coordinators would work with the Lake Mead National Recreation Area and BLM district staff, including resource management, protection, interpretation and education, planning, and facility management staff, to implement this plan and evaluate new proposals, provide mitigation when necessary, and make recommendations to modify the plan. The wilderness coordinators would also serve as a liaison to NPS regional and national wilderness programs.



DEVELOPMENT

- Education/Information Sign
- Developed Access Point
- Primitive Access Point
- Designated Route
- Public Roads
- Wilderness Boundary
- Lake Mead NRA Boundary

ZONING

- Zone 1
- Zone 2

North

0 5 10 20 Miles

Figure 7

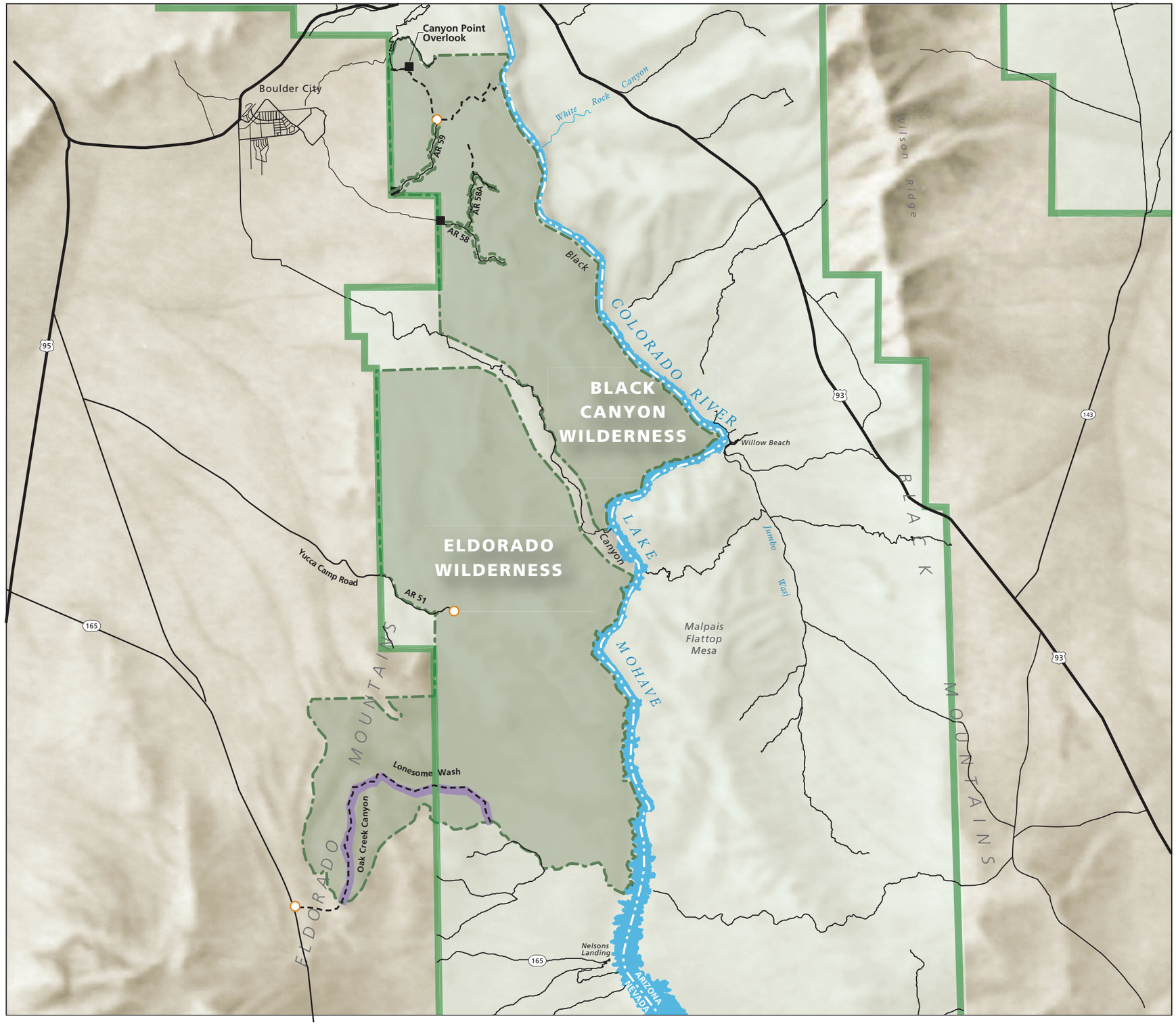
PINTO VALLEY AND JIMBILNAN WILDERNESS

Alternative C

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
Bureau of Land Management
National Park Service

October • 2013



DEVELOPMENT

- Education/Information Sign
- Developed Trailhead
- Primitive Trailhead
- Designated Routes
- Public Roads
- Wilderness Boundary
- Lake Mead NRA Boundary

ZONING

- Zone 1
- Zone 2

North

0 1 2 4 6 8 Miles

Figure 8

BLACK CANYON AND ELDORADO WILDERNESS

Alternative C

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
Bureau of Land Management
National Park Service

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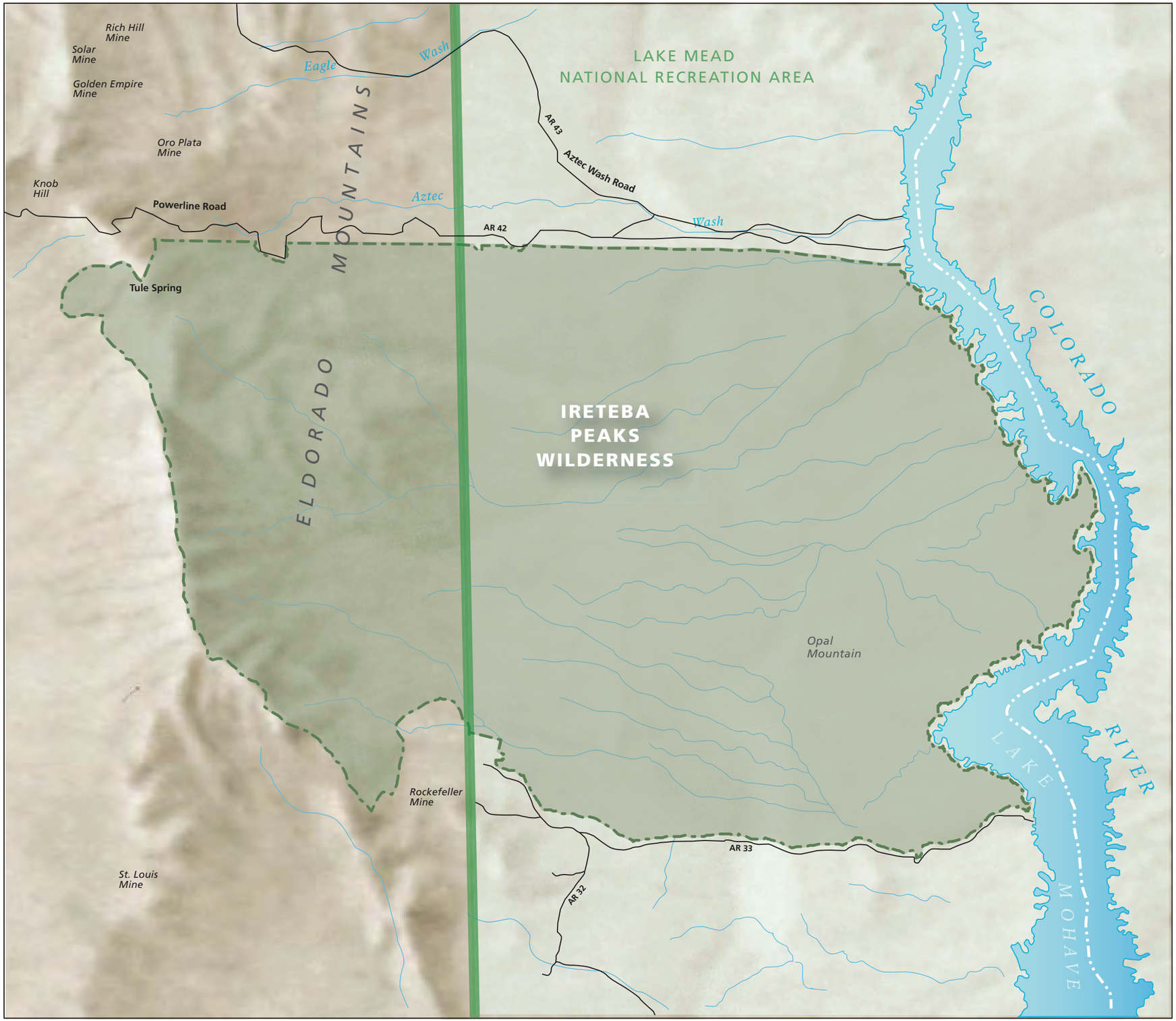


DEVELOPMENT

- Education/Information Sign
- Developed Trailhead
- Primitive Trailhead
- Public Roads
- Wilderness Boundary
- Lake Mead NRA Boundary

ZONING

- Zone 2

North

0 1 2 4 Miles

Figure 9

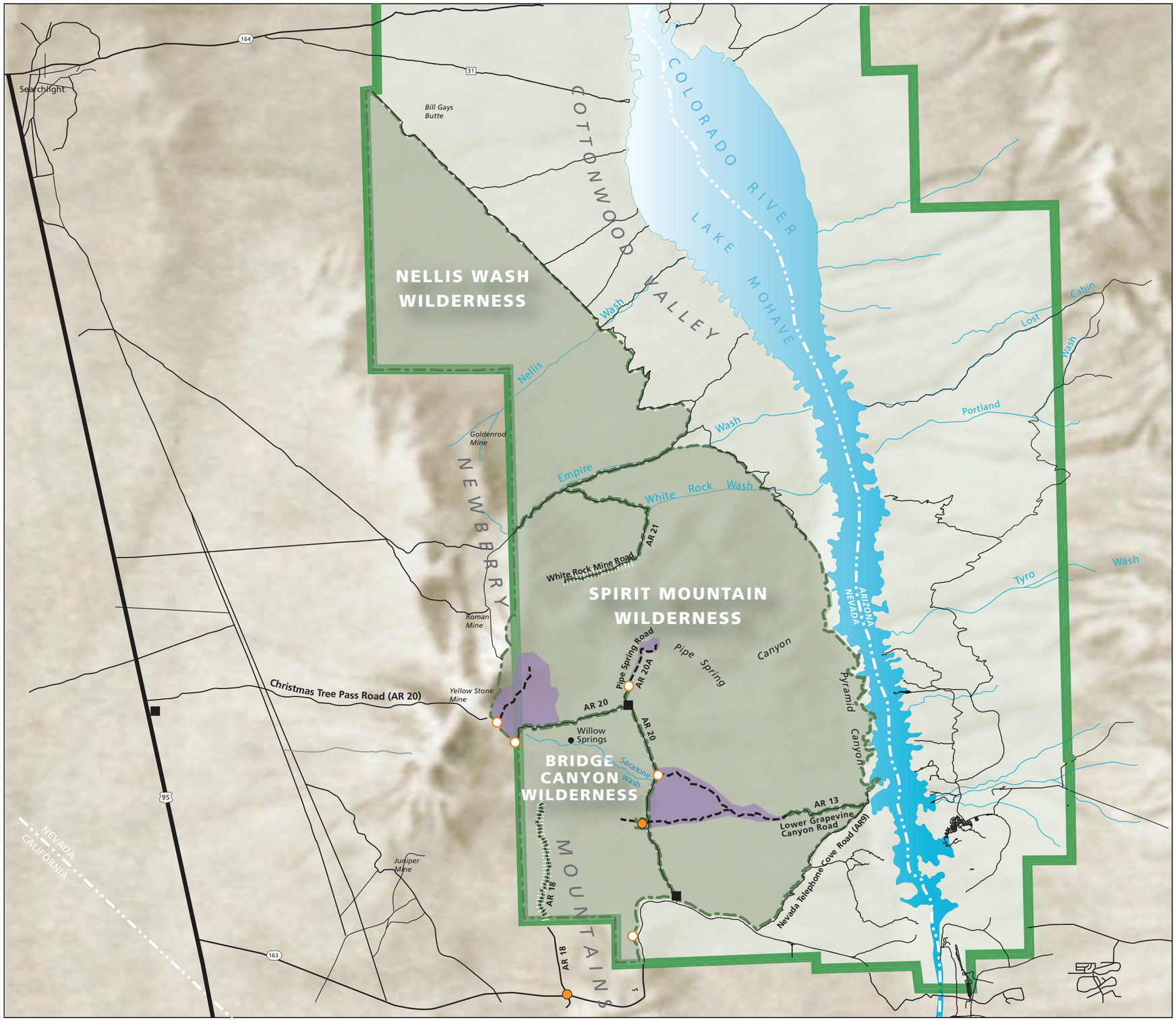
IRETEBA PEAKS WILDERNESS

Alternative C

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
Bureau of Land Management
National Park Service

DSC • 602 • 101431 • October 2013



DEVELOPMENT

- Education/Information Sign
- Developed Access Point
- Primitive Access Point
- Designated Routes
- Public Roads
- Road Removed
- Wilderness Boundary
- Lake Mead NRA Boundary

ZONING

- Zone 1
- Zone 2

North

0 1 2 4 6 8 Miles

Figure 10

NELLIS WASH, SPIRIT MOUNTAIN AND BRIDGE CANYON WILDERNESS

Alternative C

WILDERNESS MANAGEMENT PLAN
Lake Mead National Recreation Area

United States Department of the Interior
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WILDERNESS CHARACTER MONITORING AND VISITOR USE MANAGEMENT

INTRODUCTION

This section of the plan identifies the visitor use management and wilderness character measures, standards, and management strategies for the Jimbilnan, Pinto Valley, Black Canyon, Eldorado, Ireteba Peaks, Nellis Wash, Spirit Mountain, and Bridge Canyon wilderness areas. The components are defined and described as follows:

- Indicators and related measures specify conditions to be assessed for progress on attaining goals and objectives, preserving wilderness character, and satisfying visitor use management requirements.
- Standards (either qualitative or quantitative) guide management decisions on the minimum acceptable condition for measures and serve as triggers for management action.
- Management strategies comprise a toolbox of options considered for implementation in order to maintain or restore conditions according to management goals and objectives.

In the context of wilderness, the concept of visitor use management is defined as the proactive and adaptive process of planning for and managing characteristics of visitor use and the physical, social, and managerial setting through a variety of strategies and tools to sustain desired resource conditions and visitor experiences consistent with protecting wilderness character. Visitor use characteristics may include amount, type, timing, and distribution of visitor use, including activities and behaviors. In short, visitor use management strives to maximize the benefits of visitor use while meeting resource and experiential protection goals. This planning and management process provides the framework within which visitor capacity should be addressed, where it is necessary. As part of the visitor use management process, visitor capacity is the maximum amount and type of visitor use that an area can accommodate while sustaining desired resource conditions and visitor experiences consistent with the values for which the area was established. Therefore, visitor use management is being adopted as part of the wilderness management plan. Wilderness character monitoring is a separate process that consists of choosing measures that represent a relevant and cost-effective way to determine how wilderness character is changing over time (Landres et al. 2008). The 1964 Wilderness Act, NPS *Management Policies 2006,* and the BLM Manual 6340 require the monitoring of conditions and long-term trends in wilderness character.

The frameworks used for addressing visitor use management and wilderness character have the same goal of protecting resources (natural, cultural, and visitor experience) through monitoring established measures and determining if the conditions are approaching the designated standard. Visitor use management focuses solely on visitor use and the associated impacts on resources and visitor experience, whereas wilderness character monitoring focuses more holistically by evaluating any potential impacts including administrative and visitor use. For this plan, the wilderness character monitoring framework was overlaid on the visitor use management framework because the former encompasses the latter. Wilderness character monitoring in the wilderness, when combined with similar information from other NPS and BLM units, provides a tool for understanding trends of wilderness character in the region and across these systems. This function is distinct to the wilderness character framework.

Given the broad scope of wilderness character measures across the five wilderness qualities,

limited existing data for certain measures, and the fact that some of the conditions being evaluated are outside NPS management control, some standards are qualitative and assess changes in trends, while other standards are quantitative, measurable variables. The qualitative changes in trends and quantitative standards trigger the modification or initiation of management actions. Most of the visitor-use-related standards are quantitative because management of visitor use is largely within the agency's management control (Sharp, Cahill, and Sharp 2012).

The frameworks for wilderness character and visitor use management are forms of adaptive management in that they are iterative processes in which management decisions are continuously informed and improved. Measures will be monitored, conditions will be compared to standards, and management strategies will be adjusted as appropriate based on the most current knowledge of wilderness character conditions. In particular, the upcoming resource stewardship strategy and the Mojave Network Inventory and Monitoring data may provide useful insights about trends in wilderness character, leading to possible updates for the wilderness character monitoring framework where appropriate. The goal of this adaptive management process is to protect the five qualities of wilderness character through informed, proactive, and transparent management. With a meaningful set of measures, standards, and management strategies, these elements collectively support protection of the management goals and objectives for wilderness character.

Visitor Use Management

Managing visitor use is inherently complex and depends not only on the number of visitors, but also on where the visitors go, what they do, and the "footprints" they leave behind. In managing for visitor use, wilderness management staff and partners rely on a variety of management tools and strategies rather than relying solely on regulating the number of people in a management area. In addition, the ever-changing nature of visitor use requires a deliberate and adaptive approach to visitor use management. The measures, standards, and management strategies help ensure visitor use is being managed to protect wilderness values, therefore supporting the fulfillment of legislative and policy mandates.

These eight wilderness areas receive very low levels of use. Although there is not a consistent tracking system for counting visitor use across NPS and BLM, both agencies have noted that likelihood of encountering other people in most of the wilderness areas is quite low, and that visitors have excellent opportunities for solitude in all areas. Based on the existing NPS and BLM knowledge of resource and social conditions within the wilderness areas, this amount of use allows the National Park Service, the Bureau of Land Management, and their partners to protect resources and provide high-quality visitor experiences, including achieving desired conditions and maintaining the measures and standards outlined in table 6. Also, although use levels may be adversely affecting some wilderness character qualities in limited areas, there is no indication of adverse effects on overall wilderness character in the wilderness areas. Nevertheless, increases in visitor use and the associated impacts on resources would be monitored to ensure that NPS and BLM commitments to the wilderness legislative and policy mandates, as well as desired conditions and related standards, are all being achieved. It is anticipated that if use levels increase, the visitor experience at key destinations in the wilderness would be the value most sensitive to adverse impacts as a result of increased contacts between visitors. This would affect the levels of solitude and sense of remoteness found in the wilderness. There may also be concerns that increased use levels would result in impacts that could affect soil, vegetation, and wildlife habitat. The measures and standards in table 6 will help NPS and BLM staff track changes in these visitor experience and resource conditions to determine if increases in use levels are having effects on desired conditions.

Wilderness Character Monitoring

Monitoring wilderness character is important for several reasons: (1) to comply with the Wilderness Act, (2) to fulfill agency policy (NPS *Management Policies 2006* and BLM Manual 6340), and (3) to improve wilderness stewardship. The Wilderness Act states that wilderness areas "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, and so as to provide for the protection of these areas, the preservation of their wilderness character." NPS *Management Policies 2006* states, "Management will include the protection of these (wilderness) areas, for the preservation of their wilderness character." BLM Manual 6340 provides the line manager and program staff professionals with general policies for the administration and management of BLM wilderness areas designated by Congress. This manual outlines procedures to ensure the congressional mandate to manage each wilderness area "to preserve its wilderness character" will be met. Because the majority of the park is federally designated or eligible wilderness, monitoring wilderness character is essential to protect the properties that make Lake Mead National Recreation Area unique.

Although the staff would continue monitoring wilderness character measures and standards throughout the park, the rigor of monitoring (e.g., frequency of monitoring cycles, amount of geographic area monitored) might vary considerably depending on how close existing conditions are to the standards. For instance, if the existing conditions are far from exceeding the standard, the rigor of monitoring might be less than if the existing conditions are close to or trending toward the standard.

Wilderness character is described as five necessary and interrelated qualities: untrammeled, natural, undeveloped, and solitude or primitive and unconfined recreation, and other features and values (Landres et al. 2008). Together, the five qualities comprise an integrated ecological and social system of wilderness, as follows:

1. Untrammeled—The Wilderness Act describes wilderness as "an area where the earth and its community of life are untrammeled by man," and "generally appears to have been affected primarily by the forces of nature." In short, wilderness is essentially unhindered and free from modern human control or manipulation. This quality is degraded by modern human activities or actions that control or manipulate the components or processes of ecological systems inside the wilderness.

2. Natural—The Wilderness Act also describes wilderness as "protected and managed so as to preserve its natural conditions." In short, wilderness ecological systems are substantially free from the effects of modern civilization. This quality is degraded by intended or unintended effects of people on the ecological systems inside the wilderness since the area was designated.

3. Undeveloped—The Wilderness Act further states that wilderness is "an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation," "where man himself is a visitor who does not remain," and "with the imprint of man's work substantially unnoticeable." This quality is degraded by the presence of nonrecreational structures, installations, habitations, and by the use of motor vehicles, motorized equipment, or mechanical transport that increases people's ability to occupy or modify the environment.

4. Solitude or a primitive and unconfined type of recreation—The Wilderness Act states that wilderness has "outstanding opportunities for solitude or a primitive and unconfined type of recreation." This quality protects the opportunity for people to experience true wilderness settings; it does not provide for a specified level of enjoyment people will have therein. This quality is degraded by settings that reduce these opportunities, including visitor encounters,

signs of modern civilization, recreation facilities, and management restrictions on visitor behavior.

5. **Other Features and Values**— In some cases wilderness managers may find the four qualities do not fully express the values and features found in its wilderness areas. The fifth quality is based on the last clause of section 2(c) of the Wilderness Act which states that a wilderness "may also contain ecological, geological, or other features of scientific, educations, scenic, or historical value." The fifth quality is useful to wilderness managers for addressing deterioration or loss of cultural resources integral to wilderness character.

The five qualities of wilderness character capture the intent that Congress put forth in the Wilderness Act as well as the guidance in NPS *Management Policies 2006* and BLM Manual 6340. Both point to monitoring conditions and long-term trends in wilderness character. The *Keeping It Wild* (Landres et al. 2008; NPS 2012a) framework was used as a guide in this process. The purpose of the *Keeping It Wild* framework is to improve wilderness stewardship by providing managers with a tool to assess how wilderness character is changing over time. Identifying wilderness character through this framework is integral to meeting the goals and objectives of this plan.

The planning team considered many potential measures that would identify impacts of concern, but those described in table 6 were considered the most significant, given the importance and vulnerability of the resources or visitor experiences affected. After prioritization, the team refined the language for all measures to ensure that they were reliable, measureable, and manageable for long-term monitoring efforts. The final step of the process focused on identifying draft standards for each of the selected measures, along with associated management actions that would be used if standards were exceeded. Standards represent the minimum acceptable condition of the *measure* variables where adjustments in current management or additional actions would be required to further protect wilderness character. The wilderness monitoring framework shown in table 6 illustrates measures, standards, and management actions.

Initial monitoring would determine if the measures are accurately measuring the conditions of concern and if the standards truly represent the minimally acceptable condition. The wilderness staff might decide to modify the measures or standards and revise the monitoring program if better ways are found to measure changes in wilderness character. Most of these types of changes should be made within the first several years of initiating monitoring. After this initial testing period, adjustments would be less likely to occur. Finally, if conditions change appreciably, NPS and BLM staff might need to identify new measures to ensure that wilderness character desired conditions are achieved and maintained. Information on the wilderness monitoring efforts and any changes to the measures and standards will be shared with the public.

Measures, Standards, and Management Strategies for the Five Qualities of Wilderness Character

The following analyses are related to the measures, standards, and management strategies presented in table 6, and are intended to provide more detail and clarification. The strategies presented in the text and table are not an exhaustive list, nor are they necessarily in priority order.

Untrammeled Quality. The measures for the untrammeled wilderness quality focus on authorized and unauthorized actions undertaken by federal land managers and others, respectively, that manipulate the biophysical environment. Within the eight wilderness areas discussed in this plan, these measures include

- number of authorized actions to manage plants, animals, pathogens, soil, water, or fire

- number of unauthorized actions to manage plants, animals, pathogens, soil, water, or fire

Tracking the number of projects per year that are authorized by the NPS and BLM in the wilderness, as well as those actions that are unauthorized, would provide useful information about trends over time. These measures support protection of wilderness character by maintaining the integrity of the wilderness and preventing impacts on the untrammeled wilderness quality. See table 6 for a detailed list of measures, standards, and associated management strategies. If standards are reached, management strategies may include indirect actions such as increased education for wilderness managers, researchers, partners, and volunteers to reduce impact resulting from restoration work and increased partnerships with neighboring landowners to exclude introduction of new invasive species into the wilderness. If indirect strategies are not effective, increased monitoring and patrol may occur, and more stringent efforts to enforce regulations to protect the resources would be considered.

Natural Quality. The measures for the natural quality focus on effects from modern civilization on wilderness ecological systems. This includes plant and animal species, physical resources, and biophysical processes. Within the eight wilderness areas addressed here, these include

- occurrences and extent of tamarisk
- extent and magnitude of disturbance to spring sites

These measures evaluate the occurrences and extent of tamarisk and the extent and magnitude of disturbance to spring sites. These measures were selected to evaluate disturbances by tamarisk to vegetation and soil resources that could potentially adversely affect the naturalness, natural resource processes, and distribution of wildlife and plant populations in the wilderness. Monitoring the number of occurrences and extent of tamarisk supports protection of wilderness character by maintaining the integrity of the native species found within the wilderness areas discussed here. Monitoring the extent and magnitude of disturbance to spring sites supports protection of wilderness character by determining the level at which natural feature qualities are being degraded. See table 6 for a detailed list of measures, standards, and associated management strategies. Should standards be reached, management strategies that could be implemented to mitigate impacts on natural character qualities include both indirect and direct management actions. Indirect management actions could include increased education, such as signage, brochures, and interpretive programming. The range of direct management actions include intense removal of tamarisk and revegetation, increased enforcement, restrictions on use such as temporary or permanent closures to spring sites, and restrictions on camping and fire use near spring sites.

Undeveloped Quality. The measure for the undeveloped quality focuses on effects on the primeval character of wilderness including improvements or influences from modern human occupation. Examples consist of nonrecreational structures, installations, and developments, and the use of motorized equipment or mechanical transport. Within the eight wildernesses discussed in this plan, the following measure was included:

- number of acres disturbed as a result of motorized/mechanized use

The measure developed under this quality evaluates the impact of developments in wilderness. The ideal standard is that no developments would exist in wilderness. Within the wilderness areas discussed in this plan, one measure was developed to monitor the amount of disturbed acreage as a result of motorized/mechanical use. Monitoring this measure supports protection of wilderness character by determining the level at which the primeval character of wilderness is being impacted by indications of anthropogenic developments created by motorized / mechanized use. The goal of the standard

established for the undeveloped quality is to ensure that that no net long-term decrease to wilderness character occurs. See table 6 for a detailed description of this measure, standard, and associated management strategies. If the standard is reached, management strategies may include both indirect and direct management actions. Indirect management actions could include increased education, such as Leave No Trace practices, as well as informational dissemination such as signage, brochures, and interpretive programming. The range of direct management actions include increased enforcement, fines, redirecting, restricting, or eliminating use, designating routes/trail as appropriate, eliminating excess routes/trails, use of natural barriers, as well as revegetation and implementation of natural barriers to disturbed trails and sites.

Solitude or Primitive and Unconfined Recreation. The measures for this quality help ensure that opportunities for solitude or primitive and unconfined recreation exist in wilderness. This includes a focus on remoteness from sights and sounds of people inside of wilderness, remoteness from occupied and modified areas outside of wilderness, facilities that decrease self-reliant recreation, management restrictions on visitors' behavior, and the effects of recreational developments in wilderness.

Specific measures developed for the eight wilderness areas discussed in this plan include

- number of trail encounters
- noise level
- human waste
- litter / trash dumping
- number of complaints received by management due to perceived user conflicts or crowding near climbing areas
- crowding
- number of informal campsites
- number of unofficial user-created trails
- fixed anchors, i.e., the number of bolt-intensive face climbs in wilderness
- fixed anchors, i.e., the number of fixed anchors on nonintensively bolted climbs in climbing areas

The Wilderness Act specifies that wilderness areas have opportunities for "solitude or a primitive and unconfined type of recreation." Solitude can be considered as the state or situation of being alone, while primitive and unconfined recreational opportunities allow for physical and mental challenges and personal growth in environments in which mistakes may have significant consequences (Borrie 2000; Dustin and McAvoy, 2000; Landres et al. 2008). Therefore, it is important that these elements be monitored through measures that embody the values of these characteristics. Monitoring this quality evaluates how opportunities for visitors to experience wilderness may change due to degradation from encounters with other visitors, human caused noise, and signs of use (e.g., human waste, litter) associated with anthropogenic presence (Landres et al. 2008). Crowding at climbing areas would also be monitored to ensure opportunities for solitude. See table 6 for a detailed list of measures, standards, and associated management strategies. Should standards be reached, management strategies may include both indirect and direct management actions. Indirect management actions could include increased education, such as Leave No Trace practices, as well as informational dissemination such as signage, brochures, and interpretive programming. The range of direct management actions include increased enforcement, fines, redirecting, restricting, or eliminating use, as well as installation of facilities and waste bags and removal of inappropriate items. For climbing areas, education and outreach may occur to inform the public that the use of fixed anchors should be rare in wilderness. Additionally, management teams may discourage the use of climbing in areas that are used for traditional tribal uses. If standards are reached in climbing areas, it may be necessary to regulate use (e.g., institute a permit system for placement and replacement of new fixed anchors). Where appropriate, removal of bolt-

intensive climbing routes may be necessary as directed by Director's Order 41.

Regarding climbing activities, the National Park Service recognizes that climbing is a legitimate and appropriate use of the wilderness and provides opportunities for solitude or primitive and unconfined recreation. In order to preserve this quality and to provide opportunities for all visitors and recreational groups to experience solitude in wilderness, park managers should monitor remoteness from sights and sounds of people near climbing areas. Park and BLM management may collect this information by tracking the number of complaints due to perceived user conflicts as related to traditional tribal uses. No more than five complaints per spring or fall climbing season should be documented in this regard before the range of indirect and direct management actions would be taken.

Crowding may be monitored by documenting the number of encounters with other user groups per climbing area in one day. At climbing areas that include higher numbers of bolt-intensive face climbs and greater concentration of fixed anchors, climbing management strategies would address ways to control, and in some cases reduce the number of bolt-intensive face climbs at individual climbing areas. These management strategies are intended to preserve the park's opportunities for solitude, in addition to protect the "untrammeled" and "undeveloped" qualities of the park's wilderness character. In addition to promoting minimum impact techniques and sound climbing ethics outlined in Leave No Trace, further education could be provided to climbers and other visitors on traditional tribal uses of climbing areas within the wilderness. In some cases these educational efforts may discourage climbing in areas that are used for traditional tribal uses.

When addressing recreational developments in wilderness, the ideal standard is that no developments would exist in wilderness. Within wilderness areas discussed in this plan, measures have been developed to monitor the amount of disturbed acreage as a result of the number of informal campsites, the number of unofficial user-created trails, the number of bolt-intensive face climbs in climbing areas, and the number of fixed anchors on nonintensively bolted climbs in climbing areas. Monitoring these measures supports protection of wilderness character by determining the level at which the primeval character of wilderness is being impacted by anthropogenic developments. The goal of the standards established for this quality is to ensure that that no net long-term decrease in wilderness character occurs. Should standards be reached, management strategies that could be implemented to mitigate impacts on natural character qualities include both indirect and direct management actions. Indirect management actions could include increased education, such as signage, brochures, and interpretive programming. The range of direct management actions include increased enforcement, restrictions on use such as temporary or permanent closures of spring sites, and restrictions on camping and fire use near spring sites.

For measures related to climbing activities and the use of fixed anchors for this quality, Director's Order 41 recognizes that the occasional placement of a fixed anchor for belay, rappel, or protection purposes does not necessarily violate the Wilderness Act. However, climbing practices with the least negative impact on wilderness qualities will always be the preferred choice (i.e., the use of temporary anchors and equipment that can be placed and removed without altering the environment will be preferred). Fixed anchors or fixed equipment should be rare in wilderness. Where the occasional fixed anchor must be placed, it must be placed judiciously in order to prevent the degradation of the wilderness character. Fixed anchors should not be placed merely for convenience or to make an otherwise "unclimbable" route climbable.

The establishment of bolt-intensive face climbs is considered incompatible with wilderness preservation and management due to the concentration of human activity that

they support. Bolt-intensive face climbs, by the nature of the rock surfaces they follow, require the placement of more than an "occasional" fixed anchor for protection purposes. They are climbs that would generally not be climbable without the placement of multiple fixed anchors bolted in a concentrated sequence, from the bottom to the top of a particular climb, including single pitch and multiple pitch climbs. In order to protect this quality, some bolt-intensive face climbs would be removed within the climbing areas.

By contrast, a nonintensively bolted climb may contain infrequent placements of fixed anchors and fixed equipment. Such anchors enable safe rappels when no other means of descent is possible, for example. These climbs may include anchors that connect terrain that is otherwise protected by removable anchors (e.g., one crack system or other natural feature to another) or when there are no features that will accommodate removable equipment but the occasional placement of a fixed anchor may provide a modicum of safety during the ascent. For climbs that meet these criteria, fixed anchors currently in place may remain or be replaced by permit.

When a climber determines the need for anchor placement or replacement, this request would be accomplished in compliance with current regulations (e.g., power drills are prohibited). Safety remains the responsibility of the climber. The National Park Service and Bureau of Land Management will not, as policy or practice, monitor fixed anchors to evaluate their condition or accept any responsibility for fixed anchors.

Other Features and Values. The fifth quality is based on the last clause of section 2(c) of the Wilderness Act which states that a wilderness "may also contain ecological, geological, or other features of scientific, educations, scenic, or historical value." The measures for the fifth quality focus on effects on other features and values in wilderness, including deterioration or loss of cultural resources integral to wilderness character. Within the eight wildernesses discussed in this plan, these include

- disturbance level to cultural sites
- disturbance level to rock art, other archeological sites, rocks, and government property
- number of visitors participating in nontraditional practices

The measures developed under this quality evaluate the impacts due to the loss of statutorily protected cultural resources. The ideal standard is that no loss of cultural resources would occur. Specifically, there would be no negative change in disturbance level of any given cultural site, and there would be no new evidence of graffiti or other vandalism on rock art, other archeological sites, rocks, and government property. Additionally, negative impacts on tribal members participating in traditional beliefs and practices would be minimized. Within the wilderness areas discussed in this plan, measures have been determined that monitor the disturbance level to cultural sites, rock art, archeological sites, rock and government properties, as well as concerns raised by the tribes. Monitoring these measures supports protection of wilderness character by determining the level at which the other features and values character of wilderness is being negatively impacted by loss of statutorily protected cultural resources. The goal of the standards established for the fifth quality is to ensure that that no net long-term decrease to wilderness character occurs. See table 6 for a detailed list of measures, standards, and associated management strategies. If standards are reached, management strategies may include both indirect and direct management actions. Indirect management actions could include increased education, such as Leave No Trace practices, as well as informational dissemination such as signage, brochures, and interpretive programming. The range of direct management actions include increased enforcement, surveillance, fines, redirecting, restricting, regulating, or eliminating use, as well as revegetation and implementation of

natural barriers on disturbed sites. To reduce the impacts on tribal members participating in traditional beliefs and practices, the following strategies may also be used: removal of routes/parking near areas, temporary or permanent closures, discouraging the use of traditional tribal sites being promoted for use, increased surveillance, signage near areas, and regulation of public use through a permit system.

TABLE 6. WILDERNESS MONITORING FRAMEWORK

UNTRAMMELED QUALITY Wilderness is essentially unhindered and free from modern human control or manipulation					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
What are the trends in actions that control or manipulate the "earth and its community of life" inside wilderness?	Actions authorized by the federal land manager that manipulate the biophysical environment	Authorized actions to manage plants, animals, pathogens, soil, water, or fire	Number of authorized actions to manage plants, animals, pathogens, soil, water, or fire	Maintain current number of authorized actions to manage plants, animals, pathogens, soil, water, or fire	• Increased education of staff, researchers, partners, and volunteers to reduce impact resulting from restoration work • Increased partnerships with neighboring landowners to exclude introduction of new invasive species into the wilderness
	Actions not authorized by the federal land manager that manipulate the biophysical environment	Unauthorized actions by agencies, citizen groups, or individuals that manipulate plants, animals, pathogens, soil, water, or fire	Number of unauthorized actions to manage plants, animals, pathogens, soil, water, or fire	No new occurrences of unauthorized actions to manage plants, animals, pathogens, soil, water, or fire	• Increase monitoring, patrol, and education • If management actions are not effective, more stringent efforts to enforce regulations to protect the resources would be considered

NATURAL QUALITY Wilderness ecological systems are substantially free from the effects of modern civilization					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
What are the trends in terrestrial, aquatic, and atmospheric natural resources inside wilderness?	Plant and animal species and communities	Occurrences and extent of tamarisk	Number of occurrences and extent of tamarisk within a one-half mile segment of wilderness	No new occurrences of tamarisk where they do not presently exist; no spread or growth of existing invasions	• Education • Revegetation • Intense management of areas if tamarisk spread begins to occur

NATURAL QUALITY Wilderness ecological systems are substantially free from the effects of modern civilization					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
		Disturbance of spring sites*	Level of disturbance to spring sites *Disturbance level defined by the Mojave Inventory and Monitoring Network arid land springs monitoring. Problem analysis would be needed to isolate visitor-caused impacts	No negative change in disturbance level of any given spring site, compared to the previously monitored baseline, and no spring sites above a moderate disturbance level (as indicated by the Mojave Inventory and Monitoring Network arid land springs monitoring program)	• Education • Revegetation • Increased enforcement • Removal of human structures and litter • Temporarily or permanently close areas • Restrictions on camping and fires

UNDEVELOPED QUALITY Wilderness retains its primeval character and influence, and is essentially without permanent improvement or modern human occupation					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
What are the trends in mechanization inside wilderness?	Use of motor vehicles, motorized equipment, or mechanical transport	Area of disturbance resulting from motorized/ mechanized use	Number of acres disturbed as a result of motorized/mechanized use	For each wilderness area, no increase from previously monitored baseline, within the acreage of disturbance resulting from motorized/mechanized use	• Education (regulations, appropriate behaviors, reporting process of illegal uses to staff) • Signage at wilderness boundaries • Increase surveillance • Impose fines • Improve interagency coordination

SOLITUDE OR PRIMITIVE AND UNCONFINED RECREATION QUALITY Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
What are the trends in outstanding opportunities for solitude inside wilderness?	Remoteness from sights and sounds of people inside the wilderness	Number of routes/ encounters	Number of encounters with other visitor groups during a visit to the wilderness area more than one-half mile from the wilderness boundary	Encounters with other groups (within sight and sound of one another) more than one-half mile from the wilderness boundary would be infrequent, with no more than eight groups encountered per day, with this standard exceeded no more than four days per year	• Education • Redistribute use (time and space) • Limit use (limit length of stay, group sizes, levels of use)
		Human-caused noise	Percentage of time certain sound pressure levels (35dBA, 45dBA, 52dBA, and 60dBA) are exceeded; details on the importance of these metrics can be found in the 2012 acoustical monitoring report (NPS 2012b) (A-weighted decibel [dBA] refers to the A-Weighted sum of sound energy across the range of human hearing. Humans do not hear well at very low or very high frequencies and weighting adjusts for this.)	No increase in the baseline exceedence levels noted in the 2012 acoustical monitoring report (NPS 2012b); standard may need to be updated as more information becomes available; may need to be an improvement from the 2012 conditions in some areas	• Education (Leave No Trace; appropriate behaviors) • Restrict activities • Limit levels of use • Implement zones to meet soundscape management objectives (see Marin et al. 2011)
		Human waste	Number of encounters with human waste	No more than 5% of visitors encounter evidence of human waste in the wilderness areas (standards would be achieved for 95% of all measurements or samples obtained through monitoring over the course of a visitor season)	• Remove human waste when observed • Education (Leave No Trace; appropriate behaviors) • Provide facilities at trailheads • Provide waste bags

SOLITUDE OR PRIMITIVE AND UNCONFINED RECREATION QUALITY Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
		Litter/trash dumping	Number of occurrences of dumping	No new occurrences of dumping	• Education (Leave No Trace, regulations, appropriate behaviors, reporting process of illegal use to staff) • Signage (informational wayside exhibits/kiosks) • Increase law enforcement • Immediate removal of dumped materials
		Litter	Number of pieces of litter* per mile of route *A "piece" of litter is considered to be at minimum, the size of shotgun shells and/or candy wrappers	No more than 5 pieces per mile of designated route; no geocaches	• Education (Leave No Trace) • Place trash receptacles (where appropriate) • Monitor for and remove the advertised geocaches from websites (with the exception of virtual geocaching activities)
What are the trends in climbing and how does that affect outstanding opportunities for solitude inside wilderness?	Remoteness from sights and sounds of people near climbing areas	Number of complaints received by management due to perceived user conflicts or crowding near climbing areas	Perceived user conflicts as related to traditional tribal uses, climbing use, and ability for all to achieve solitude	No more than 5 complaints per spring or fall season	• Education (Leave No Trace) • Education for climbers on traditional tribal use of areas • Discourage use of climbing in areas that are used for traditional tribal uses • Regulate public use (e.g., institute a permit system for placement and replacement of new fixed anchors); where appropriate, remove bolt-intensive climbing routes or parking near those climbing areas
		Crowding	Number of encounters with other user groups per climbing area in one day	No more than 3 encounters with other user groups per day while at climbing areas	• Education (Leave No Trace) • Education for climbers on traditional tribal use of areas • Discourage use of climbing in areas that are used for traditional tribal uses • Regulate public use (e.g., institute a permit system for placement and replacement of new fixed anchors) • Where appropriate, remove bolt-intensive climbing routes or parking near those climbing areas

SOLITUDE OR PRIMITIVE AND UNCONFINED RECREATION QUALITY Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
What are the trends for recreational development in wilderness and how does that affect opportunities for primitive and unconfined recreation?	Recreational structures, installations, and developments	Informal campsites	Number of informal campsites* per quarter mile and within 100 feet of sensitive resources *As evidenced by obvious fire activity (e.g., blackened soil, fire rings, burnt materials)	No more than one informal campsite per quarter mile; no user-created campsites within 100 feet of sensitive resources (springs, archeological sites, etc.)	• Education (resource sensitivity, appropriate behaviors, Leave No Trace) • Eliminate unofficial campsites • Designate official campsites / concentrated use areas • Assign campsite locations and/or travel routes • Temporarily or permanently close areas • Restrict building of campfires
		Unofficial user-created trails	Number of unofficial user-created trails to an area or feature	No more than 2 unofficial user-created trails that are outside of NPS/BLM marked trails (except for Spirit Mountain and Bridge Canyon wilderness areas where this measure would not be monitored)	• Education (concerning resource sensitivity; appropriate behaviors; Leave No Trace) • Designate routes/trails and signs accordingly • Eliminate excess routes/trails • Implement natural barriers • Limit use • Temporarily close areas
		Fixed anchors	Number of bolt-intensive face climbs in climbing areas	There would be no bolt-intensive face climbs in climbing areas	• Education (Leave No Trace) • Education for climbers that the use of fixed anchors should be rare in wilderness • Discourage use of climbing in areas that are used for traditional tribal uses • Regulate public use (e.g., institute a permit system for placement and replacement of new fixed anchors) • Where appropriate, remove bolt-intensive climbing routes or parking near those climbing areas

SOLITUDE OR PRIMITIVE AND UNCONFINED RECREATION QUALITY Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
			Number of fixed anchors on nonintensively bolted climbs in climbing areas	No new fixed anchors for nonintensively bolted climbs	• Education (Leave No Trace) • Education for climbers that the use of fixed anchors should be rare in wilderness • Discourage use of climbing in areas that are used for traditional tribal uses • Regulate public use (e.g., institute a permit system for placement and replacement of new fixed anchors)

OTHER FEATURES AND VALUES Wilderness retains its cultural resources integral to wilderness character					
Monitoring Question	**Indicator**	**Measure**	**What Does the Measure Evaluate?**	**Potential Standards**	**Potential Management Strategies**
What are the trends in cultural resources inside wilderness?	Deterioration or loss of cultural resources integral to wilderness character	Change in disturbance level to cultural sites	Measurable change from baseline*disturbance level to cultural sites *Disturbance levels defined by the Southern Nevada Agency Partnership Cultural Site Stewardship Program or other datasets	No negative change in disturbance level of any given cultural site, compared to the previously monitored baseline, and not cultural sites above a minor disturbance level (impact level 1)	• Take appropriate site stewardship action based on level of impact under the guidance of the park cultural resource specialists • Education • Restrictions on camping and fire • Restrictions on route use • Increased Enforcement • Removal of litter and other debris • Revegetation
		Incidences of graffiti or other vandalism on rock art, other archeological sites, rocks, and government property	Measurable change from baseline*disturbance level to rock art, other archeological sites, rocks, and government property	No new evidence of graffiti or other vandalism to rock art, other archeological sites, rocks, and government property	• Education (appropriate behaviors; regulations; process of reporting graffiti or other vandalism to staff) • Remove routes/parking near areas • Temporarily or permanently close areas • Discourage the site being advertised/promoted • Increase area surveillance • Impose fines/post warning signs • Regulate public use (e.g., institute a permit system)

What are the real / perceived impacts on ethnographic resources resulting from visitation?	Decreased opportunities for tribes to conduct / participate in tradition, belief, and practices	Number of occurrences by visitors interrupting or disturbing traditional practices	Reduction in opportunities for tribes to participate in traditional beliefs and practices	Impacts on tribal members participating in traditional beliefs and practices will be minimized. Therefore, no more than one occurrence will interrupt these practices per year.	• Education • Remove routes/parking near areas • Temporarily or permanently close areas • Discourage the site being advertised/promoted • Increase area surveillance • Impose fines/post warning signs • Regulate public use (e.g., institute a permit system)

MITIGATION MEASURES

Mitigation measures are the practicable and appropriate methods that would be used under the action alternatives to avoid or minimize harm to wilderness character, natural and cultural resources, visitors, and the visitor experience. The mitigation measures have been developed by using existing laws and regulations, best management practices, conservation measures, and other known techniques.

Note: Many of the mitigation measures below relate to construction of facilities, all of which would occur outside the wilderness areas.

NATURAL RESOURCES

General

Previously disturbed areas would be used whenever possible and new disturbance would be confined to carefully selected sites with as small a construction footprint as possible.

Natural and cultural resource staff would identify sensitive areas during design and planning stages and would be on-site during periods of construction, if necessary, to ensure that all mitigation and conservation measures are followed.

Best management practices would be implemented to reduce impacts on air and water quality and natural soundscapes.

Soils

Erosion control measures would be incorporated into development projects. Areas of disturbance would be rehabilitated through raking and, as appropriate, replacement of topsoil and revegetation.

Vegetation

Best management practices would be used to avoid the introduction of nonnative plant species. This would include prohibiting the use of imported fill, soil, or hay bales; ensuring all equipment is clean and free of foreign soil or seeds; minimizing new ground disturbance and initiating restoration of disturbed sites immediately; and monitoring disturbed areas for growth of nonnative species. All cacti and yuccas would be avoided or salvaged and replanted.

Wildlife

Visitor impacts on wildlife would be addressed through such techniques as visitor education programs, restrictions on visitor activities, and ranger patrols.

During any construction of facilities to support wilderness management, noise abatement measures would be implemented. These measures could include the following: a schedule to minimize impacts in noise-sensitive areas, use of the best available noise control techniques wherever feasible, use of hydraulically or electrically powered impact tools when feasible, and the location of stationary noise sources as far from sensitive uses as possible.

For occupied raptor nests, rock climbing would be prohibited up to 0.5 mile from the nest site.

Threatened, Endangered, and Rare Species

Surveys would be conducted for special status species, including rare, threatened, and endangered species, before taking any action that might cause harm. In consultation with

the U.S. Fish and Wildlife Service and the Nevada Department of Wildlife, appropriate measures would be taken to protect any sensitive species, whether identified through surveys or presumed to occur.

Prior to any surface disturbing activities associated with the implementation of this wilderness management plan, the following conservation measures would be implemented to ensure that the federally threatened Mojave desert tortoise (*Gopherus agassizii*) and its habitat are protected:

- Project areas would be surveyed for tortoises within 24 hours of the start of ground disturbance. If a tortoise is present, it would be allowed to move out of harm's way of its own volition.
- All project personnel would receive desert tortoise education, which would include information on the species' life history and legal status as well as all stipulations associated with project implementation.
- Litter control would be strictly enforced.
- Pets would be required to be under leash control at all times.
- Speed limits would be strictly enforced.
- Sites where vegetation is disturbed would be rehabilitated as soon as possible to restore habitat.

CULTURAL RESOURCES

As appropriate, archeological surveys and/or monitoring would precede any ground disturbance. National register-eligible or national register-listed archeological resources would be avoided to the greatest extent possible. If such resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with the Nevada State Historic Preservation Office and associated American Indian tribes. If during construction previously unknown archeological resources were discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented; if the resources cannot be preserved *in situ*, an appropriate mitigation strategy would be developed in consultation with the Nevada State Historic Preservation Office and associated American Indian tribes.

Sensitive traditional use areas would be protected to the extent feasible by avoiding or mitigating impacts on ethnographic resources and continuing to provide access to traditional use and spiritual areas.

Use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would be prohibited.

Visitors would be educated on the importance of protecting the wilderness areas' cultural resources and leaving these undisturbed for the enjoyment of future visitors.

VISITOR USE AND EXPERIENCES

Visitor safety concerns would be integrated into interpretive and educational programs.

Guidance consistent with Leave No Trace principles would be developed to educate visitors on minimizing impacts on wilderness areas.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

According to CEQ regulations implementing the National Environmental Policy Act, the environmentally preferable alternative is the alternative "that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the responsible official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative."

The environmentally preferable alternative is alternative B.

Alternative C would provide for more visitor use opportunities and increased information to visitors, compared to alternative B, but there also would be a higher potential for more impacts on wilderness resources and values in comparison with the preferred alternative.

SUMMARY TABLES

TABLE 7. SUMMARY OF THE WILDERNESS ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
Overall Concept	The National Park Service and the Bureau of Land Management would continue to provide minimal management of the eight wilderness areas. For the foreseeable future there would be no major change in the management of the wilderness areas.	The emphasis would be on wilderness character preservation while providing more opportunities for visitors to access some of the wilderness areas compared to alternative A.	The emphasis would be on continuing to preserve wilderness resources while providing additional opportunities for visitors to access several of the wilderness areas compared to alternatives A and B, particularly in the Pinto Valley and Spirit Mountain wilderness areas.
Wilderness Stewardship Program	No effort to institute a volunteer stewardship program.	A volunteer wilderness stewardship program would be established to aid in the management and monitoring of the wilderness areas.	Same as alternative B.
Collection of Natural Resources	Not permitted on NPS lands (with the exceptions of permitted scientific collecting). Permitted on BLM lands for non-commercial purposes.	Not permitted on NPS lands (with the exceptions of permitted scientific collecting). In the portions of the three wilderness areas managed by the Bureau of Land Management (the Eldorado, Ireteba Peaks, and Spirit Mountain wilderness areas) the collection of natural resources, including plants and rocks, for noncommercial purposes would continue to be allowed.	Same as alternative B. Same as alternative B.
Dogs and Other Pets	Pets would continue to be permitted, with pets required to be on leash on NPS lands.	Pets would be required to be under leash control at all times.	Same as alternative B.
Group Sizes	No limits on group sizes in the wilderness areas.	Groups would be limited to no more than 12 people, total, per group, including the leader of the group; groups larger than 12 would be divided.	Same as alternative B.

TABLE 7. SUMMARY OF THE WILDERNESS ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
Climbing, Mountaineering, and Canyoneering	No changes to management of climbing, mountaineering and canyoneering in the wilderness areas.	Areas close to sensitive resources, such as bird nesting areas, would be closed to climbing or scrambling during nesting periods. For occupied raptor nests, rock climbing would be prohibited up to 0.5 mile from nest sites. Use of climbing equipment (including climbing chalk) would be prohibited within a minimum of 50 feet of rock art.	Same as alternative B.
Jimbilnan Wilderness	No changes to management of the area; dispersed access to the area.	A kiosk and information would be provided at the intersection of Northshore and Boathouse road (Approved Road 97).	A kiosk and information would be provided at the intersection of Northshore and Boathouse road (Approved Road 97).
		To minimize camping impacts inside the wilderness area the existing designated camping areas located just outside the wilderness would be marked.	To minimize camping impacts inside the wilderness area the existing designated camping areas located just outside the wilderness would be marked.
Pinto Valley Wilderness	No changes to the Cottonwood Valley road or to Hamblin Peak.	A route to Hamblin Peak would be formalized (cairn system); all other routes would be removed and the area restored. A sign/information to Pinto Valley would be provided, with directions to Hamblin Peak at MP 18.2 off the Northshore Road. A sign/information would be provided at MP 25.5 off the Northshore Road; a route along the old road to the wash would be designated and maintained. A portion of the former Pinto Valley road would be designated a stock/hiker route; the remainder would be a designated hiking route. If appropriate, after evaluation for national register eligibility the old mine site in the Pinto Valley area would be restored	A route to Hamblin Peak would be formalized (possibility of designated trail) with a loop option. A sign/information to Pinto Valley would be provided, with directions to Hamblin Peak at MP 18.2 off the Northshore Road. A sign/information would be provided at MP 25.5 off the Northshore Road; a route along the old road to the wash would be designated and maintained; acknowledge the Boulder Wash route. Same as alternative B. If appropriate, after evaluation for national register eligibility the old mine site in the Pinto Valley area would be restored

TABLE 7. SUMMARY OF THE WILDERNESS ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
		to natural conditions. Horse and pack animal use will be limited to washes due to sensitive cryptogamic soils.	to natural conditions. An informational kiosk at the Redstone picnic area (MP27) would be provided. Horse and pack animal use will be limited to washes due to sensitive cryptogamic soils.
Black Canyon Wilderness	No change to access to Boy Scout Canyon. No new signs, trailheads, or kiosks provided.	An access point and information signs would be established at Boy Scout Canyon Road (Approved Road 59) on the route that leads to the canyon.	An access point and information signs would be established at Boy Scout Canyon Road (Approved Road 59) on the route that leads to the canyon.
		An access point would be established on Boy Scout Canyon (via North Boy Scout Canyon Road 75D, unnamed wash) and a route would be designated down the unnamed wash. A designated route would lead down Boy Scout Canyon. A kiosk would be provided at Canyon Point Road Overlook (view into wilderness area). Informational signs would be provided at the entry of every road to Black Canyon Wilderness. Informational signs on the wilderness area would be provided at the national recreation area boundary. The old signs in Boy Scout Canyon/Wash would be removed.	An access point would be established on the Boy Scout Canyon (via North Boy Scout Canyon Road 75D, unnamed wash) and a route would be designated down the unnamed wash. A designated route would lead down Boy Scout Canyon. A kiosk would be provided at Canyon Point Road Overlook (view into wilderness area). Informational signs would be provided at the entry of every road to Black Canyon Wilderness. Informational signs on the wilderness area would be provided at the national recreation area boundary. The old signs in Boy Scout Canyon/Wash would be removed.
Eldorado Wilderness	Minimal management of area would continue. No additional access or educational materials provided by the agencies.	An access point would be established at Nevada State Route 165, providing visitor information on a designated route into the wilderness area along Oak Creek and Lonesome Wash.	An access point would be established at Nevada State Route 165, providing visitor information on a designated route into the wilderness area along Oak Creek and Lonesome Wash.

TABLE 7. SUMMARY OF THE WILDERNESS ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
		An access point would be established at the end of Yucca Camp Road (Approved Road 51) into the wilderness area. A wilderness boundary sign would be placed at the end of Approved Road 49 where the wilderness area begins.	An access point would be established at the end of Yucca Camp Road (Approved Road 51) into the wilderness area. A wilderness boundary sign would be placed at the end of Approved Road 49 where the wilderness area begins.
Ireteba Peaks Wilderness	No change; minimal management of area would continue.	No change to access or visitor management of this area. Restoration work would occur at Tule Spring.	No change to access or visitor management of this area. Restoration work would occur at Tule Spring.
Nellis Wash Wilderness	No change; minimal management of area would continue.	Same as alternative A.	An access point and information sign would be provided off Approved Road 22.
Spirit Mountain Wilderness	Day use and dispersed overnight camping would continue to be permitted on both BLM and NPS lands in the wilderness area. No new access provided to the area. Pipe Spring Road parking area would continue to be maintained. Prohibition on car camping in this area would continue (NPS only). No new action would be taken to manage climbing or bouldering. No action would be taken to encourage or discourage visitors from hiking up Spirit Mountain; visitors would continue using user-created trails to hike up to the top of Spirit Mountain.	Day use and dispersed overnight camping would continue to be permitted on both BLM and NPS lands in the wilderness area. Informational signs would be developed as needed at the Spirit Mountain trailhead on Christmas Tree Pass. No fixed anchors and equipment would be permitted; all existing fixed anchors and equipment would be removed if it can be done so without damaging the rock face. No action would be taken to encourage or discourage visitors from hiking up Spirit Mountain; visitors would continue using user-created trails to hike up to the top of Spirit Mountain.	Only day use would be permitted on both BLM and NPS lands in the wilderness area. Informational signs would be developed as needed at the Spirit Mountain trailhead on Christmas Tree Pass. No fixed anchors and equipment would be permitted; all existing fixed anchors and equipment would be removed if it can be done so without damaging the rock face. A designated route would be established to the summit of Spirit Mountain (need consultation with tribe). A second route from the southeast side of Spirit Mountain also would be designated to the summit. The summit register on Spirit

TABLE 7. SUMMARY OF THE WILDERNESS ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
			Mountain provides valuable information on use of the area and would be retained. Routes would be designated in Sacatone Wash, lower Grapevine Canyon, and to Pipe Spring.
		Information signs would be installed as needed at Sacatone Wash and Christmas Tree Pass Road and on Pipe Spring Road, at the beginning of the route to Pipe Spring.	Information signs would be installed as needed at Sacatone Wash and Christmas Tree Pass Road and on Pipe Spring Road, at the beginning of the route to Pipe Spring.
		Informational kiosks would be developed as needed at the junction of Approved Road 20 and Nevada State Route 163, and at the junction of U.S. Highway 95 and Approved Road 20, and an information sign would be placed as needed at the junction of Nevada Telephone Cove Road and Nevada State Route 163. The Lower Grapevine Canyon Road (Approved Road 13) would be converted to a route.	Informational kiosks would be developed as needed at the junction of Approved Road 20 and Nevada State Route 163, and at the junction of U.S. Highway 95 and Approved Road 20, and an information sign would be placed as needed at the junction of Nevada Telephone Cove road and Nevada State Route 163. An access point would be established off of Christmas Tree Pass Road at Grapevine Canyon.
Bridge Canyon Wilderness	Parking area would be located at Sacatone Wash and Christmas Tree Pass Road into wilderness. Trailhead at Grapevine Canyon area would also have parking area/turnaround at the end of Approved Road 18.	An access point would be established at Sacatone Wash off of Christmas Tree Pass Road. An access point would be established at upper Grapevine Canyon. An access point would be established at the junction of Nevada State Route 163 and Approved Road 18. The Spirit Mountain kiosks on Christmas Tree Pass, at the intersection of Nevada State Route 163 and Christmas Tree Pass and at U.S. Highway 95 and Christmas Tree Pass would also provide information on the Bridge Canyon Wilderness. An informational kiosk would	An access point would be established at Sacatone Wash and Christmas Tree Pass Road. An access point would be established at upper Grapevine Canyon and a formal route would be maintained. An access point would be established at the junction of Nevada State Route 163 and Approved Road 18. The Spirit Mountain kiosks on Christmas Tree Pass, at the intersection of Nevada State Route 163 and Christmas Tree Pass and at U.S. Highway 95 and Christmas Tree Pass would also provide information on the Bridge Canyon Wilderness. An informational kiosk would

TABLE 7. SUMMARY OF THE WILDERNESS ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
		be placed as needed in the lower Grapevine Canyon parking area off of Approved Road 20. No new fixed anchors or fixed equipment, with the exception of permitted replacement anchors, would be allowed; after an inventory of climbing routes is completed, the National Park Service would work with tribes and partners to reduce the concentration of existing bolt-intensive face climbs. Approved Road 18 would be converted to a hiker route in the national recreation area.	be placed as needed in the lower Grapevine Canyon parking area off of Approved Road 20. No new fixed anchors or fixed equipment, with the exception of permitted replacement anchors, would be allowed; after an inventory of climbing routes is completed, the National Park Service would work with tribes and partners to reduce the concentration of existing bolt-intensive face climbs.

TABLE 8. SUMMARY OF KEY IMPACTS OF THE ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
NATURAL RESOURCES – Soils	Some soils would be compacted, eroded, and lost, and some soil properties would be altered due to visitor use in localized areas such as along routes, in washes, and at particular points of interest such as at Boy Scout Canyon and Spirit Mountain. These adverse impacts on soils and cryptogamic soil crust would probably be minor to moderate, highly localized, and long term.	Some soils would be eroded and lost and some soil properties would be altered. This would be due to the use of designated routes and from visitor use in localized areas, such as in washes, and at specific points of interest. Overall, these adverse impacts would probably be minor and long-term in extent. On the other hand, establishing a route up Hamblin Peak in the Pinto Valley Wilderness, monitoring wilderness character, and applying visitor use management measures should help prevent the development of new user-created trails and resulting soil erosion, compaction or loss; this would have a long-term, beneficial impact.	Some soils would be eroded and lost and some soil properties would be altered. This would be due to the use of designated routes and from visitor use in localized areas, such as in washes, and at specific points of interest. Overall, these adverse impacts would probably be minor and long-term in extent. On the other hand, establishing a route up Hamblin Peak in the Pinto Valley Wilderness, monitoring wilderness character, and applying visitor use management measures should help prevent the development of new user-created trails and resulting soil erosion, compaction or loss; this would have a long-term, beneficial impact.
NATURAL RESOURCES – Vegetation	Some impacts would occur due to visitor use in the formation of user-created, unofficial trails,	Some long-term, negligible to minor, adverse impacts would occur in local areas due to the	Some long-term, negligible to minor, adverse impacts would occur in local areas due to the

TABLE 8. SUMMARY OF KEY IMPACTS OF THE ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
	and illegal OHV use. These adverse impacts would probably be localized, minor to moderate, and long-term in extent. Nonnative plants would probably continue to spread in the wilderness areas, resulting in unknown, long-term, adverse impacts on native vegetation. However, continuing efforts to control nonnative species would probably have a long-term, beneficial impact in local areas.	use of new, designated routes and from visitor use in localized areas. The existence and spread of nonnative plants would continue to have a negligible to minor, long-term, adverse impact on native vegetation. However, efforts to restore native vegetation, remove user-created trails, monitor wilderness character and apply visitor use management measures would probably have long-term, beneficial impacts on native vegetation in localized areas.	use of new, designated routes and from visitor use in localized areas. The existence and spread of nonnative plants would continue to have a negligible to minor, long-term, adverse impact on native vegetation. However, efforts to restore native vegetation, remove user-created trails, monitor wilderness character and apply visitor use management measures would probably have long-term, beneficial impacts on native vegetation in localized areas.
NATURAL RESOURCES – Terrestrial Wildlife	Some wildlife habits and movements may be altered due to increased visitor use in localized areas such as in pull-offs outside the wilderness areas, along popular routes, and at points of interest. Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use.	Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use of the wilderness areas. There would also be long-term, beneficial impacts on some wildlife populations due to vegetation restoration efforts and the closure and restoration of roads and unofficial user-created trails in the wilderness areas.	Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use of the wilderness areas. There would also be long-term, beneficial impacts on some wildlife populations due to vegetation restoration efforts and the closure and restoration of roads and unofficial user-created trails in the wilderness areas.
NATURAL RESOURCES – Special Status Species	A few individual state-listed species (Las Vegas bear poppy, threecorner milkvetch, and sticky buckwheat) may be lost or damaged due to visitor use in the future in localized areas, and rarely some desert tortoise may be harassed by visitors, but this would be expected to have a negligible to minor, long-term, adverse effect on these populations. The alternative would not affect the integrity, distribution, or presence of the desert tortoise and the three state-listed plant species in the wilderness areas. Overall, alternative A may affect, but would not be likely to adversely affect, the desert tortoise.	Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use of the wilderness areas. There would also be long-term, beneficial impacts on some desert tortoise, state-listed plant populations, and a BLM sensitive plant species due to vegetation restoration efforts, and the closure and restoration of unofficial user-created trails in the wilderness areas. Overall, alternative B may affect, but would not be likely to adversely affect, the desert tortoise.	Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use of the wilderness areas. There would also be long-term, beneficial impacts on some desert tortoise, state-listed plant populations, and a BLM sensitive plant species due to vegetation restoration efforts, and the closure and restoration of unofficial user-created trails in the wilderness areas. Overall, alternative C may affect, but would not be likely to adversely affect, the desert tortoise.

TABLE 8. SUMMARY OF KEY IMPACTS OF THE ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
NATURAL RESOURCES – Natural Soundscape	Some long-term, minor to moderate, adverse impacts on soundscapes would occur due to visitor use in localized areas such as at parking areas, along popular routes and at points of interest, such as Boy Scout Canyon and Hamblin Peak, illegal OHV use, and boating traffic on Lake Mead and Lake Mohave.	Some natural soundscapes would be degraded due to visitor use in localized areas such as along routes, in washes, in high use areas such as at Boy Scout Canyon, and in some wilderness areas where boating traffic on Lake Mead and Lake Mohave can be heard. These adverse impacts would probably be negligible to minor and long term in extent. Continuing efforts to monitor and establish a baseline for natural soundscapes in the wilderness areas, and to develop and implement of mitigation measures would result in a long-term, beneficial impact on the natural soundscapes. Monitoring wilderness character and visitor use management measures would also result in long-term, beneficial impacts on the natural soundscape in the wilderness areas.	Some natural soundscapes would be degraded due to visitor use in localized areas such as along routes, in washes, in high use areas such as Boy Scout Canyon, and in some wilderness areas where boating traffic on Lake Mead and Lake Mohave can be heard. These adverse impacts would probably be minor and long-term in extent. Continuing efforts to monitor and establish a baseline for natural soundscapes in the wilderness areas, and to develop and implement mitigation measures would result in a long-term, beneficial impact on the natural soundscapes. Monitoring wilderness character and visitor use management measures would also result in long-term, beneficial impacts on the natural soundscape in the wilderness areas.
WILDERNESS CHARACTER	The no-action alternative would have no effect on most qualities of wilderness character; however, there would continue to be a long-term, moderate adverse impact on other features of value wilderness character (cultural resources) primarily) in the Spirit Mountain and Bridge Canyon wilderness areas due to continuing hiking, climbing, and bouldering in two wilderness areas, and use of fixed anchors.	Alternative B would have a long-term, minor beneficial impact on wilderness character, primarily due to efforts to improve the natural, undeveloped, and solitude qualities, and other features of value in several of the wilderness areas; minor to moderate, long-term beneficial impact on other features of value (cultural resources), primarily due to the changes in climbing that would occur in two wilderness areas.	Alternative C would have a long-term, minor beneficial impact on wilderness character, primarily due to efforts to improve the natural, undeveloped, and solitude qualities and other features of value in several of the wilderness areas; minor long-term beneficial impact other on other features of value (cultural resources), primarily due to the changes in climbing that would occur in two wilderness areas.

TABLE 8. SUMMARY OF KEY IMPACTS OF THE ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
CULTURAL RESOURCES – Archeological Resources	In alternative A, there would be some long-term indirect negligible to minor adverse impacts on the wilderness areas' archeological sites as current practices continue and visitation remains light. There would be no adverse effect under section 106 of the National Historic Preservation Act for archeological sites in the various wilderness areas.	Overall, there would be a potential negligible to minor adverse impact from actions proposed in alternative B. Most of the wilderness areas' archeological resources would not be affected by the actions in alternative B. With the creation of designated routes and increased visitor use in localized areas such as along routes, in washes, and at specific points of interest, there may be some minor adverse impacts on archeological sites from trampling or vandalism. Overall, these adverse impacts would probably be minor, although permanent. On the other hand, establishing and monitoring wilderness character and visitor use management measures should help prevent any moderate adverse impacts on archeological sites and instead, could have a beneficial impact through increased preservation and monitoring. Under section106 requirements, the determination of effect would be no adverse effect for the negligible to minor impacts.	The creation of designated routes and increased visitor use in localized areas such as along routes, in washes, and at specific points of interest, would create some negligible to minor adverse impacts on archeological sites due to trampling or vandalism; however, most of these impacts would probably be avoidable. If they occur, these adverse impacts probably would be negligible to minor, although long term. Additionally, establishing and monitoring wilderness character and visitor use management measures should help prevent any moderate adverse impacts on archeological sites and instead could have a moderate beneficial impact through increased preservation and monitoring. Under section106 requirements, the determination of effect would be no adverse effect for the negligible to minor impacts.
CULTURAL RESOURCES – Ethnographic Resources	Alternative A would have some adverse impacts on the wilderness areas' only traditional cultural property, Spirit Mountain—located in the Spirit Mountain Wilderness. Continued use of the area without instituting some controls on visitor use through the establishment of designated trailheads and signs may result in continuing negligible to minor adverse impacts as visitation remains light. A negligible to minor adverse impact would constitute no adverse effect under section106. However, if a moderate adverse impact is noted, the determination of effect on this national register-	Alternative B would have some negligible to minor long-term adverse impacts on the wilderness areas' only traditional cultural property, Spirit Mountain, located in the Spirit Mountain Wilderness. A negligible to minor adverse impact would be considered a no adverse effect under section 106. However, if a moderate adverse impact is noted, the determination of effect on this national register-listed property for section 106 would be an adverse effect. Implementation of alternative B would result in negligible to minor, long-term adverse effects to ethnographic resources. The determination of effect for section 106	Alternative C would have some adverse negligible to minor long-term impacts on the wilderness areas' only traditional cultural property, Spirit Mountain—located in the Spirit Mountain Wilderness. A negligible to minor adverse impact would be a no adverse effect under section 106. However, if a moderate adverse impact is noted, the determination of effect on this national register-listed property for section 106 would be an adverse effect. It is likely that directed use in the Spirit Mountain Wilderness would serve to keep impacts in the negligible to minor range. Implementation of alternative

TABLE 8. SUMMARY OF KEY IMPACTS OF THE ALTERNATIVES

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C
	listed property for section106 requirements would be an adverse effect.	requirements would be no adverse effect.	C would result in negligible to minor, long-term adverse effects to ethnographic resources. The determination of effect for section 106 requirements would be no adverse effect.
VISITOR USE AND EXPERIENCE	Implementing the no-action alternative would result in the continuation of existing adverse and beneficial impacts on visitor use of the wilderness areas. This alternative would not change how visitors use the areas and would have no effect on the number of visitors; therefore, this alternative would have no new impact on visitor use or experience.	Implementing the preferred alternative would change how visitors use the areas and could increase the number of visitors, which would have a long-term, negligible to minor, beneficial impact and a long-term negligible adverse impact on visitor use or experience.	Implementing alternative C would change how visitors use the areas and would increase the number of visitors; this would have a long-term, minor, beneficial impact and long-term, negligible to minor, adverse impacts on visitor use and experience.

CONSISTENCY OF THE ALTERNATIVES WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

CEQ regulations (40 CFR 1502.2(d)) require a determination of how each alternative being analyzed in detail would or would not achieve the policies of section 101(b) of the National Environmental Policy Act. The policies in section 101(b) are to:

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations
2. assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings
3. attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences
4. preserve important historic, cultural, and natural aspects of our national heritage, and, wherever possible, maintain an environment that supports diversity and variety of individual choice
5. achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources

Of the three alternatives considered, alternative B best satisfies the national environmental goals—it provides the highest level of protection of wilderness resources while concurrently improving access opportunities to the areas and providing for an appropriate range of neutral and beneficial uses of the environment. The preferred alternative maintains an environment that supports a diversity and variety of individual choices, and it integrates resource protection with an appropriate range of visitor uses and understanding.

The preferred alternative (alternative B) surpasses the other alternatives in realizing the full range of the section 101 national environmental policy goals. The no-action alternative does not provide as much resource protection as the preferred alternative. The no-action alternative does not balance population and resource use because, unlike alternative B, there would be no wilderness character monitoring and visitor use management framework to proactively manage impacts from future visitor use. In addition, the preferred alternative would provide more opportunities for public enjoyment and understanding of the wilderness areas than the no-action alternative, and thus better fulfills criteria 3, 4, and 5.

Alternative C would provide for more visitor use opportunities and increased information to visitors, compared to alternative B, but there also would be a higher potential for more impacts on wilderness character and values in comparison with the preferred alternative. In addition, current and expected use levels for the eight wilderness areas do not justify the higher level of management that would occur under alternative C. Thus, alternative C would not satisfy criterion 3 (attain the widest range of beneficial uses of the environment without degradation or other undesirable consequences) and criterion 4 (preserve important aspects of our national heritage) as well as the preferred alternative satisfies these criteria.

Chapter Four:
The Affected Environment

INTRODUCTION

This chapter describes the natural and cultural resources, visitor use and experiences, and wilderness character of the eight wilderness areas that might be affected either directly or indirectly by implementing any of the alternatives. This chapter is not a complete description of the eight wilderness areas' environment. For additional information on the areas' environment, see http://www.nps.gov/lame/naturescience/areawilderness.htm.

NATURAL RESOURCES

SOILS

Soils within the wilderness areas are generally shallow, friable, wind-deposited or alluvial materials that are very susceptible to wind and water erosion. Erosive forces cause significant, sometimes dramatic, and long-lasting changes in physiography. Evaporation rates are much greater than precipitation and this creates extremely low soil moisture conditions throughout the year, which severely restricts plant growth. Burros also establish trails; this increases soil compaction and soil erodibility, and decreases cryptogamic soil density. Modification by use or development causes loss of soils. This soil damage is slow to heal because of the lack of precipitation and slow plant growth.

Lithosols are thin, stony surface soils derived from rocky parent materials, which characterize the slopes and crests of parallel desert ranges. These soils support scant growths of desert shrubs. Areas include desert ranges, such as Eldorado, Newberry, and Black mountains; the crests, rocky slopes, and upper part of some associated alluvial slopes; and steep-walled canyons.

Red desert soils are pinkish, reddish, and brownish-gray soils, which are commonly only slightly leached, rich in lime and mineral plant nutrients. They are derived from alluvial outwash from a great variety of rocks in the mountain ranges (metamorphic, granitic, volcanic, and sedimentary). Red desert soils include stony to gritty alluvium of fan deposits and finer basin interior deposits. These soils support creosotebush, leguminous trees, cacti, etc. Areas include desert basins, Eldorado Valley, and others.

Six primary soil types are found in Lake Mead National Recreation Area (NPS 2002). All of these soil series would be expected to occur in the wilderness areas as identified in table 9.

The creosotebush community soils typically develop on gray alluvium and generally have high salt-alkali contents that often form caliche hardpans.

The desert riparian community soils are usually silty to sandy but become quite rocky at the higher elevations.

Soils and People

In the past, livestock grazing affected portions of the wilderness areas, and one mine was located in the Spirit Mountain Wilderness. Burros also establish trails; this activity increased soil compaction and soil erodibility, and decreased cryptogamic crust density.

Another major source of soil disturbance has been tracks from off-highway vehicles, both before and after the wilderness areas were established. A small percentage of the users of Lake Mead National Recreation Area's approved roads system and nearby BLM roads leave the approved roads and illegally create new tracks and trails. Surveys by NPS rehabilitation crews have shown a serious documented increase in illegal OHV damage over the last several years. Illegal OHV use has been identified to be a problem in Black Canyon, Eldorado, Ireteba Peaks, Nellis Wash, Spirit Mountain, and Bridge Canyon. Vehicles enter the wilderness areas from nearby roads or from roads that were bounded by wilderness areas. While the numbers of vehicles illegally going into most of the wilderness areas is believed to be relatively small, they can cause substantial damage.

The presence of illegal vehicle tracks also is a visual invitation for others to do the same (NPS 2002).

TABLE 9. SOIL TYPE AND VEGETATION

Type	Description	Vegetation
Carrizo	Deep, excessively drained soils formed in stratified alluvium, on floodplains and alluvial fans	Sparse growth of cactus, creosotebush, white bursage, mesquite
Drygyp	Very shallow to a petrogypsic horizon, somewhat excessively drained soils that formed in alluvium derived from gypsum rock	Mainly creosotebush, white bursage, range ratany, catclaw, Mormon tea, and big galleta
Heleweiser	Very deep, somewhat excessively drained soils formed in alluvium derived from basalt, sandstone, and limestone	Mainly creosotebush, white bursage, range ratany, and big galleta
Chem	Very shallow and shallow over a duripan, well-drained soils on fan remnants, formed in alluvium from mixed rocks over semi-consolidated gravelly sediments	Mainly creosotebush, white bursage, ratany, white brittlebush, and red brome
Gypwash	Very deep, somewhat excessively drained soils that formed in alluvium derived dominantly from limestone	Mainly white bursage and creosotebush
Huevi	Very deep, well-drained soils that formed in semi-consolidated alluvium from mixed rock sources	Mainly creosotebush, range ratany, and various annuals

SOURCE: NPS 2002

Off-highway vehicle driving is extremely damaging to fragile and irreplaceable desert soils, threatening the long-term ecosystem sustainability of the wilderness areas. Mojave Desert soils are stabilized not so much by vascular plants as by cryptogamic soil crusts and a mosaic of rock mulch called desert pavement. Motorcycles, all-terrain vehicles and other off-highway vehicles create ruts, pulverize and disperse surface soil, compact the subsurface soil, demolish chemically bonded surface crusts and protective layers of desert pavement, and crush and destroy the cryptogamic crust that bind the soil together (NPS 1989). If these protective layers are removed, these areas are then vulnerable to wind, water, and mechanical erosion. Exposed soils are subsequently lost to wind and water erosion, removing all nutrients, microbiota, and seed in the process. Natural recovery after disturbance may take several decades to thousands of years without active restoration or other intervention (NPS 2002).

VEGETATION

Overview of Vegetative Communities

The vegetation of the eight wilderness areas contains species representative primarily of the Mojave Desert. However, differences in elevation, presence of water (i.e., springs), soils, and other environmental factors affect the location and extent of vegetative communities found in the wilderness areas. The Spirit Mountain Wilderness contains more diverse vegetative communities than the other wilderness areas to the north due to its higher elevation, geographical features, and its Sonoran Desert plants, which are at the edge of their range and intermix with the Mojave Desert vegetation here.

Desert vegetation is mainly found on the flats and slopes throughout the wilderness areas up to 6,000 feet. The dominant vegetative communities in this area are creosotebush-bursage and Mojave mixed shrub. Together, these two communities comprise some 98% of the wilderness areas. The creosotebush-

bursage community is widespread in all of the wilderness areas, and occurs below 4,000 feet in valley bottoms and lowlands of mild slope aspect. It is locally well-developed on lower bajadas, alluvial fans, and playas. It may be found occasionally at higher elevations on arid, south-facing slopes. Near the Colorado River, the topography occupied by this community is especially rocky and rugged. Vegetation cover is sparse in this community and dominated by creosotebush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Primary associated shrub species can include blackbrush (*Coleogyne ramosissima*, usually at higher elevations), Mormon tea (*Ephedra* spp.), indigo bush (*Psorothamnus fremontii*), shadscale (*Atriplex confertifolia*), hopsage (*Grayia spinosa*), desert thorn (*Lycium* spp.), ratany (*Krameria erecta*), cheesebush (*Hymenoclea salsola*), honey mesquite (*Prosopis glandulosa*), and brittlebush (*Encelia farinosa*). Other associated species can include yucca (*Yucca* spp.), and prickly pear cactus (*Opuntia erinacea*) Profusions of annual wildflowers can be observed in this community in the spring.

The creosotebush-bursage community can transition into a blackbrush dominated community which occurs on upper bajadas (alluvial fans on the lower slopes of mountains), slopes, and valleys below 5,900 feet. The blackbrush community is similar but of greater density than the creosotebush community. This community is dominated by blackbrush, with the primary associated shrubs including spiny hopsage, Mormon tea, shadscale, desert thorn, snakeweed (*Gutierrezia sarothrae*), and creosotebush. Matchweed (*Gutierrezia microcephala*) is also frequently associated with this community.

Mojave mixed shrub is the other major vegetative community in the wilderness areas. This community occurs on upper bajadas and hills at elevations from about 3,250 feet to 4,000 feet. Vegetation in this community is quite variable. Codominants and diagnostic species include blackbrush, California buckwheat (*Eriogonum fasciculatum*), Nevada ephedra (*Ephedra nevadensis*), Hopsage (*grayia spinosa*), spiny menodora (*Menodora spinescens*), beargrass, buckhorn cholla (*Opuntia acanthocarpa*), goldeneye shrub (*Viguiera parishii*), Joshua tree (*Yucca brevifolia*), Mohave yucca (*Yucca schidigera*), and banana yucca (*Y. baccata*). Desert grasses, including ricegrass (*Achnatherum hymenoides*), desert needlegrass (*Achnatherum speciosum*), bush muhly (*Muhlenbergia porteri*), big galleta grass (*Pleuraphis rigida*), and black grama (*Bouteloua eriopoda*) may form an herbaceous layer. Desert scrub species may also be present as well as the tree species little Utah juniper (*Juniperus osteosperma*).

The desert lowland riparian community comprises vegetation in local desert washes, which is not dramatically different in growth-form from that of the surrounding desert shrub and tree communities. Plants are comparable but usually occur in greater density in the desert riparian community because of greater occurrence of water. It is scattered like fingers through the landscape. Tree species present in the lowland riparian areas include: catalpa or desert willow (*Chilopsis linearis*), mesquite (*Prosopis glandulosa*), and cat's claw acacia (*Acacia greggii*). In addition, common shrubs include brittlebush (*Encelia farinosa*), sweetbush (*Bebbia juncea*), cheesebush, and desert rabbitbrush (*Chrysothamnus paniculatus*).

In areas with springs various aquatic plant species can be expected, and the peripheries of springs may have a number of sedges (*Carex sp.*), rushes (*Juncus sp.*), cattails (*Typha sp.*), saltgrass (*Distichlis spicata*), and salt-tolerant shrubs. Cottonwoods (*Populus fremontii*), mesquite, desert willow, and tamarisk may also be found in these mesic soils.

An important component of many of the vegetative communities in the wilderness areas is the cryptogamic (or microphytic) crust. Composed of fungus, algae, lichen, and mosses, which grow on or just below the soil surface, the crusts play an important role in soil stabilization in deserts. They have the potential of slowing soil erosion by wind and

water, enhancing infiltration of precipitation, and stimulating vascular plant growth through improved soil, water, and available nitrogen relations.

Jimbilnan Wilderness

The vegetation in the Jimbilnan Wilderness[1] is primarily composed of Mojave mixed scrub and creosotebush-bursage communities. The flats and bajadas are dominated by species such as creosotebush, white bursage, indigo bush, Mojave yucca, a few beavertail cactus (*Opuntis basilaris*), and many other low-growing desert shrubs.

The mountain slopes include species such as creosotebush, white bursage, Nevada ephedra, Schott's pygmycedar (*Peucephyllum schottii*), desert stingbush (*Eucnide urens*), sweetbush, brittlebush, and barrel cactus (*Ferocactus cylindraceus*). Washes support a diverse array of shrub (e.g., catclaw acacia [*Acacia greggii*], cheesebush, and rabbitbrush [*Chrysothamnus* spp.]) and forb species (e.g., desert tobacco [*Nicotiana obtusifolia*] and groundcherry [*Physalis lobata*]).

A community of largely gypsophile plants (plants that thrive on gypsum soils) occurs in the mud hills in the Jimbilnan Wilderness, and to a lesser extent in the Pinto Valley Wilderness. Common plants of this community are pygmy cedar (*Peucephyllum schottii*), indigo bush, Mormon tea, shadscale, desert holly (*Atriplex hymenelytra*), and globe mallow (*Sphaeralcea ambigua*). The Las Vegas bearpoppy (*Arctomecon californica*), listed as threatened by the state of Nevada, occurs here. Other plants found here include sunray (*Enceliopsis argophylla* var. *grandiflora*), Palmer's phacelia (*Phacelia palmeri*), Parry's sandpaper bush (*Petalonyx parryi*), desert trumpet (*Eriogonum inflatum*), prickly poppy (*Argemone sp.)*, and desert stingbush (*Eucnide urens*). Two nonnative species, Russian thistle (*Salsola* spp.) and tamarisk (*Tamarix ramosissima*), occur in the area.

Two rare, state-listed plant taxa probably occur on sandy soils in this area: threecorner milkvetch (*Astragalus geyeri* var *triquetrus)* and sticky buckwheat (*Eriogonum viscidulum*) (Bangle 2008).

Pinto Valley Wilderness

The vegetation here is similar to that found in Jimbilnan Wilderness. The vegetation generally is sparse Mojave desert scrub, dominated by creosotebush and white bursage, but with a diverse flora of annual and perennial plants. Several cactus species occur in the area, including beavertail pricklypear cactus, silver cholla (*Opuntia echinocarpa*), cottontop cactus (*Echinocactus polycephalus*), common fishhook cactus (*Mammillaria tetrancistra*), and California barrel cactus (*Ferocactus cylindraceus*).Washes support a variety of shrubs, including catclaw acacia, and honey mesquite. Sandstone Spring supports honey mesquite,catclaw acacia, desert almond (*Prunus fasciculata*), four-wing saltbush (*Atriplex canescens)*, desert saltgrass, and other shrubs, while Cottonwood Spring supports two cottonwood trees and a thicket of honey mesquite, and catclaw acacia.

Nonnative invasive species such as tamarisk and Russian thistle occur in some washes.

Three state-listed plant species occur in the wilderness area: the Las Vegas bearpoppy, threecorner milkvetch, and sticky buckwheat. Las Vegas buckwheat (*Eriogonum corymbosum* var. *nilesii*), a sensitive species and a U.S. Fish and Wildlife Service candidate species, also has the potential to occur within this wilderness area.

1. Much of the information on specific wilderness areas is taken from http://www.birdandhike.com/Wilderness/_Wild_index.htm, accessed on August 22, 2008.

Black Canyon and Eldorado Wilderness Areas

The vegetation in these two areas is similar. Mojave desert scrub is the primary vegetative community in the two wilderness areas. Vegetation is dominated by creosote bush, bursage, a few other low-desert shrubs, and a variety of cacti.

West of the crest in both areas the vegetation on the flats and hillsides is sparse, stunted creosotebush and bursage, with little else except exotic red brome. There are a few other shrub species mixed in, such as buckwheat and brittlebush, plus a few cacti (prickly pear and cholla) scattered about, but the diversity is low and there is none of the buckhorn cholla (*Opuntia acanthocarpa*) or teddybear cholla (*Opuntia bigelovii*) found south of here. Vegetation in the shallow drainages is more robust and diverse.

East of the crest, the vegetation on the steep, rocky hillsides is sparse, stunted creosotebush with little else in most places except red brome. Along the washes, the species diversity is higher, and species such as catclaw acacia and brittlebush are common.

The vegetation in Burro Wash is dense and diverse compared to the hillsides. Vegetation is dominated by creosotebush and snakeweed, with an occasional catclaw acacia and a limited variety of other low-growing shrubs. On the rocky hillsides just above the wash, the cover is mostly stunted creosote and red brome, plus a few barrel cactus among the rocks.

In the lower part of Burro Wash taller shrubs are present, including mesquite, catclaw acacia with mistletoe (*Phoradendron sp.*), desert willow, and tamarisk. Creosotebush, snakeweed, brittlebush, ephedra, and some prickly pear are also present. The rocky hillsides and cliffs support pygmy cedar (*Peucephyllum schottii*), creosotebush, Mormon tea, and barrel cactus.

Ireteba Peaks Wilderness

Creosote-bursage is the primary vegetative community in this area, with areas of Mojave desert scrub. Vegetation is dominated by creosotebush, bursage, brittlebush, yucca, and a few other low-growing shrubs and grasses. In the mountains, barrel cactus and Mormon tea are common on the steep, rocky hillsides. In the washes, the vegetation is more diverse. Catclaw acacia and mistletoe are common, plus there are numerous other shrubs, buckhorn cholla, and prickly-pear cactus. Big barrel cactus occur in some washes, and patches of teddybear cholla blanket some hillsides.

Nellis Wash Wilderness

As with Ireteba Peaks, creosote-bursage is the primary vegetative community in Nellis Wash, dominated by creosote bush, bursage, brittlebush, yucca, and a few other low-growing, sparse, desert shrubs and grasses. In the Newberry Mountains, barrel cactus and Mormon tea are common on the steep, rocky hillsides. In the washes, the vegetation is more diverse. In Empire Wash, catclaw acacia is common along with mistletoe, plus numerous other shrubs and buckhorn cholla. On the southeastern ridges, the vegetation is sparse, stunted creosotebush with little else mixed in. In some areas, however, patches of teddybear cholla blanket the hillside. On the northeastern bajada, creosote and bursage dominate, but they are more dense, less stunted, and other shrubs also are common. Yucca and buckhorn cholla occur here too.

Spirit Mountain Wilderness

Spirit Mountain supports the most diverse vegetative communities of the eight wilderness areas. The two primary vegetative communities are creosote-bursage and Mojave desert scrub. At lower elevations, the vegetation is less diverse with creosotebush and other shrubs dominating. In the washes, there are desert willow, cottonwood,

grapevines, common reed, and rabbitbrush. In the rocky canyons and washes at the base of Spirit Mountain, the vegetation is a juniper (*Juniperus californica*) forest with a diverse flora. Other common plants include paperbag bush (*Salazaria mexicana*), catclaw acacia, buckhorn cholla, a variety of composite shrubs, bitterbrush, yucca, beargrass (*Nolina bigelovii*), buckwheat, scrub oak (*Quercus turbinella*), desert willow, pinyon pine (*Pinus monophylla*), skunkbush *(Rhus aromatic)*, rabbitbrush, mound cactus (*Echinocereus triglochidiatus*), Mormon tea, green ephedra (*Ephedra viridis*), and barrel cactus. The lower slopes also support smoketree (*Psorothamnus spinosa*), one of the northern-most populations in Nevada. At Christmas Tree Pass the dominant vegetation is California juniper and blackbrush, with some yucca, pinyon, cholla, scrub oak, and other species mixed in.

Bridge Canyon Wilderness

Bridge Canyon also supports a diversity of vegetation. Mojave desert scrub is the primary vegetative community in the area. At lower elevations, species like creosotebush, yucca, desert shrubs, and grasses dominate the landscape. The canyons and washes support a more diverse flora. Common species include desert willow, rabbitbrush, and bitterbrush. Stands of cottonwood trees grow in Grapevine and Sacatone canyons. At higher elevations, the vegetative community is pinyon-juniper-blackbrush, with species such as juniper and blackbrush dominating the landscape, and a few pinyon pine scattered about. Other common species here include yucca, scrub oak, and catclaw acacia.

Nonnative Plants

Because virtually all of the wilderness areas have been grazed or otherwise affected by people, nonnative plants are present in all of the wilderness areas. With more than 100 known species of nonnative plants in Lake Mead National Recreation Area, many of these plants probably occur in the wilderness areas. They are spread by hikers, illegal off-highway vehicles, and burros, as well as by wind, water, and birds.

The most common nonnative species in the wilderness areas are tamarisk (*Tamarix* spp.), Sahara mustard (*Brassica tournefortii*), red brome (*Bromus madritensis* ssp.*rubens*), and cheatgrass (*B. tectorum*). Other nonnative species found in the wilderness areas include African mustard (*Malcomia africana*), London rocket (*Sisymbrium irio*), hedgemustard (*Sisymbrium orientale*), Arabian grass (*Schismus arabicus*), and Russian thistle (*Salsola paulseni*).

Tarmarisk is known to occur throughout the wilderness areas. Most of its occurrence is scattered individual plants along washes and at springs, such as Tule and Cottonwood springs. In addition, Boone (2007) noted that tamarisk is common along the Colorado River in Black Canyon.

Red brome, Sahara mustard, Arabian grass, and cheatgrass are invasive nonnative plants. These plants occur in many of the wilderness areas. Generally, Arabian grass tends to grow at lower elevations, red brome at low to middle elevations, and cheatgrasss at mid to high elevations in the wilderness areas. These plants may alter the natural fire regime, increasing fire intensity and rate of spread, and decreasing fire return intervals. Because native plant species are poorly adapted to such conditions, alteration of the fire regime favors the establishment and growth of cheatgrass, red brome, Sahara mustard, and other nonnative plant species.

People and Vegetation

The activities of people have altered the vegetation of all of the wilderness areas, although to varying degrees depending largely on accessibility. In addition to introducing nonnative species, other activities that have altered the areas' vegetation include livestock and feral burro grazing, illegal OHV driving, mining, and recreational use in certain high-

use areas (e.g., camping at springs, the creation of unofficial trails). These activities have affected the distribution and abundance of native plants, as well as species composition and plant diversity. Climate change and air pollution may also be affecting native plants, although this is unknown in the wilderness areas.

As noted previously, illegal OHV use has disturbed soils in the wilderness areas. This activity also has been the source of one of the most evident impacts on vegetation in several of the wilderness areas, including Black Canyon and BLM lands in the Eldorado and Ireteba Peaks wilderness areas. Off-highway vehicles crush and destroy plants including the lichens, fungus, and algae that make up the cryptogamic crust (NPS 1989). These areas are then vulnerable to wind, water, and mechanical erosion, which can indirectly result in additional losses of plants. Disturbances create opportunities for nonnative plants to become established in these areas. In addition, the vehicles can bring in nonnative seed sources with them. Air-borne dust not only damages human and animal respiratory systems but also deposits on plant leaf area, reducing photosynthesis and productive habitat.

A potential for wildland fires also has increased in the wilderness areas. Fire is not believed to play a substantial role in the natural ecology of desert shrub communities. (An exception to this is Spirit Mountain, which has a fire history and periodically burns.) The Mojave shrub ecosystem is not believed to have had occurrences of large wildfires prior to the 19th century introduction of nonnative annual grasses, most notably red brome and Arabian grass. These grasses are more flammable and fire-prone than native grasses and shrubs. Where areas are infested by these nonnative species, desert shrub communities are threatened by wildfire. Long response times and fire response delays are common in the eight wilderness areas due to the remote nature of the areas. If a wildfire occurs during dry and windy conditions in areas with buildup of red brome, Arabian grass, and cheatgrass, large fires could result.

Natural recovery of disturbed areas occurs slowly in the desert. It has been estimated that the recovery of vegetation on noncompacted soils may require 60 years to reach pre-disturbance biomass, and up to 180 years for reasonable recovery of species diversity (NPS 1989). Over the past 10 years, NPS managers have been restoring disturbed areas in the wilderness areas, primarily vehicle tracks. Some of these areas are seeded or planted using native species. Management of non-native species, such as tamarisk and Sahara mustard, also is occurring in the wilderness areas.

TERRESTRIAL WILDLIFE

Although a detailed survey of wildlife has not been completed in the eight wilderness areas, the areas support a variety of wildlife. Their remote location, narrow canyons, and steep terrain provide habitat for many solitude-dependent species.

Reptiles and birds are the most commonly seen species in the wilderness areas. As might be expected in a warm, desert area, reptiles are common throughout the region. For the most part, they prefer the rocky slopes and dry washes where boulders and brush furnish plenty of shelter and shade. A total of 41 species of reptiles have been identified in the national recreation area as a whole, including 5 species of turtles and tortoises, 16 lizard species, and 20 snake species (NPS 2004a). Many of these species probably occur in the wilderness areas. Species likely to be found in the areas include chuckwalla (*Sauromalus obesus obesus*), collared lizard (*Crotaphytus bicinctores*), western whiptail lizard (*Cnemidophorus tigris*), side-blotched lizard (*Uta stansburiana*), long-nosed leopard lizard (*Gambelia wislizenii*), zebra-tailed lizard (*Callisaurus draconoides*), banded Gila monster (*Heloderma suspectum cinctum*), gopher snake (*Pituophis catenifer*), common king snake (*Lampropeltis getulas*), sidewinder (*Crotalus cerastes*), specked rattlesnake

(*Crotalus mitchelli*), and Mojave rattlesnake (*Crotalus scutulatus*).

Birds that are likely to be found in the areas include prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicenis*), peregrine falcon (*Falco peregrinus*), turkey vulture (*Cathartes aura*), great horned owl (*Bubo virginianus*), common raven (*Corvus corax*), burrowing owl (*Athene cunicularia hypugea*), and greater roadrunner (*Geococcyx californianus*). A large number of smaller bird species use the wilderness areas as well, including Gambel's quails (*Callipepla gambelli*), a game bird, black-tailed gnatcatcher (*Polioptila melanura*), Say's phoebe (*Sayornis saya*), white-crowned sparrow (*Zonotrichia leucophyrs*), black-throated sparrow (*Amphispiza bilineata*), canyon wren (*Catherpes mexicanus*), cactus wren (*Campylorhynchus brunneicapillus*), rock wren (*Salpinctes obsoletus*), Phainopepla (*Phainopepla nitens*), and horned lark (*Eremophilia alpestris*). It is also worth noting that Sacatone and Grapevine washes have been identified as part of an important bird area because of the density of Phainopepla and other species of concern that use these catclaw acacia washes (National Audubon Society 2008).

Ten species of amphibians are known to occur in the national recreation area, including five frog species and five toad species (NPS 2004a). Several of these species probably occur in the wilderness areas near springs, including the red-spotted toad (*Bufo punctatus*), Woodhouse's toad (*B. woodhouseii*), and Arizona toad (*B. microscaphus*).

A total of 74 mammal species are listed as occurring in the national recreation area, of which 19 are bats. Most of these mammals probably occur in the wilderness areas. Small mammals including desert, Ord's and Merriam's kangaroo rats (*Dipodomys deserti*), *D. ordii,* and *D. merriami*), white-tailed antelope squirrels (*Ammospermophilus leucurus*), deer, cactus, and desert pocket mice (*Peromyscus maniculatus, P. eremicus,* and *Chaetodipus* penicillatus), black-tailed jackrabbits (*Lepus californicus*), and desert cottontail rabbits (*Sylvilagus audubonii*) probably inhabit the wilderness areas. Bat species may roost in caves and overhangs. Predators such as coyotes (*Canis latrans*), badger (*Taxidea taxus*), desert kit fox (*Vulpes macrotis*), bobcat (*Lynx rufus*), and mountain lion (*Felis concolor*) are also likely residents.

Desert bighorn sheep (*Ovis canadensis nelsoni*) occupy most of the mountainous areas within the national recreation area, including all of the wilderness areas, where steep terrain provides protection from predators. The southern Nevada population of desert bighorn sheep is one of the premier populations in the nation (NPS 2003). Typical bighorn sheep habitat is rough, rocky and steep, broken up by canyons and washes. In the eight wilderness areas, desert bighorns could be described as nomadic; remaining mobile throughout their range to take advantage of variable rainfall patterns and available water sources (many of which are ephemeral). Nevada Department of Wildlife biologists have observed that desert bighorns usually limit summer activity to an area within two miles of water, although some summer movements can be greater (BLM and NPS 2007). Lambing habitat is present in most of the wilderness areas, particularly Pinto Valley, Black Canyon, Eldorado, Ireteba Peaks, and Spirit Mountain.

Bighorn sheep hunting occurs in all of the wilderness areas. The Nevada Department of Wildlife issues hunting tags for the areas, which are highly sought after. Ireteba Peaks, Boy Scout Canyon, Burro Wash, Cathedral Peaks, and Pinto Ridge are all popular places for sheep hunting. Hunting seasons are set by the Nevada Department of Wildlife and vary from year to year. (In 2013 the season runs from November 20 to December 20.)

Nonnative Wildlife (Wild Horses and Burros)

Wild horses and feral burros, two nonnative species, occasionally occur in the wilderness areas, particularly in the Pinto Valley and

Jimbilnan wildernesses. Burros have probably overgrazed some areas, disrupted cryptogamic soil crusts, contributed to erosion, and competed with native species for forage and water. NPS staff completed a burro management plan in 1995 and in the mid-1990s and early 2000s removed 1,100 to 1,200 burros. Since that time the population has been maintained through smaller removal efforts in cooperation with other state and federal partners.

THREATENED AND ENDANGERED SPECIES AND BLM SENSITIVE SPECIES

The only federally listed species known to occur in the eight wilderness areas is the Mojave desert tortoise (*Gopherus agassizii*). The desert tortoise, which is listed as threatened by both the U.S. Fish and Wildlife Service and the State of Nevada, probably occurs in all eight wilderness areas. In addition, the U.S. Fish and Wildlife Service has designated desert tortoise critical habitat that includes Eldorado, a small part of Ireteba Peaks, Nellis Wash, Spirit Mountain, and Bridge Canyon wilderness areas. Most of the national recreation area, including all of the wilderness areas, supports patchy, very low densities of tortoises, with a few hot spots of higher densities. Typically, tortoise densities are close to one tortoise per 100 acres. Desert tortoises are normally found below 4,500 feet, but may be found at elevations up to 5,000 feet. Desert tortoises occupy a variety of habitats from flats and slopes dominated by creosotebush scrub at lower elevations to rocky slopes in blackbrush and juniper woodland ecosystems at higher elevations (USFWS 2008). Tortoises are most abundant in creosote-bursage communities and Mojave Desert shrub in valleys and on bajadas and hills. An important habitat requirement is the presence of annual wildflowers and native grasses as forage (RECON 2000). The native grass big galleta is often present where the desert tortoise is most abundant. Population trends for the desert tortoise in the wilderness areas are unknown, but in Clark County generally the desert tortoise is presumed to be declining due to a number of threats, including habitat modification and degradation, and wildlife mortality caused by off-highway vehicles (RECON 2000).

Three BLM special status and state-listed critically endangered plant species are known to occur, or are likely to occur, in the wilderness areas. Las Vegas bearpoppy (*Arctomecon californica*) is an evergreen perennial herb known to occur in the Jimbilnan and Pinto Valley wildernesses. It occurs in open, dry, spongy or powdery, often dissected ("badland") or hummocked soils with high gypsum content, often with a well-developed soil crust, in areas of generally low relief on all aspects and slopes, at elevations from 1,060 to 3,642 feet. Although the species is relatively well protected in the wilderness areas, overall it is declining rapidly in numbers. OHV use is one of the threats to this species (Nevada Natural Heritage Program 2001a).

Threecorner milkvetch (*Astragalus geveri* var. *triquetrus*) also occurs in the Jimbilnan and Pinto Valley wildernesses. This annual plant, a member of the legume family, occurs on open, deep sandy soil or dunes, generally stabilized by vegetation and/or a gravel veneer, at an elevation from 1,100 to 2,400 feet. It is dependent on sand dunes or deep sand. The plant germinates only in wetter years. Off-highway vehicles and other recreational use of the habitat are identified as a threat to this species (Nevada Natural Heritage Program 2001b).

Sticky buckwheat (*Eriogonum viscidulum*) occurs in Pinto Valley and possibly Jimbilnan. Another annual plant, a member of the buckwheat family, sticky buckwheat occurs in deep loose sandy soils in washes, flats, steep Aeolian slopes, and stabilized dune areas, at an elevation of 1200-2200 feet. It is dependent on sand dunes or deep sand (Nevada Natural Heritage Program 2001c).

In addition to the above species, several BLM sensitive species may occur in the areas managed by the bureau. Table 10 lists the species that may occur in the areas. However, this may not represent actual species present

because extensive surveys within these wildernesses have not been conducted. Three of the four BLM sensitive plant species are also state-listed plant species.

TABLE 10. BLM SENSITIVE SPECIES THAT DO OR MAY OCCUR IN THE BLM WILDERNESS AREAS

Common Name	Scientific Name
Wildlife	
Western burrowing owl	*Athene cunicularia hypugaea*
Golden eagle	*Aquila chrysaetos*
Peregrine falcon	*Falco peregrinus*
Loggerhead shrike	*Lanius ludovicianus*
Bendire's thrasher	*Toxostoma bendirei*
LeConte's thrasher	*Toxostoma lecontei*
Banded Gila monster	*Heloderma suspectum cinctum*
Chuckwalla	*Sauromalus ater*
Mojave shovel-nosed snake	*Chionactis occipitalis occipitalis*
Desert glossy snake	*Arizona elegans eburnata*
Mojave desert sidewinder	*Crotalus cerastes cerastes*
Bighorn sheep	*Ovis Canadensis*
California leaf-nosed bat	*Macrotus californicus*
Pallid bat	*Antrozous pallidus*
Townsend's big-eared bat	*Corynorhinus townsendii*
California myotis	*Myotis californicus*
Western small-footed myotis	*Myotis ciliolabrum*
Cave myotis	*Myotis velifer*
Yuma myotis	*Myotis yumanensis*
Fringed myotis	*Myotis thysanodes*
Western pipistrelle	*Pipistrellus Hesperus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Allen's big-eared bat	*Ildionycteris phyllotis*
Mojave gypsum bee	*Andrena balsamorhizae*
Mojave poppy bee	*Perdita meconis*
PLANTS	
Las Vegas bearpoppy	*Arctomecon californica*
Sticky buckwheat	*Eriogonum viscidulum*
Rosy twotone beardtongue	*Penstemon bicolor ssp. roseus*
Threecorner milkvetch	*Astragalus geveri var. triquetrus*

NATURAL SOUNDSCAPE

Natural sounds and quiet are important characteristics of wilderness. The opportunity to experience natural sounds and quiet are an integral part of the visitor experiences in wilderness areas.

Natural soundscapes include wind, water, wildlife, and other sounds produced by the environment. The opportunity to hear natural sounds depends on the natural ambient sound level, or the consistent background sound level that exists in the absence of noise. Noise is extraneous or undesired sound (Morfey 2001). The natural ambient sound level combines with the human threshold of hearing to set the threshold that sounds must exceed to be heard. However, the presence of sound energy from one source may be made inaudible (masked) by the presence of sound energy from another source (Kryter 1994). Low frequency noise is more effective at masking high frequency signals than the reverse. For example, transportation noise, which is concentrated in lower frequency bands (below 1250 Hertz), may mask bird songs in higher frequency bands.

Noises can have two impacts. Perceived noises can alter the quality of the soundscape and alter the behavior of visitors and wildlife.

Noise also elevates ambient sound levels above the natural condition, and thereby reduces opportunities to hear the sounds of nature. Many factors affect how visitors and wildlife perceive and respond to noise. Primary acoustical factors include the level, duration, and spectral properties of the noise, as well as the rate of occurrence and its diurnal or seasonal schedule. Nonacoustical factors, such as experience, expectations, and adaptability, play a role in how visitors and wildlife respond to noise. The listener's activity will also affect how he/she responds to noise.

Table 11 provides examples of A-weighted sound levels. Normal speech has a sound level of approximately 60 dBA. Sound levels above about 120 dBA begin to be felt inside the human ear as discomfort and eventually at still higher levels as pain.

Acoustical data are available for backcountry areas at Lake Mead National Recreation Area—specifically the Muddy Mountains/Pinto Valley, Ireteba Peaks, and Spirit Mountain wilderness areas (see appendix F).

The wilderness areas are considered to be relatively quiet, especially when focusing on truncated ambient levels (the levels that focus on frequencies affected by transportation noise). Table 12 shows natural and existing ambient levels at three Lake Mead acoustical monitoring sites in the wilderness areas (the sites area labled LAME009, LAME010, and LAME011). The table displays two exceedence values for each site at a variety of levels and times of day. In each cell, the top value, dBT, is a sum of the energy in the frequencies commonly affected by transportation noise, approximately 100–800 Hertz. This range does not correspond to a specific vehicle or type of transportation, but rather provides an indication of how transportation noise might be contributing to existing ambient levels. The bottom value in each cell is presented in dBA, A-weighted decibels. This value incorporates measurements from the full frequency spectrum, from 12.5-20,000 Hertz. While the A-weighted decibel scale has traditionally been used in sound studies as an approximation of human hearing, it falls short in evaluating the effects of transportation noise on a park's acoustic environment because it heavily discounts low frequencies.

TABLE 11. COMMON NOISE LEVELS AND THEIR EFFECTS ON THE HUMAN EAR

Source	Decibel Level (dBA)	Effect
Normal breathing	10	
Leaves rustling at Canyonlands National Park	20	
Soft whisper, quiet library (15 feet), Snake River (at 300 feet)	30	Very quiet
Crickets at Zion National Park (at 16 feet), Snake River (at 100 feet)	40	Moderate
Light auto traffic (100 feet)	50	Moderate
Conversational speech (3 feet), 4-stroke snowmobile (30 mph at 50 feet), automobile (45 mph at 100 feet)	60	Sound levels above 60 dB begin to interfere with close range conversational speech
Personal watercraft (82 feet)	68–76	Very loud
Vacuum cleaner, 2-stroke snowmobile (30 mph at 50 feet)	70	Intrusive
Off-highway recreational vehicles	70–90	85 dB is the level at which hearing damage begins
V8 "muscle" boat (82 feet)	85–86	
Heavy truck or loud motorcycle (25 feet)	90	Extremely loud No more than 15 minutes of unprotected exposure recommended for sounds between 90–100 dB
Thunder	100	
Military jet at Yukon-Charley Rivers National Preserve (328 feet above ground level)	120	Threshold of sensation begins around 120 dB
Shotgun firing	130	Threshold of pain begins around 125 dB

SOURCES: Kormanoff and Shaw 2000, traffic noise background information (www.drnoise.com/PDF_files/Traffic%20Noise%20Primer.pdf); NPS 2013; and McCusker 2007

For instance, using the A-weighted decibel scale, one could conclude that the acoustic conditions in an urban environment (dominated by low-frequency sounds) are comparable to those of a wilderness area where birdsong and insects contribute high-frequency sound energy. The truncated scale, dBT, is appropriate to use for this study because it focuses solely on the frequencies that are affected by transportation noise.

Truncated data for the wilderness areas indicate daytime median existing ambient sound levels (L_{50}) ranged from 13.4 dBA in remote desert scrub to 30.7 dBA in areas closest to flight corridors for the Las Vegas McCarran International Airport. Existing ambient includes natural and nonnatural sounds. Natural ambient sound levels (no human-caused sounds present) are slightly lower. Daytime median natural ambient sound levels (L_{nat}), at truncated frequencies, ranged from 11.8 to 20.0 dBA. In the early morning hours, sound pressure levels at some of the sites were very close to the noise floor (which is the lowest recording limit) of acoustical monitoring equipment. Sound levels as low as these are extremely rare and highly sensitive to the influence of extrinsic sound events.

The wilderness areas listed in table 12 are relatively quiet in comparison to other portions of the park and even other parks. However, there were still significant amounts

of human-caused sounds recorded in the wilderness areas. The human-caused sounds most commonly heard at the monitoring sites were high-altitude jets, helicopters, and vehicles.

The data collected from sites LAME009, LAME010, and LAME011 are an initial baseline for these inland wilderness areas. At Lake Mead, noise levels increase closer to the shores of both Lakes Mead and Mohave and near roads. Most of the natural sounds heard within the wilderness areas include the wind blowing across the landscape and wildlife calls (e.g., birds). Common human-caused sounds include engines from watercraft and other vessels, noise from vehicles on roads adjacent to and near the wilderness areas, off-highway vehicles, aircraft overflights, and sounds from backcountry visitors.

On a year-round basis, the loudest and most frequent noise in several of the wilderness areas, specifically Pinto Valley and Black Canyon, is from aircraft overflights. Many of these aircraft fly from Las Vegas to Grand Canyon National Park. Estimates of air tour activity vary from more than 68,000 to as many as 80,000 flights per year. In addition, commercial jet traffic going to and from Las Vegas can be heard in the wilderness areas. Boat noise is most noticeable during the summer months in the portions of the wilderness areas directly adjacent to the lakes (i.e., Spirit Mountain, Pinto Valley, Jimbilnan, Eldorado, Black Canyon, and Ireteba Peaks); however, when there is intervening terrain, boat noise will be greatly attenuated. Noise from off-highway vehicles driving within or near the wilderness areas can be heard at times in several of the wilderness areas. At the boundary of the Black Canyon Wilderness area, OHV vehicle noise is prevalent every afternoon and on the weekends in fall, winter, and spring (Zuro-Kreimer 2008). Limiting or mitigating these human-caused contributions of sound could improve the natural acoustical environment. Natural soundscapes offer visitors the opportunity to discover solitude and other wilderness values.

In addition to affecting visitor experience, soundscape preservation is also vitally important to overall ecosystem health. The peer-reviewed literature widely documents that sound plays a critical role in intra-species communication, courtship and mating, predation and predator avoidance, and effective use of habitat. Additionally, similar studies have shown that wildlife can be adversely affected by sounds and sound characteristics that intrude on their habitats. While the severity of the impacts varies depending on the species being studied and other conditions, research strongly supports the fact that wildlife can suffer adverse behavioral and physiological changes from intrusive sounds (noise) and other human disturbances. Documented responses of wildlife to noise include increased heart rate, startle responses, flight, disruption of behavior, and separation of mothers and young (Selye 1956; Clough 1982; National Park Service 1994; US Department of Agriculture 1992; Anderssen, Nicolaisen, and Gabrielsen 1993).

When noise elevates ambient sound levels, signals that might otherwise have been detected and recognized are missed. The noise is said to mask these signals. Masking degrades an animal's auditory awareness of its environment, and fundamentally alters interactions among predators and prey. There are many animal species that rely almost exclusively on sound to locate their prey (e.g. owls, bats). Masking also affects acoustical communication. Animals have been shown to alter their calling behavior and shift their vocalizations in response to noise (Brumm and Slabbekoorn 2005; Patricelli and Blickley 2006; Slabbekoorn and Ripmeester 2008; Warren et al. 2006). These shifts have been documented in a variety of signal types: begging calls of bird chicks (Leonard and Horn 2008), alarm signals in ground squirrels (Rabin, Coss, and Owings 2006), echolocation cries of bats (Gillam and McCracken 2007), and sexual communication signals in birds and anurans (Brumm and Slabbekoorn 2005; Patricelli and Blickley 2006; Warren et al. 2006; Slabbekoorn and Ripmeester 2007, Parris et al. 2009). Vocal adjustment probably

comes at a cost to both energy balance and information transfer; however, no study has addressed receivers. Some species are unable to adjust the structure of their sounds to cope with noise even within the same group of organisms (Lengagne 2008). These differences in vocal adaptability could partially explain why some species do well in loud environments and others do poorly (Patricelli and Blickley 2006; Slabbekoorn and Ripmeester 2007).

Some large herbivores have been observed to habituate to acoustic stimuli (Krausman et al. 1998; Weisenberger et al. 1996). Habituation is a decreased responsiveness to a stimulus upon repeated exposure. There are many reasons why reports of habituation to noise should be interpreted with caution. A reduction in one form of response may represent a shift to another, unobserved mode of response rather than development of complete tolerance. Observation of more tolerant population may be the result of sensitive individuals leaving the area (Bejder et al. 2006). Animals that remain may not have other viable options. Lastly, a completely habituated animal has learned to ignore a class of stimuli, some of which may signal biologically significant conditions.

Table 12. Natural and Existing Ambient Levels at Selected Lake Mead Acoustic Monitoring Sites (LAME009, LAME010, and LAME011)

Site	Exceedence levels (dBA) 0700 to 1900		Exceedence levels (dBA) 1900 to 0700	
	L_{nat}	L_{50}	L_{nat}	L_{50}
LAME009 Callville Wash (Muddy Mountains and Pinto Valley Wilderness)	20.0 21.4	30.7 31.2	13.1 16.6	18.9 20.4
LAME010 West Powerline Wash Road (Ireteba Peak Wilderness)	11.8 16.2	13.4 17.1	9.5 15.0	9.6 15.2
LAME011 Pipe Spring Road (Spirit Mountain Wilderness)	13.6 17.4	16.2 20.1	9.6 18.5	10.0 21.6

Each cell in the table shows two measurements: dBT (top) and dBA (bottom). The dBT measurements focus on general transportation noise (~100–800 hertz). These results allow park staff to confidently draw conclusions about human-caused sounds. The dBA measurements, on the other hand, include the full frequency spectrum (~10–20,000 hertz), and have historically been the unit of measurement in sound studies. However, conclusions drawn from these data may be less reliable. Wilderness areas where much of the sound energy comes from birds, frogs, and insects, even without much human-caused sound, could still appear as loud as a noisy urban environment.

WILDERNESS CHARACTER

The Wilderness Act speaks of wilderness as a resource in itself. A wilderness, in contrast to those areas where humans dominate the landscape, is defined by the qualities comprising its wilderness character. Wilderness character encompasses a combination of biophysical, experiential, and symbolic elements as described by five principal qualities: natural, undeveloped, untrammeled, outstanding opportunities for solitude or a primitive and unconfined type of recreation, and other features of value. These five qualities are of equal importance and can be defined in the following ways.

NATURAL

The Wilderness Act states that wilderness is "protected and managed so as to preserve its natural conditions." In short, wilderness ecological systems are substantially free from the effects of modern civilization. This quality can be degraded by intended or unintended effects of modern people on the ecological systems inside the wilderness after the area is designated (Landres et. al 2008).

To most visitors the wilderness areas appear to be natural and undeveloped, covered largely by natural-looking desert vegetation. The natural character of the wilderness areas is mostly preserved. A number of rare, sensitive, threatened and endangered species occur in the areas (see the previous descriptions of vegetation, wildlife, and threatened and endangered species). However, some changes in vegetation have occurred, most notably, the widespread presence of several nonnative species (e.g., red brome, tamarisk, and cheatgrass). Another change from the primeval character is the occasional presence of feral horses and burros; however, their presence has been very limited. There is no permanent human presence in any of the wilderness areas. Although parts of the lands comprising the wilderness areas were once grazed and several areas had mining sites, these activities no longer occur. Since the time that grazing ended, the vast majority of the wilderness areas have been left to the forces of nature.

UNDEVELOPED

The Wilderness Act states that wilderness is "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation . . . where man himself is a visitor who does not remain" and "with the imprint of man's work substantially unnoticeable." This quality is degraded by the presence of structures, installations, habitation, and by the use of motor vehicles, motorized equipment, or mechanical transport that increases people's ability to occupy or modify the environment (Landres et. al 2008).

Although roads existed in some of the wilderness areas, mainly to support mining activities or fire suppression activities, they are no longer maintained and many are overgrown. The NPS staff in a separate planning process decided which roads in the national recreation area, including the wilderness areas, would be closed and the landscape restored.

Signs of off-highway vehicle use are present in some areas. However, as noted previously, restoration efforts are underway in the wilderness areas to remove and restore areas with vehicle tracks and old roads.

There are fences and/or signs along several of the wilderness boundaries, including Black Canyon, Bridge Canyon, Ireteba Peaks, Jimbilnan, Pinto Valley, and Spirit Mountain that affect the undeveloped quality. Old double track and single track roads are present in the Pinto Valley Wilderness. Some old structures are present in the Tule Spring

area, and an abandoned mine site in the Ireteba Peaks Wilderness. An old retaining wall and guzzler are present in the Pinto Valley Wilderness. A dam structure is present in Grapevine Canyon and old mining sites in the Spirit Mountain Wilderness.

No visitor facilities, including maintained hiking trails and campsites, are present in the wilderness areas.

UNTRAMMELED

The Wilderness Act states that wilderness is "an area where the earth and its community of life are untrammeled by man," and "generally appears to have been affected primarily by the forces of nature." In short, wilderness is essentially unhindered and free from modern human control or manipulation. This quality can be degraded by modern human activities or actions that control or manipulate the components or processes of ecological systems inside the wilderness (Landres et. al 2008).

The vast majority of the wilderness areas are untrammeled. However, trammeling activities have occurred in the past, some of which continue to occur, including fire control, control of nonnative species, and management of desert bighorn sheep. Active restoration activities also occur on NPS lands. In the Spirit Mountain Wilderness there has been tamarisk removal and replanting of catclaw acacia.

SOLITUDE OR A PRIMITIVE AND UNCONFINED TYPE OF RECREATION

The Wilderness Act states that wilderness has "outstanding opportunities for solitude or a primitive and unconfined type of recreation." This quality is about the opportunity for people to experience wilderness; it is not directly about visitor experiences per se. This quality can be degraded by elements that reduce these opportunities, such as visitor encounters, signs of modern civilization, recreation facilities, and management of or restriction on visitor behavior (Landres et. al 2008).

Outstanding opportunities for primitive, unconfined recreation exist in each of the eight wilderness areas, including opportunities for hiking, backpacking, rock climbing, bouldering, hunting, wildlife watching, and exploration.

Currently, no recreation uses in the wilderness areas require a permit. Recreation in the wilderness areas is largely unconfined. Hunting and trapping require the proper licenses in the proper seasons, and campfire restrictions might be in place if conditions warrant. Backcountry camping has certain restrictions (e.g., camping is limited to a maximum of 15 days at one site on NPS lands and 14 days at one site on BLM lands), but currently access to and recreation in the wilderness areas is not restricted.
Overall, the eight wilderness areas offer outstanding opportunities for solitude. In the majority of the areas, a sense of remoteness and isolation is experienced. Numerous massive rocky outcrops, ridges, and mountainous topography combined with narrow canyons, ravines, and cracks create secluded locales and scenic vistas of land without visible human developments. The topography, the wilderness' large area, and the need for route-finding skills, create outstanding opportunities for solitude.

Very few people visit these wilderness areas and most who do visit spend short times there. The harsh desert environment, extreme heat, and lack of shade make these areas challenging and inhospitable, especially during the summer. There are a few places where relatively large groups of people (10–20+) may occur at times in the wilderness areas. Opportunities for solitude may be fewer at times due to high use levels at Hamblin Peak in Pinto Valley Wilderness, Boy Scout Canyon in the Black Canyon Wilderness, Spirit Mountain and Sacatone Canyon in the Spirit Mountain Wilderness, and Grapevine Canyon in the Bridge Canyon Wilderness.

Due to the remoteness and harsh desert environment of the wilderness areas, visitors tend to be day users. For those visitors willing to venture further into the wilderness areas there are many outstanding opportunities for solitude, even during the peak visitor season.

A few isolated user-created campsites in the wilderness areas, including Black Canyon, Bridge Canyon, Eldorado, Ireteba Peaks, and Spirit Mountain, detract from the sense of solitude. Signs of past climbing activity (bolts and/or ropes) are present in Black Canyon, Bridge Canyon, and Spirit Mountain. User-created trails are present in Bridge Canyon, Pinto Valley, and Spirit Mountain. A large number of cairns are present along the trail route to the Spirit Mountain summit. In addition, the vegetation is badly damaged on the summit and spray-painted rocks are present. There also is evidence of off OHV use in Bridge Canyon, Ireteba Peaks, and Spirit Mountain, and an OHV play area in the Ireteba Peaks. Powerlines are adjacent to the Nellis Wash Wilderness, and motor vehicles incursions have occurred in this area. Graffiti is in a few places in the wilderness areas.

Several sources external to the wilderness areas affect opportunities for solitude. As noted in the soundscape section, most of the wilderness areas are quiet, although in the Pinto Valley, Black Canyon, Eldorado wilderness areas natural quiet is periodically interrupted by high-altitude commercial passenger plane overflights or low-level helicopter air tour flights. Noise from vehicles using perimeter roads adjacent to the wilderness areas and cherry-stemmed roads in the Black Canyon Wilderness can affect the sense of solitude. Watercraft on the Colorado River sometimes can also be heard in the wilderness areas, including Black Canyon and Eldorado.

OTHER FEATURES OF VALUE

This quality applies to those values and features that are not fully covered in the other four qualities, including features of scientific or cultural value. These features are unique to the Spirit Mountain and Bridge Canyon wilderness areas.

Cultural resources are an important part of wilderness character. These resources teach about the history and special significance of people's relationship to the land. The Spirit Mountain region is sacred to American Indian peoples. This area has been visited by American Indians for thousands of years. Spirit Mountain is a traditional cultural property and is listed in the National Register of Historic Places because of its significance to the Yuman tribes, which include but are not limited to Mohave, Hualapai, Yavapai, Havasupai, Quechan, Pai pai and Maricopa (SNAPWT 2013b). Spirit Mountain itself is referred to as "Avi Kwa'Ame" by the Yuman people, who consider the mountain to be their cultural and spiritual birthplace, making it sacred ground. The mountain is recognized as a link to the tribes' cultural history and their religious traditions.

CULTURAL RESOURCES

OVERVIEW

Before the existence of Lake Mead, Lake Mohave, and Hoover Dam, early desert American Indians, explorers, and pioneers occupied the area encompassing the one and half million acres of Lake Mead National Recreation Area.

Three of the wilderness areas (Eldorado, Ireteba Peaks, and Spirit Mountain) contain BLM lands where cultural resources also exist. BLM land surveys are characterized by similar cultural resources.

Cultural resources are the physical evidence of past and current use of the land by humans. These are found throughout Lake Mead National Recreation Area and include artifacts, archeological sites, historic structures, cultural landscapes, ethnographic resources, and traditional cultural properties. They range in complexity from a single stone tool or bottle fragment to a large prehistoric village or historic-period town site. Cultural sites are the locations of human activities that are identifiable through inventory, historical documentation, oral history, and consultation with American Indian tribes.

The 1986 *Lake Mead National Recreation Area General Management Plan* focused on the completion of cultural surveys in developed areas of the national recreation area. The 1986 plan proposed survey of 5% of all lands in the national recreation area to study and evaluate wilderness and backcountry. Park staff estimate approximately 5% of the designated wilderness areas has been surveyed for cultural resources. Despite this lack of information, significant cultural resources are known to occur in the national recreation area. More than 1,200 known cultural sites are in the recreation area as a whole, with approximately 100 of those sites located in wilderness. Most of these sites, including those documented in wilderness, are currently unevaluated but considered potentially eligible for listing in the National Register of Historic Places. Initial efforts to identify and evaluate cultural resource properties within wilderness have demonstrated that there is high potential for the presence of national register-eligible cultural sites in some areas.

Prehistory

Archeologists have identified a series of American Indian cultures that have occupied Lake Mead National Recreation Area and adjacent areas in southern Nevada and western Arizona over the last 12,000 to 13,000 years. These cultures have been divided into discrete time periods based on various criteria, i.e., changes in technology, the types of animal and plant foods used, or the migration of peoples into and out of the area.

Occupation of the area began at the end of the late Pleistocene around 12,000 to 13,000 years ago with the Paleoindian period. The Paleoindian period lasted into the Holocene and ended around 7,000 years before present (BP). The Pleistocene was dominated by greater rainfall and moderate temperatures, which created an environment of vast lakes and humid conditions. During the Paleoindian period of the early Holocene, the environment was characterized by a general trend to warmer and dryer conditions. Paleoindian peoples lived in small, highly nomadic groups, used wild plant foods, and hunted now extinct big game. Physical remains from the Paleoindian period usually consist of flaked stone tools and the byproducts of tool manufacture, e.g., flakes and spent cores.

The Archaic period (7000 to 2000 BP) is characterized by nomadic peoples living in small groups adapted to the mosaic of microenvironments created by the overall warmer and dryer conditions. Their

subsistence was based on gathering wild plant foods and hunting small game. Flaked stone tools and the byproducts of tool manufacture, along with the common occurrence of ground stone artifacts, typify the Archaic period.

The arrival of Ancestral Puebloan peoples from the east marked the end of the Archaic period and the beginning of the Saratoga Springs period. The Saratoga Springs period (2000 to 750 BP) was dominated by the expansion of Ancestral Puebloan peoples into the Lake Mead area, and their eventual withdrawal. These groups used pottery and lived in permanent structures. They practiced some horticulture but still depended heavily on wild plant and animal foods.

The Late Prehistoric lifeway, which began around 750 BP, was similar to Archaic adaptations. The people lived in small mobile groups, gathered wild plant foods, and hunted small game. They also practiced small scale horticulture. Archeologically, these people are indistinguishable from the Mojave, Quechan, Hualapai, and Havasupai (Yuman-speaking peoples) and the Southern Paiute (Numic-speaking peoples) who occupied the area during the Historic period.

European American History

The Spanish and later the Mexicans were the first whites to explore the area. During the Spanish/Mexican period (1500s to 1840s), trade routes were established between the population centers in New Mexico and the colonies in California. These trade routes included the Mojave Trail and the Old Spanish Trail, which passed through Southern Nevada.

The Mormons were the first to establish permanent white settlements in Southern Nevada. These included Las Vegas, St. Thomas, and Callville; the latter two were inundated by the creation of Lake Mead. During the late 1800s and early 1900s, the prosperity of these communities and others in the area was determined by the boom and bust cycles of the mining and ranching industries that formed the economic base of the area. The construction of Hoover Dam in the 1930s dramatically changed the landscape of southern Nevada and Western Arizona. It brought thousands of people to the area, put Las Vegas on the map, and helped develop the area's current economy based on recreation and tourism. The National Park Service obtained management responsibility for much of Lake Mead and the surrounding area in 1936 under a memorandum of agreement between the National Park Service and the Bureau of Reclamation (Rothman 2004).

ARCHEOLOGICAL SITES

Recent archeological investigations carried out to current professional standards have focused on the developed areas of the recreational area. Most of the archeological sites located during these surveys are related to the making of stone tools.

Generally, in these eight wilderness areas for Lake Mead National Recreation Area and adjacent BLM lands, there is a great scarcity of water and food resources. This lack of resources would restrict permanent occupation. However, there is a high probability of finding prehistoric sites located near water sources. Some of the wilderness areas may have been better watered in the past, but at present only seasonal water is contained in tinajas (very small independent basins) eroded in the sandstone bedrock and water-carved pockets within bedrock exposed in washes.

The following list is a general characterization of cultural resources found in the various wilderness areas, as well as an accounting of acres of completed archeological survey:

Jimbilnan Wilderness has had 31 acres surveyed for cultural resources to current professional standards. Another 489 acres were previously surveyed, but the documentation is considered unreliable. Of the documented sites, there are two: one

prehistoric lithic scatter and one historic mine.

Pinto Valley Wilderness includes rock art found sporadically throughout the area. There have been195 acres surveyed to current professional standards, and 3,600 acres survey under older methods with unreliable documentation. There are three documented sites, all prehistoric—two rock art and one artifact scatter.

Black Canyon Wilderness contains some remnants of past mining. This wilderness area has had the most archeological survey completed. Archeological resources include rock art, lithic scatters, and an intaglio (a design created by scraping away desert pavement). Two thousand thirty acres have been surveyed to current professional standards; with another 100 acres surveyed where the documentation is considered unreliable. There are 18 documented sites: 3 historic, 15 prehistoric that include 11 artifact scatters, 1 rock art, and 3 other.

Eldorado Wilderness has had 30 acres surveyed for cultural resources to current professional standards. There have been documented two prehistoric site: one lithic scatter and one habitation site.

Ireteba Peaks Wilderness has had 75 acres surveyed to current professional standards. Four sites have been documented: one historic mining and three prehistoric—one lithic scatter and two rock art.

Nellis Wash Wilderness has had the least archeological survey completed. Only one acre has been surveyed to current professional standards. The only documented archeological site in this wilderness is a prehistoric rock art site.

Spirit Mountain Wilderness contains numerous archeological resources. There have been 150 acres surveyed according to current professional standards and 30 acres from older unreliable surveys. There are 11 documented sites in this wilderness area, including 7 prehistoric sites—3 artifact scatters and 4 rock art sites—and 4 historic sites—2 mines, 1 habitation site, and 1 road.

Bridge Canyon Wilderness displays an outstanding collection of rock art as well as a number of other archeological sites. Eight hundred twenty acres of this wilderness have been surveyed to current professional standards, and 55 acres were surveyed under older unreliable methods. The 63 documented sites include 3 historic sites, all mining, and 60 prehistoric sites—26 habitation, 12 rock art, 14 artifact scatters, and 8 other.

At present, with the exception of Spirit Mountain and the Grapevine Canyon areas adjacent to the Bridge Canyon Wilderness, cultural resources in the wilderness areas do not show significant impacts from visitation.

Archeological surveys from adjacent areas and anecdotal information indicate the potential for short-term use rockshelters, open campsites, hunting blinds, lithic procurement areas, intaglios, trail shrines, and rock art. Where surveys and inventories have been completed, faunal remains recovered during the archeological investigations include bighorn sheep, rabbits, small rodents, and tortoises. Groundstone artifacts recovered during other investigations point to small seed processing characteristic of desert Archaic cultures. Ceramic types recovered in the vicinity of the eight wilderness area include Virgin Anasazi, Lower Colorado, and Southern Paiute. Stone tools and projectile point styles date from the Archaic to the Protohistoric Period.

Rock art panels including petroglyphs and pictographs are scattered throughout the various wilderness areas. Rock art styles vary. There are curvilinear/abstract elements as well as representational designs including quadrupeds such as bighorn sheep and anthropomorphs. Designs interpreted as atlatls (throwing sticks) and riders on horseback provide evidence that the area was used over a long period of time.

ETHNOGRAPHIC RESOURCES

An ethnographic resource is identified by way of a specific contemporary human group or family using a particular place over time in accord with that group's traditional cultural heritage and social identity. More specifically, an ethnographic resource is "a 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" (NPS 2006).

Ethnographic resources eligible for inclusion in the National Register of Historic Places are called traditional cultural properties (NPS 2006). Traditional cultural properties are defined generally as ethnographic resources that are eligible for inclusion in the national register because of association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. Spirit Mountain and the surrounding canyons have been identified as traditional cultural properties and are listed in the National Register of Historic Places because of its significance to the Yuman speaking tribes. This area is still sacred to the members of these tribes, and they continue to use the area according to their traditions.

Other potential ethnographic resources include components of a traditional trail system that some Yuman tribes continue to travel to places such as Spirit Mountain and Grapevine Canyon for ceremonial purposes. In addition, Cleland (2011) describes a large-scale ethnographic trail system that extends from below Davis Dam to the Gulf of California. The trail system is punctuated with petroglyphs, geoglyphs, rock alignments, trail shrines, and other resources that are prevalent in undisturbed areas (Cleland 2011, NPS 1993). While these features are often considered to be archeological resources, the fact that many are incorporated into contemporary traditional ceremonies indicates that they may be significant as ethnographic resources, as well. It is likely that the defined trail system, described by Cleland, extends northward into wilderness areas in the recreation area. These resources could also be viewed as an ethnographic cultural landscape(s). Other traditional cultural properties may exist and will be identified through consultation with various tribes and other stakeholders.

VISITOR USE AND EXPERIENCE

No specific visitation or visitor use data exist for the NPS or BLM lands in the eight wilderness areas. The only visitor use information currently provided by the National Park Service for the wilderness areas is a brief description of the areas and a general map on the national recreation area's web site. No facilities, including trails and campsites, are provided in the wilderness areas, and most of the wilderness areas do not have parking areas or signed entrance points. However, private sector information is published in guidebooks and posted on the Internet. Specific hiking routes are described for several areas, such as Hamblin Peak, Cleopatra Wash, Boy Scout Canyon, and Spirit Mountain.

The following information is largely based on NPS staff observations and inferences.

VISITOR USE PATTERNS AND CHARACTERISTICS

The eight wilderness areas are generally within a two-hour drive of Las Vegas. Visitor use of the desert lands in the Lake Mead area is highly seasonal: year-round visitation is possible, but hot temperatures—normally over 100 degrees—limit summer visitation. Thus, visitor use patterns for the eight wilderness areas are substantially different from Lake Mead and Lake Mohave, which receive by far the bulk of visitation in the national recreation area. Wilderness area users are typically local residents who go into the wilderness areas in the spring, fall, and winter when temperatures are cooler. The peak season is October through March. Due to the lack of water in the wilderness areas, most people are believed to be day hikers, with a few backpackers going to locations such as Boy Scout Canyon and Spirit Mountain. Most groups are small, approximately 2–4 people in a party (excluding NPS-led interpretive walks and the occasional group outing, which can have up to 12 people).

The wilderness areas are accessed at various points along roads. Most of the roads are dirt, while a few are paved. Some visitors also access the wilderness areas from Lake Mead and Lake Mohave, beaching their boats and then walking into the wilderness areas. (The wilderness area boundary is 300 feet from the high water mark.) Most people access the springs in Boy Scout Canyon from the water. Many of the secondary roads also are places where there are illegal vehicle intrusions into the wilderness areas.

Several destinations receive the bulk of the visitation in the wilderness areas. Grapevine Canyon in the Bridge Canyon Wilderness receives the highest level of use of the eight wilderness areas, with an estimated 600–900 visitors per month during the winter and spring months. Most of these visitors stop at the rock art panels just within the wilderness boundary. (Unlike the other wilderness areas, the Grapevine Canyon parking area has a traffic counter. Many of these visitors are from out of the area, from California. There is also a large segment of visitors from other states and countries (Tesar 2008). Pinto Valley and Hamblin Peak is the second most popular area (but with substantially less use than Grapevine). Other relatively popular destinations include Spirit Mountain, Sacatone Canyon and the Catacombs areas in the Spirit Mountain Wilderness, and Boy Scout Canyon area in the Black Canyon Wilderness.

VISITOR EXPERIENCES AND OPPORTUNITIES

All of the wilderness areas offer outstanding opportunities for primitive recreation due to their remoteness, isolation, size, variety of topography, desert vegetation (including rare

plants), scenery, wildlife, and in most areas, solitude. (This is discussed further in the "Wilderness Character" section.) Activities that people pursue in the wilderness areas include day hiking, backpacking, camping, birding and nature viewing, photography, climbing, bouldering, and canyoneering, upland game and big horn sheep hunting, and mine and other cultural resource exploration. Camping is not popular in most areas due in part to the need to carry water and a lack of firewood. No permits are required to camp in the wilderness areas.

Rock climbing is not a popular activity, although localized climbing occurs. Characterized by quartz monzonite domes with long slabs and some crack features, most climbing occurs in the Bridge Canyon Wilderness (approximately 78 routes). A smaller amount occurs in the Spirit Mountain Wilderness (approximately 12 climbs, which are short "single-pitch" climbs). The Bridge Canyon Wilderness is generally the area known to climbers as the region south of Christmas Tree Pass Road (Approved Road 20), while climbing in the Spirit Mountain Wilderness is located north of the road. Most climbing occurs in the winter months when temperatures are more comfortable for this activity.

Equestrian use probably sporadically occurs in some wilderness areas, although the lack of water and inhospitable terrain limits this use. Other pack stock (i.e., burros and mules) are not believed to be used in the wilderness areas now, but may be used in the future to carry water and supplies for people.

No commercial guiding trips occur in the wilderness areas, with the exception of hiking and hunting. Most guided hiking in the wilderness areas is associated with kayaking and canoeing, and occurs in areas near the lakes and river. Big game (sheep) hunting guides regularly use the wilderness areas during the hunting season. Guides usually take clients into the wilderness areas on a daily basis.

NPS staff periodically lead interpretive hikes into the wilderness areas, primarily the Pinto Valley and Cottonwood Springs areas, and occasionally into the Jimbilnan and Black Canyon (Boy Scout Canyon) wildernesses. These are popular hikes, particularly for people who are not familiar with the desert areas. Group size is limited to a maximum of 12 people.

Following are some of the attractions at each of the wilderness areas.

Jimbilnan Wilderness–Visitor attractions in this wilderness area include hiking Cathedral Canyon, Cleopatra Wash, Mangonese Wash, and exploring sand dunes in the Middle Point area.

Pinto Valley Wilderness–This wilderness area provides opportunities for several scenic hikes, including hiking up Hamblin Peak, Northshore Peak, and along Pinto Valley. Other destinations include Bearing Peak, Boulder Wash, Cottonwood Spring, Saddle Peak, Razorback Ridge, Murphy's Peak, and Signature Rock.

Black Canyon Wilderness–The primary attraction in this wilderness are the hot springs in Boy Scout Canyon. Other destinations include Petroglyph Wash, overlook view at the end of the road at Canyon Point mesa, and Queho and Trunkman caves.

Eldorado Wilderness–Several hiking destinations are in this area, including Oak Creek Canyon and Lonesome Wash.

Ireteba Peaks Wilderness–Visitor attractions in Ireteba Peaks include Opal Mountain, the Ireteba Peaks, and Tule Spring.

Nellis Wash Wilderness–This open, flat area receives very little visitor use. Visitor attractions and destinations are not known in this area.

Spirit Mountain Wilderness–Spirit Mountain provides a variety of opportunities for visitors. Destinations include Spirit

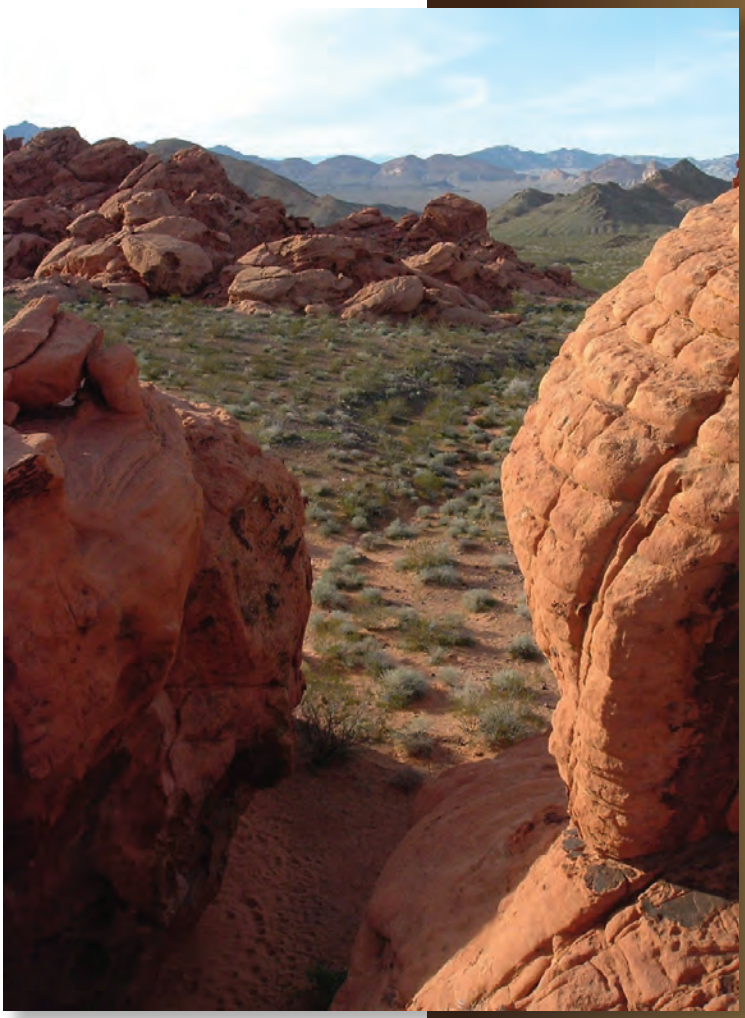
Mountain, lower Grapevine Canyon, Sacatone Wash, Pipe Spring Canyon, and the White Rock Mine. The area is popular for upland game hunters. In the spring people come here to see the wildflowers.

Bridge Canyon Wilderness–Visitor attractions here include the rock art in Grapevine Canyon, the Catacombs, Bridge Canyon, and Dripping Springs.

VISITOR SAFETY

The eight wilderness areas are exciting, challenging places to access and explore, but also are potentially hazardous. The wilderness areas experience extreme heat in the summer, generally lack shade and water, and are subject to lightning strikes and flash floods. Visitors run the risk of being caught off-guard with changing weather conditions. Visitors sometimes also underestimate their need for food and water in such a harsh desert environment. Response times to handle emergencies in the wilderness areas can be far greater than for similar distances in nonwilderness areas due to a lack of cell phone coverage, few ranger patrols, limited emergency access routes, and a lack of information about where people are in the wilderness areas because permits are not required and there are no trailhead registers.

Other visitor safety concerns include potentially dangerous wildlife such as rattlesnakes, one type of scorpions, and the banded gila monster which are all venomous, but will leave visitors alone unless disturbed. A microscopic amoeba, *Naegleria fowleri*, can live in hot springs and can cause a rare infection and sometimes death. Abandoned mines and tunnels exist in some of the wilderness areas. With deep shafts and old, rotten supporting timbers, these old mines can be dangerous.



Chapter Five:
Environmental Consequences

METHODOLOGY FOR ASSESSING IMPACTS

Potential impacts (direct, indirect, and cumulative effects) are described in terms of type, context (are the effects site-specific, local, or even regional?), duration (are the effects short-term [less than one year], long-term [greater than one year], or permanent?) and intensity (is the degree or severity of effects negligible, minor, moderate, or major). Because definitions of intensity (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this environmental impact statement.

This environmental impact statement generally analyzes several actions, such as installation of signs and the closure of some approved roads. Other actions noted in the alternatives, such as the establishment of new access points and the designation of routes, are generally identified, but specific design details and site-specific locations have not been identified. If and when proposed site-specific developments or other actions are ready for implementation following the approval of the wilderness management plan, appropriate detailed environmental and cultural compliance documentation would be prepared. This compliance would be in accordance with the National Environmental Policy Act of 1969 and the National Historic Preservation Act of 1966, both as amended, and would meet requirements to identify and analyze each possible impact for the resources affected.

CUMULATIVE IMPACTS

The Council on Environmental Quality regulations, which implement the National Environmental Policy Act of 1969 (42 USC 4321 *et seq.*), require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for all alternatives, including the no-action alternative.

Cumulative impacts were determined by combining the impacts of the alternatives with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects for the wilderness areas at Lake Mead National Recreation Area and adjacent BLM lands, and, if applicable, the surrounding region. (For more details on these projects, see the "Cumulative Impact Analysis" section.)

IMPACTS ON CULTURAL RESOURCES AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

In this environmental impact statement impacts on cultural resources 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 both NEPA requirements and section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation's regulations implementing section 106 (36 CFR Part 800, *Protection of Historic Properties*), impacts on cultural resources were also identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected, national register-eligible or national

register-listed cultural resources; 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 national register-listed or national register-eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the national register, e.g. diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). A determination of no adverse effect means there is an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the national register.

CEQ regulations and NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* also call for a discussion 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 rules only. It does not suggest that the level of effect as defined by section 106 is similarly reduced. Cultural resources are nonrenewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under section 106 may be mitigated, the effect remains adverse.

A section 106 determination of effect is included in the conclusions of the impact analysis sections. The section 106 determination of effect is an assessment of the effect of the undertaking (implementation of the alternative) on national register-eligible or national register-listed cultural resources only, based on the criterion of effect and criteria of adverse effect found in the advisory council's regulations.

NATURAL RESOURCES – SOILS

Definitions of Intensity Levels

Negligible Impact – The action would result in a change in soil, but the change would be at the lowest level of detection, or not measurable.

Minor Impact – The action would result in a detectable change, but the change would be slight and local. There could be changes in a soil's profile in a relatively small area, but the change would not increase the potential for erosion.

Moderate Impact – The action would result in a clearly detectable change in a soil. There could be a loss or alteration of the topsoil in a small area, or the potential for erosion to remove small quantities of additional soil would increase.

Major Impact – The action would result in the permanent loss or alteration of soils in a relatively large area, or there would be a strong likelihood for erosion to remove large quantities of additional soil as a result of the action.

NATURAL RESOURCES – VEGETATION AND WILDLIFE

Definitions of Intensity Levels

Negligible Impact – The action might result in a change in vegetation or wildlife, but the change would not be measureable or would be at the lowest level of detection.

Minor Impact – The action might result in a detectable change, but the change would be slight and have a local effect on a population. This could include changes in the abundance or distribution of individuals in a local area, but not changes that would affect the viability of local populations. Changes to local ecological processes would be minimal.

Moderate Impact – The action would result in a clearly detectable change in a population and could have an appreciable effect. This could include changes in the abundance or distribution of local populations, but not changes that would affect the viability of regional populations. Changes to local ecological processes would be of limited extent.

Major Impact – The action would be severely adverse or exceptionally beneficial to a population. The effects would be substantial and highly noticeable, and they could result in widespread change and be permanent. This could include changes in the abundance or distribution of a local or regional population to the extent that the population would not be likely to recover (adverse) or return to a sustainable level (beneficial). Important ecological processes would be altered, and "landscape-level" (regional) changes would be expected.

NATURAL RESOURCES – SPECIAL STATUS SPECIES

Definitions of Intensity Levels

Negligible Impact – Impacts on state or federally listed plant and wildlife species would not be observable or measurable and would be well within the range of natural variability.

Minor Impact – Impacts on species or their habitat would be detectable, but still within the range of natural variability both spatially and temporally. No interference with feeding, reproductive, or other activities affecting population viability would result from the impacts. Sufficient functional habitat would remain to support viable populations.

Moderate Impact – Impacts on activities necessary for survival, and on species habitats, can be expected on an occasional basis, but are not anticipated to threaten potential or continued existence of the species in the park. Changes to population characteristics could be outside the natural range of variability spatially or temporally but would not be anticipated to result in loss of population viability.

Major Impact – Impacts on state or federally listed plant and wildlife species or their habitats would be detectable, outside of the natural range of variability both spatially and temporally, and would be anticipated to result in loss of viability at the population level.

NATURAL RESOURCES – NATURAL SOUNDSCAPES

Definitions of Intensity Levels

Negligible Impact – Noise is either not detectable or detectable only for brief periods of time. Most detectable noises do not induce physiological or behavioral responses in humans or wildlife.

Minor Impact – Noise is detectable for a small fraction of the time. Noise induces physiological or behavioral responses in humans or wildlife, but these responses are brief and within the range of natural variation in these parameters.

Moderate Impact – Noise is detectable for a substantial fraction of the time at low levels, or is present at high levels for short durations. Noise induces physiological or behavioral responses in humans or wildlife that may be of extended duration, but can be accommodated without measurable risk of diminished biological function.

Major Impact – Noise appreciably masks other sounds for a substantial fraction of the

time, or regularly exceeds high levels. Noise induces physiological or behavioral responses in humans or wildlife that are of extended duration and may present measurable risk of diminished biological function.

WILDERNESS CHARACTER

Definitions of Intensity Levels

Negligible Impact – Effects on opportunities for solitude or primitive and unconfined recreation would be confined to a small, localized area; any changes would not be perceived (or would be barely perceived) by most visitors. Also, any effects on the degree of development, the prevalence of natural conditions, or other features of value would be confined to a relatively small, localized area and would be barely perceived by most visitors.

Minor Impact – Effects on opportunities for solitude or primitive and unconfined recreation would be slightly beneficial or adverse and confined to a limited area of a wilderness area; changes would be perceived by some visitors. Also, effects on the degree of development, the prevalence of natural conditions, or other features of value would be apparent and confined to a limited area of a wilderness area and would be perceived by some visitors; natural conditions would continue to predominate.

Moderate Impact – Effects on opportunities for solitude or primitive and unconfined recreation would be apparent in one or more wilderness areas; changes would be apparent to many visitors. Also, effects on the degree of development, the prevalence of natural conditions, or other features of value would be readily apparent in one or more wilderness areas; natural conditions would predominate overall. Some changes in wilderness character would be apparent to many visitors.

Major Impact – Effects on opportunities for solitude or primitive and unconfined recreation would be obvious in one or more wilderness areas; changes would be obvious to most visitors. Also, effects on the degree of development, the prevalence of natural conditions, or other features of value would be substantial in one or more wilderness areas. Some changes in wilderness character would be obvious to most visitors.

CULTURAL RESOURCES – ARCHEOLOGICAL RESOURCES

Definitions of Intensity Levels

Negligible Impact – Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for section 106 would be no adverse effect.

Minor Impact – disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for section106 would be no adverse effect.

Moderate impact – disturbance of a site(s) results in loss of integrity. The determination of effect for section 106 would be adverse effect. A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the memorandum to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA regulations from major to moderate.

Major Impact – disturbance of a site(s) results in loss of integrity. The determination of effect for section 106 would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or advisory council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

CULTURAL RESOURCES – ETHNOGRAPHIC RESOURCES

Definitions of Intensity Levels

Negligible Impact – Impact(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs. The determination of effect on traditional cultural properties (ethnographic resources eligible to be listed in the national register) for section 106 would be no adverse effect.

Minor Impact – Impact(s) would be slight but noticeable but would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs. The determination of effect on traditional cultural properties (ethnographic resources eligible to be listed in the national register) for section 106 would be no adverse effect.

Moderate Impact – Impact(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's practices and beliefs, even though the group's practices and beliefs would survive. The determination of effect on traditional cultural properties (ethnographic resources eligible to be listed in the national register) for section 106 would be adverse effect.

Major Impact – Impact(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs, to the extent that the survival of a group's practices and/or beliefs would be jeopardized. The determination of effect on traditional cultural properties (ethnographic resources eligible to be listed in the national register) for section 106 would be adverse effect.

VISITOR USE AND EXPERIENCE

Definitions of Intensity Levels

Negligible Impact – The changes in visitor use and experience would be below or at the lowest level of detection. The visitor would probably not be aware of the effects.

Minor Impact – Changes in visitor use and/or experience would be slight but detectable, but would not appreciably diminish or enhance critical characteristics of the visitor experience. There would be no noticeable change in visitor use and experience or in any defined measures of visitor satisfaction or behavior, either positively or negatively.

Moderate Impact – A few critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be altered. The visitor would be aware of the effects and would probably be able to express an opinion about the changes. Visitor satisfaction would begin to either decline or increase as a direct result of the effect.

Major Impact – Multiple critical characteristics of the desired visitor experience would change and/or the number of participants engaged in an activity would be greatly reduced or increased. The visitor would be aware of the effects associated with implementation of the alternative and would probably express a strong opinion about the change. Visitor satisfaction would markedly decline or increase.

CUMULATIVE IMPACT ANALYSIS

Cumulative impacts are described in the Council on Environmental Quality's regulation 1508.7 as the impacts that result from incremental impacts of the action when added to other past, present, and reasonably foreseeable action, regardless of what agency (federal or nonfederal) or person undertakes such other action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time.

To determine potential cumulative impacts, past, present, and potential future actions and projects within and surrounding the Nevada side of Lake Mead National Recreation Area were identified. The area considered covers about 25 miles in radius in Clark County and includes the communities of Boulder City, Henderson, Overton, and Las Vegas, Nevada. The actions and projects addressed are listed below.

These activities were evaluated in conjunction with the impacts of each alternative to determine if they would result in any cumulative impacts on a particular natural, cultural, or socioeconomic resource, or on visitor use. Because most of these actions are in the early planning stages, the qualitative evaluation of cumulative impacts was based on a general description of the projects.

ACTIONS AND PROJECTS INSIDE THE WILDERNESS AREAS

Independent of this wilderness management plan, several NPS and BLM plans are being developed for various actions and projects in wilderness. Limited prescribed burning, thinning, and herbicide spraying would continue, if determined to be necessary in a minimum requirements analysis, in the effort to control the spread of nonnative species on NPS lands. The national recreation area's exotic plant management plan addresses nonnative plant control, including actions in the wilderness areas. The national recreation area's fire management plan (NPS 2004b) will continue to provide direction consistent with the wilderness management plan to protect native species and vegetation.

An air tour management plan for Lake Mead National Recreation Area will eventually be developed. This plan will provide direction on air tours that fly over the national recreation area and thus will affect the natural soundscapes in the wilderness areas.

ACTIONS AND PROJECTS OUTSIDE THE WILDERNESS AREAS

The Boulder City Bypass project involves traffic improvements to U.S. Highway 93 between the cities of Henderson and Boulder City. The preferred alternative is a southern bypass of Boulder City and would include construction of a four-lane divided freeway near the Black Canyon Wilderness (FHA and NDOT 2005).

Since 2007, large-scale energy facilities have begun operations near the national recreation area. A 69-megawatt concentrated solar thermal facility began operations in the Eldorado Valley, near Boulder City, Nevada, in 2007. A 200-megawatt wind energy facility spread over approximately 19,000 acres of lands managed by the Bureau of Land Management is proposed east of Searchlight, Nevada, in the Eldorado Mountains and Piute Valley. Two wilderness areas are located relatively close to the project area: Ireteba Peaks (approximately six miles northeast) and Nellis Wash (the nearest turbine would be approximately two miles from the wilderness).

The Nevada Department of Wildlife is authorized to capture and/or transplant desert bighorn sheep within three BLM wilderness

areas in the Southern Nevada District, including the Muddy Mountains Wilderness. The agency is also authorized to use helicopters to perform annual inspection, maintenance, and repair of wildlife water developments within certain BLM wilderness areas, including two wildlife water developments in the Muddy Mountains Wilderness. The Muddy Mountains Wilderness is located less than 1 mile from the Pinto Valley Wilderness and within approximately six miles of the Jimbilnan Wilderness.

The Bureau of Land Management published a desert tortoise relocation plan (BLM 2012c) that will allow desert tortoise population augmentation within the Southern Nevada District. The intent is to promote the reestablishment of desert tortoise in its native habitat. This has the potential to affect the Eldorado, Ireteba Peaks, and Spirit Mountain wilderness areas.

Several BLM plans are being developed that have the potential to affect several of the wilderness areas. The BLM *Las Vegas Field Office Resource Management Plan* is undergoing revision and therefore overarching land use allocations in the analysis area may change in the future. The resource management plan addresses management of resource uses and values within the field office. This plan could affect the Lake Mead wilderness areas by making changes in management and use of adjacent BLM lands, such as by designating Areas of Critical Environmental Concern or designating lands with wilderness characteristics. In addition, the BLM Las Vegas Field Office is developing a recreation area management plan and a comprehensive transportation and travel management plan. The purpose of these plans is to identify the actions that are necessary to manage a variety of recreational and travel activities and implement recreation programs throughout the lands administered by the Las Vegas Field Office. The plans will address recreation, transportation, and travel issues within the field office's lands, including lands adjacent to the Spirit Mountain, Bridge Canyon, Nellis Wash, Ireteba Peaks, and Eldorado wilderness areas. But because all of these BLM plans are still in the process of being written it is not yet possible to identify specific actions that would probably affect the wilderness areas. Thus, they were not considered in the evaluation of cumulative impacts for this wilderness plan.

IMPACTS ON NATURAL RESOURCES

ALTERNATIVE A – NO ACTION

Soils

Analysis. In alternative A, no soils would be altered due to development because no development of new facilities is included in alternative A.

Soils in the wilderness areas would probably continue to be compacted and eroded by hikers and illegal off-highway vehicle users, particularly at road pull-offs near the wilderness areas and along existing user-created, unofficial routes. Areas that would probably continue experiencing noticeable soil impacts from off-highway vehicle use include Black Canyon and Eldorado. In some areas, new user-created, unofficial routes may be created from visitation, particularly in areas with traditionally higher visitor numbers such as those with certain points of interest (e.g., Boy Scout Canyon, Spirit Mountain). In this alternative, there would continue to be no limits on the size of groups entering the wilderness areas; this would probably continue to contribute to soil compaction and erosion in some areas. In sloped areas, unofficial routes would result in increased soil erosion from stormwater runoff. These long-term, adverse impacts would probably be minor to moderate and limited in extent.

Fragile cryptogamic soil crust exists in the Pinto Valley Wilderness. Adverse impacts on these soil crusts could be minor to moderate, long-term, and localized due to the continued use and creation of unofficial routes under alternative A.

Cumulative Effects. Soils in parts of the wilderness areas have been altered by past occupation by burros, cattle grazing, and the development of user-created travel routes. These past uses of the wilderness areas led to the establishment of unofficial trails, increased soil compaction and soil erodibility, and decreased cryptogamic soil crust density. The loss and alteration of soils due to past land uses and future external actions such as nonnative plant management, vegetation restoration, and fire management would probably result in a long-term, negligible to minor, adverse impact on area soils. When the potential minor effects from visitor use in the wilderness areas in alternative A are added to the past and future impacts external to the wilderness areas, there would be a long-term, minor to moderate, adverse cumulative impact on area soils. However, the actions in alternative A would contribute a very small increment to the overall cumulative impact.

Conclusion. Some soils would be compacted, eroded, and lost, and soil properties would be altered due to visitor use in localized areas such as along unofficial trails, in washes, and at particular points of interest such as at Boy Scout Canyon and Spirit Mountain. These adverse impacts on soils and cryptogamic soil crust would probably be minor to moderate, highly localized, and long term.

When the impacts inside the wilderness areas are added to past and foreseeable future impacts from land uses and increased visitation, there would be the potential for a long-term, minor to moderate, adverse cumulative impact on area soils—although the actions in alternative A would add a very small increment to this overall impact.

Vegetation

Analysis. No impacts on native vegetation would occur due to development or improvement of facilities, because alternative A does not include such actions.

Under alternative A, visitor access to the wilderness areas would continue to be dispersed with no designated trails or routes. Illegal off-highway vehicle use would also

probably continue to be a problem with no additional signs posted on the boundaries of some wilderness areas, such as Black Canyon and Eldorado. These uses would potentially result in trampling, crushing, and other damage to native vegetation in localized areas. Visitor use levels in the wilderness areas in the future may lead to vegetation loss due to the formation of user-created, unofficial routes in or near popular use areas and from vehicles parking off roadways as visitors seek access to the wilderness areas. Also, there would continue to be no limits on the size of groups entering the wilderness areas. As a result, more native vegetation might be adversely affected in local areas. These impacts could affect the presence and distribution of some native plants in localized areas in the wilderness areas. Thus, under alternative A, visitor use would probably continue to have a long-term, negligible to minor, adverse impact on native vegetation in localized areas.

Where consistent with existing regulations, the collection of native vegetative resources on BLM portions of the jointly managed wilderness areas (Ireteba Peaks, Eldorado, and Spirit Mountain) would continue under this alternative. Overall, the impacts of resource collection on BLM portions of the wilderness areas would be long-term, localized and negligible, resulting in minimal changes to native vegetation.

Cumulative Effects. Vegetation in many parts of the wilderness areas has been altered by past occupation by burros, cattle grazing, development of user-created travel routes, and the spread of nonnative plants, resulting in a long-term, moderate to major, adverse effect on native vegetation. The loss and alteration of vegetation due to future external actions would probably result in a long-term, negligible to minor, adverse impact on area vegetation from potential future wildland fires. On the other hand, vegetation restoration efforts would continue, probably focusing on noticeably disturbed areas (from visitor use, poaching and other illegal uses, and the spread of nonnative species). This would probably have a long-term, beneficial effect on vegetation in localized areas.

The recreation area's exotic plant management plan (NPS 2010) provides an integrated approach for managing nonnative species but none of the identified priority areas are in the wilderness areas. As noted in the "Affected Environment" section, the spread of nonnative plants is a problem in the areas. Nonnative species have been spreading in different locations due to past visitor activities and through natural sources like wind and birds. In addition, even with educational efforts, some nonnative plants such as tamarisk, Russian olive, Russian knapweed, and salt cedar could be introduced or spread by visitors in the wilderness areas. It is difficult to determine the impact of these nonnative species on native vegetation due to the uncertainties about the type of species that might be introduced in the future, and the locations and frequencies of introductions. In spite of monitoring and weed control efforts, the adverse effect of the introduction and spread of nonnative species is unknown, but could range from minor to major and be long term in duration.

When the potential negligible to minor, adverse effects to vegetation in alternative A are added to the past moderate to major impacts; the future negligible to minor, adverse impacts external to the wilderness areas; and the beneficial impacts of restoration of disturbed areas, the result would be a long-term, moderate to major, adverse cumulative impact on area vegetation. However, alternative A would contribute a very small increment to the overall cumulative impact on the wilderness areas' native vegetation.

Conclusion. Some impacts would occur due to visitor use in the formation of user-created, unofficial trails, and illegal off-highway vehicle use. These adverse impacts would probably be localized, minor to moderate, and long-term in extent. Nonnative plants would probably continue to spread in the wilderness areas, resulting in unknown, long-term, adverse impacts on native vegetation. However, continuing efforts to control nonnative species would probably have a long-term, beneficial impact in local areas.

When the impacts inside the wilderness areas are added to past and foreseeable future impacts from past land uses and increased visitation, as well as the beneficial impacts of restoration of disturbed areas, there would be the potential for a moderate to major, long-term, adverse cumulative impact on area vegetation. However, the actions in alternative A would add a very small increment to this overall impact.

Terrestrial Wildlife

Analysis. Few actions in this alternative would affect the wilderness areas' wildlife populations or habitats. Wildlife populations and habitats have already been altered by the presence of visitors and NPS and BLM employees. There would continue to be no limits on the size of groups entering the wilderness areas. Animals sensitive to human activities already avoid these areas when people are present. Wildlife that occupy these areas of concentrated use, such as various reptiles, birds, and small mammals, are mostly adapted to the presence of people and would not be noticeably affected by the actions being taken in alternative A.

Although some desert bighorn sheep would continue to be taken by hunters in the wilderness areas, with population levels being monitored by state and federal biologists, the adverse effect would be expected to be negligible and long term.

Some animals would probably continue to be attracted to food offered by visitors or to areas where food and trash receptacles are present, such as at parking areas and trailheads; these areas are located outside of the wilderness areas. Overall, the adverse impacts of visitor use on wildlife populations in alternative A would be localized and negligible, resulting in no measurable changes to wildlife populations and habitats.

Where consistent with existing regulations, the collection of wildlife resources, other than game species, on BLM portions of the jointly managed wilderness areas (Ireteba Peaks, Eldorado and Spirit Mountain) would continue under this alternative. Overall, the long-term, adverse impacts of resource collection on BLM portions of the wilderness areas would be localized and negligible.

In this alternative, pets, including dogs, would still be allowed in the wilderness areas. Dogs would not be expected to go into the wilderness areas on a frequent basis; however, they could occasionally intimidate and harass wildlife, such as desert bighorn sheep, resulting in long-term, localized and negligible, adverse impacts on terrestrial wildlife.

Cumulative Effects. Terrestrial wildlife in parts of the wilderness areas have been altered by hunting and the presence of visitors and NPS and BLM employees in localized areas. In the past, wild horses and burros have been removed from some of the areas, which extirpated or reduced populations of these species to very low numbers in the wilderness areas. The removal of wild horses and burros has benefited native wildlife species by reducing competition and reducing disturbance around water sources. In addition, past and continuing efforts to prevent the spread of nonnative vegetation species, restore native vegetation, and restore riparian areas would result in long-term, beneficial impact on some wildlife populations, such as birds and small mammals.

The proposed construction of the Boulder City Bypass (preferred alternative) would result in the loss of 45–85 acres of wildlife habitat (FHA and NDOT 2005). The highway would add to the difficulty in desert bighorn sheep movements within the northern Eldorado Mountains and fragment habitat, resulting in a major, adverse impact in this area.

The proposed Searchlight wind energy project would also result in the permanent loss of 152–160 acres of wildlife habitat (BLM 2012b), resulting in the loss of shelter, breeding, and foraging opportunities. Operation of the windmills also would pose

barriers to wildlife behavior patterns. Some of these impacts may adversely affect wildlife that use the Nellis Wash Wilderness, including bats and raptors like golden eagles.

When the potential minor effects from visitor use in the wilderness areas in alternative A are added to the past and future impacts external to the wilderness areas, there would be a long-term, minor to moderate, adverse cumulative impact on terrestrial wildlife populations in the wilderness areas. However, the actions in alternative A would contribute a very small increment to the overall impact.

Conclusion. Some wildlife habits and movements may be altered due to increased visitor use in localized areas such as in pull-offs outside the wilderness areas, along popular routes, and at points of interest. Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use. In addition, some bighorn sheep would continue to be taken by hunters; however, their population levels will be monitored by state and federal biologists. This adverse effect would be negligible and long term.

When the beneficial and adverse impacts of alternative A are added to the impacts that have occurred and are likely to occur in the future in the wilderness areas, there would be a long-term, minor to moderate, adverse cumulative impact on wildlife populations and habitats. However, the actions in alternative A would contribute only a small beneficial increment and a very small adverse increment to this impact.

Special Status Species

Analysis. No impacts on federal threatened and endangered species and critical habitat, the state critically endangered plant species, and BLM sensitive species would occur due to development or improvement of facilities, because alternative A does not include such actions.

Under alternative A—even with ongoing education efforts—a few visitors may, on rare occasions, harass tortoises when they see them. However, continued dispersed visitor use of the wilderness areas would be expected to result in a long-term, negligible adverse effect on desert tortoises in the wilderness areas. Likewise, use by hikers might result in the trampling of a few state-listed Las Vegas bear poppy, threecorner milkvetch, sticky buckwheat, and the BLM sensitive rosy twotone beardtongue, but this use is expected to have a negligible, long-term, adverse effect on the populations in the areas.

In this alternative, pets, including dogs, would still be allowed in the wilderness areas. Dogs would not be expected to go into the wilderness areas on a frequent basis; however, they could occasionally intimidate and harass desert tortoise, resulting in long-term, localized minor, adverse impacts on the tortoise.

General impacts due to visitor use on the BLM sensitive wildlife species would be the same as those analyzed under the wildlife section.

Cumulative Effects. Desert tortoise critical habitat in parts of the wilderness areas has been altered by past occupation by burros, user-created trails, and illegal off-highway vehicle use. Illegal off-highway vehicle use is expected to continue in several wilderness areas, such as Black Canyon and Eldorado, probably modifying and degrading desert tortoise habitat and resulting in the harassment or even loss of some tortoises, and the loss of some state-listed Las Vegas bear poppy, threecorner milkvetch, sticky buckwheat, and BLM sensitive rosy twotone beardtongue. The loss and alteration of habitat due to future external actions that include the increased potential for wildfires in Spirit Mountain would probably result in a minor to moderate, long-term, adverse impact on area threatened and endangered species. External actions that have resulted in the loss of desert tortoise habitat and populations include urbanization, proliferation of roads, off-highway activity, grazing, habitat invasion by nonnative species, increased frequency of

wildfires, placement of landfills and other waste disposal facilities, vandalism and collection of tortoises, disease, environmental contaminants, predation by ravens and other species, and global climate change, among other factors (USFWS 2008).

The proposed construction and operation of the Boulder City Bypass (preferred alternative) and Searchlight wind energy project would result in the loss of habitat, including critical desert tortoise habitat (FHA and NDOT 2005, BLM 2012b). The highway and wind project would fragment desert tortoise habitat, and may result in the loss of some animals, resulting in a minor to moderate, adverse impact in this area.

On the other hand, continuing habitat restoration efforts in the wilderness areas would help protect tortoise habitat under alternative A, which would be a long-term, beneficial impact on the wilderness areas' desert tortoise, as well as other state-listed species and related critical habitat. The translocation of desert tortoises on BLM lands, possibly including near the Spirit Mountain, Eldorado and Ireteba Peaks wilderness areas, also could help reestablish and increase tortoise populations in these areas.

When the potential adverse effects from increased visitation in the wilderness areas in alternative A are added to past actions and illegal off-highway vehicle use and future impacts external to the wilderness areas, there would be a long-term, minor to moderate, adverse cumulative impact on desert tortoise and the three state listed plant and BLM sensitive plan species in the wilderness areas. However, alternative A would contribute a very small increment to the overall cumulative impact.

Conclusion. A few individual state-listed plants (Las Vegas bear poppy, threecorner milkvetch, and sticky buckwheat) and a BLM sensitive plant (rosy twotone beardtongue) may be lost or damaged due to visitor use in the future in localized areas, and rarely some desert tortoise may be harassed by visitors. This would be expected to have a negligible to minor, long-term, adverse effect on these populations. The alternative would not affect the integrity, distribution, or presence of the desert tortoise and the three state critically endangered plant and BLM sensitive plant species in the wilderness areas. Overall, alternative A may affect, but would not be likely to adversely affect, the desert tortoise.

When the beneficial and adverse impacts of alternative A are added to the impacts that have occurred and are likely to occur in the wilderness areas and adjacent lands, there would be the potential for a long-term, minor to moderate, adverse cumulative impact on the desert tortoise and the areas' state-listed plant and BLM sensitive plant species populations and habitats. However, alternative A would contribute a very small increment to this overall cumulative impact.

Natural Soundscape

Analysis. No impacts on natural soundscapes would occur due to development or improvement of facilities, because alternative A does not include such actions.

The potential for increased visitor use, no limits on size of groups entering the wilderness areas, and increased noise due to people's voices, would have long-term, negligible to minor, adverse impacts on the wilderness areas' natural soundscapes in localized areas (e.g., attraction areas such as Boy Scout Canyon, Hamblin Peak, and Grapevine Canyon) during the fall and spring under this alternative.

Cumulative Effects. The natural soundscapes in the wilderness areas would probably continue to be impacted by aircraft overflights, continued illegal off-highway vehicle use, and restoration activities in localized areas. Also, in some of the wilderness areas, boating traffic can be heard from Lake Mead and Lake Mohave, resulting in negligible to minor, long-term, adverse impacts in the areas' natural soundscapes.

The construction and use of the Boulder City Bypass highway would result in substantial increases in noise levels close to the highway, resulting in a moderate to major, adverse impact on the soundscape. Depending on vehicle use levels and wind direction, noise from the highway may occasionally be heard in the Black Canyon Wilderness.

The construction and operation of the Searchlight wind energy project would also result in an increase in noise levels. It was estimated that operation of the windmills would increase noise levels in the northwestern part of the Nellis Wash Wilderness from 15 to 25 decibels (BLM 2012b), resulting in an adverse impact on the natural soundscape in this area.

When the effects of visitor use in alternative A are added to the impacts from overflights, boat traffic, external developments, and management activities in the areas, there could be a moderate long-term, adverse cumulative impact on the natural soundscapes in some of the wilderness areas—primarily Black Canyon and Nellis Wash. However, alternative A would add a very small increment to the overall adverse cumulative impact.

Conclusion. Some long-term, minor to moderate, adverse impacts on soundscapes would occur due to visitor use in localized areas such as at parking areas, along popular routes and at points of interest, such as Boy Scout Canyon and Hamblin Peak, illegal off-highway vehicle use, and boating traffic on Lake Mead and Lake Mohave.

When the impacts inside the wilderness areas resulting from alternative A are added to past and foreseeable future impacts from uses and activities outside the wilderness areas (primarily external developments), there would be the potential for a long-term, moderate adverse cumulative impact on the areas' natural soundscapes—although the actions in alternative A would add a very small increment to this overall cumulative impact.

ALTERNATIVE B – PREFERRED ALTERNATIVE

Soils

Analysis. Previous uses of the wilderness areas, such as cattle grazing and mining, as well as the presence of feral burros, led to the establishment of unofficial trails, increased soil compaction and erodibility, and in some areas decreased cryptogamic soil crust density.

In alternative B, some soils would be lost or substantially altered in local areas where ground disturbance would occur due to the use of designated routes compared to alternative A. Because the designated routes would occur in areas that have already been disturbed by people, the adverse impact on soils from route use would probably be negligible to minor and long term in localized areas.

Under this alternative, the Pinto Valley old road would be reduced in width and converted to a horse and pack animal / hiking route; native vegetation along this route would be restored as part of the conversion of the road to a route. This action would have a long-term, beneficial impact on soils.

Visitors would be encouraged to stay on the designated routes. However, as in alternative A, soils in some of the wilderness areas would probably continue to be compacted and eroded by hikers at some points of interest such as Boy Scout Canyon. In sloped areas, user-created, unofficial routes would result in increased soil erosion from stormwater runoff. These long-term, adverse impacts would probably be negligible to minor and localized in extent.

The creation of new access points and the installation of information signs and kiosks would also occur in areas that have been previously disturbed and are outside of the wilderness boundary. Additional top soil would be removed or compacted due to these actions and due to some increased use in the areas, resulting in a minor to moderate,

adverse, long-term, and localized impact on soils in these areas. Also, in this alternative, the development and use of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would remove or compact top soil adjacent to the wilderness area, resulting in a localized, minor to moderate, long-term, adverse impact on the soils adjacent to the Jimbilnan Wilderness.

In alternative B, the Lower Grapevine Canyon Road adjacent to the Spirit Mountain Wilderness would be closed for resource protection, resulting in a long-term, beneficial impact on soils adjacent to the wilderness area. The development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would reduce the removal and compaction of soils caused by visitors camping within the wilderness area, as they would now camp in the newly designated camping area adjacent to the wilderness area. This would result in a long-term, beneficial impact on soils within the Jimbilnan Wilderness boundary.

This alternative would also provide visitors the opportunity for dispersed overnight camping in Spirit Mountain. This random dispersed use would also result in the removal of top soil and cause soil compaction, resulting in negligible to minor, long-term, and localized adverse impacts on the soils in this area.

In alternative B, efforts to remove user-created unofficial routes and restore the land would help reduce erosion, compared to present conditions, and would result in a long-term, beneficial impact on soils. Establishing a route to the top of Hamblin Peak in Pinto Valley would reduce the impact of soil erosion from visitor-created trails, resulting in a long-term beneficial impact.

This alternative also calls for restoration of user-created campsites to their natural condition at Tule Spring in the Ireteba Peaks Wilderness, resulting in long-term, beneficial impacts on the soils in this area.

Instituting and monitoring wilderness character and visitor use management measures should also help ensure that an unacceptable increase in the number of user-created trails (and resulting in increased soil erosion) does not occur in the wilderness areas. Also, limiting group sizes to no more than 12 people per group would reduce the potential for the development of user-created trails and soil erosion. Compared to the no-action alternative, this alternative would result in a long-term, beneficial impact on wilderness area soils.

The installation of informational signs and kiosks would also probably have a long-term, beneficial impact on area soils by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

Cumulative Effects. Soils in parts of the wilderness areas have been altered by past occupation by burros, cattle grazing, and the development of user-created trails. These past uses of the wilderness areas led to the establishment of unofficial trails, increased soil compaction and erodibility, and decreased cryptogamic soil crust density. The loss and alteration of soils due to past land uses and future external actions, such as nonnative plant management, vegetation restoration, and fire management, would probably result in negligible to minor, long-term, adverse impacts on area soils. When these past and future impacts are added to the potential adverse and beneficial effects of alternative B, there would be a long-term, minor to moderate, adverse cumulative impact on area soils. However, the actions in alternative B would contribute a very small increment to the overall impact.

Conclusion. Some soils would be eroded and lost and some soil properties would be altered. This would be due to the use of designated routes and from visitor use in localized areas, such as in washes and at specific points of interest. Overall, these adverse impacts would probably be minor and long term in extent. On the other hand, establishing a route up Hamblin Peak in the Pinto Valley Wilderness would help reduce soil erosion from user-

created trails in this area. Also, establishing and monitoring wilderness character and visitor use management measures should help prevent the development of new user-created trails and resulting soil erosion, compaction or loss; this would have a long-term, beneficial impact.

When the impacts of alternative B are added to other impacts from past and foreseeable future actions, there would be the potential for a long-term, minor to moderate, adverse cumulative impact on area soils—although the actions in alternative B would add a very small increment to this overall cumulative impact.

Vegetation

Analysis. Vegetation in most portions of the wilderness areas would not be affected by alternative B.

In alternative B, some vegetation would be lost or substantially altered in local areas where ground disturbance would occur due to the use of designated routes (e.g., the Pinto Valley hiker/horse route). The designated routes would occur in previously disturbed areas where native vegetation has already been substantially altered. Given the previous vegetation disturbance and the use of appropriate mitigation measures (e.g., revegetating disturbed areas and taking steps to avoid the spread of nonnative plants), the long-term, adverse effects on native vegetation from the use of designated routes would be negligible to minor in localized areas.

The removal of user-created unofficial routes in several of the wilderness areas, the restoration of vegetation in disturbed areas, and the removal of nonnative invasive species, such as tamarisk at spring sites, would have long-term, beneficial impacts. Under this alternative, the Pinto Valley old road would be reduced in width and converted to a hiking/horse and pack animal route, with native vegetation restored along the route. This action would have a long-term, beneficial impact on the wilderness areas' vegetation.

In alternative B, new access points would be established in various locations outside and adjacent to the wilderness boundary, resulting in localized, negligible to minor, adverse, long-term impacts on vegetation due to the loss of vegetation from the construction of these new access points. Although the installation of information signs and kiosks would occur in previously disturbed areas outside wilderness, with increased use likely in these areas some vegetation could be lost, trampled, or damaged due to increased use in the wilderness areas, resulting in negligible, adverse, and long-term impacts in localized areas.

The development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would result in a long-term, negligible to minor adverse impact on vegetation in the camping area, but would also reduce the removal of and damage to vegetation from visitors camping within the wilderness area, as they would now camp in the newly designated camping area adjacent to the wilderness area. This would result in a long-term, beneficial impact on vegetation in the wilderness area. Also in this alternative, the Lower Grapevine Canyon Road adjacent to the Spirit Mountain Wilderness would be closed for resource protection, resulting in long-term, beneficial impact on vegetation adjacent to the Spirit Mountain Wilderness.

This alternative would allow dispersed camping in the Spirit Mountain Wilderness, which could have negligible, long-term, localized adverse effects on native vegetation from visitors trampling, removing, or damaging the vegetation. None of these impacts would affect the overall integrity, distribution, or presence of native plant communities in the wilderness areas. Thus, visitor use would probably have a long-term, negligible to minor, adverse impact on the wilderness areas' native vegetation in local areas.

In alternative B, most wilderness area visitors would be encouraged to stay on the newly designated routes and would not affect native vegetation. More native vegetation might be

adversely affected in local areas due to people wandering off the routes and trampling or altering native vegetation, and due to people developing user-created trails. None of these impacts would affect the overall integrity, distribution, or presence of native plant communities in the wilderness areas. Thus, visitor use would probably have a long-term, negligible to minor, adverse impact on the wilderness areas' native vegetation in local areas.

The spread of nonnative plants, such as tamarisk, Russian olive, Russian knapweed, and salt cedar, due to visitor use would probably continue to be a problem in the wilderness areas in alternative B. Opportunities for greater access and visitor use in the wilderness areas would increase the potential for the spread of nonnative species, which would replace native plant communities. Continued use of mitigation measures should help contain the spread of some nonnative species in limited areas. Even with these measures and visitor education efforts, some nonnative plants might be introduced or spread by visitors (as well as by the wind and other animal species) in the wilderness areas. Thus, pockets of nonnative species would continue to be present during the life of this plan. It is difficult to determine the impact this would have on native species, due to uncertainties about the type of species that might be introduced and the locations and frequencies of such introductions. However, it is expected that even with continuing monitoring and weed control efforts, the impacts would result in localized, negligible to minor, long-term, adverse impacts.

Alternative B would prohibit resource collection in wilderness areas administered by the National Park Service, resulting in a long-term beneficial impact on vegetation.

In this alternative, the restoration of user-created campsites to natural conditions at Tule Spring in the Ireteba Peaks Wilderness would result in long-term, minor beneficial impacts on vegetation. Also, the establishment of the route in Pinto Valley would involve the restoration of native vegetation along the old road, which would be a long-term beneficial impact.

The establishment and monitoring of wilderness character and visitor use management measures in this alternative would help prevent the spread of additional user-created unofficial routes, and thus prevent the loss and disturbance of vegetation in the wilderness areas from trampling or removal by visitors. Also in this alternative, limiting group sizes to no more than 12 people per group would reduce the potential for the disturbance of vegetation, particularly in popular areas like Pinto Valley. This would have a long-term, beneficial impact on native vegetation in localized areas.

Alternative B would implement the Volunteer Wilderness Stewardship Program to aid in the management of the wilderness areas. Volunteer wilderness stewards would be trained to monitor cultural and natural resources and visitor use in the areas. This program would result in an overall long-term, beneficial impact on the wilderness areas' natural resources, as volunteers would assist park staff in monitoring efforts that the park staff may not be able to provide on their own. This program would also provide important and timely feedback on resource conditions to park staff so they can implement mitigation measures before the impacts have a greater effect on the resources.

The installation of informational signs and kiosks would also probably have a long-term, beneficial impact on area vegetation by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

Cumulative Effects. Vegetation in many parts of the wilderness areas have been altered by past occupation by burros, cattle grazing, the development of user-created trails, and the spread of nonnative plants, resulting in a long-term, moderate to major, adverse effect to native vegetation. The loss and alteration of vegetation due to future external actions such as possible future wildland fires would

probably result in a negligible to minor, long-term, adverse cumulative impact on the areas' native vegetation. On the other hand, vegetation restoration efforts would continue, probably focusing on noticeably disturbed areas (from visitor use, poaching, and other illegal uses, and the spread of nonnative species). This would have a long-term, beneficial effect on vegetation in localized areas.

The recreation area's exotic plant management plan (NPS 2010) provides an integrated approach for managing nonnative species, but none of the identified priority areas are in the wilderness areas. As noted in the "Affected Environment" section, the spread of nonnative plants is a problem in the wilderness areas. Nonnative species have been spreading in different locations due to past visitor activities and natural sources like wind and birds. In addition, even with education efforts, some nonnative plants such as tamarisk, Russian olive, Russian knapweed, and salt cedar could be introduced or spread by visitors in the wilderness areas. It is difficult to determine the impact of these nonnative species on native vegetation due to the uncertainties about the type of species that might be introduced in the future, and the locations and frequencies of introductions. In spite of monitoring and weed control efforts, the adverse effect of the introduction and spread of nonnative species is unknown, but could range from minor to major and be long term in duration.

When the potential negligible to minor, adverse effects of alternative B are added to the past moderate to major impacts; the future negligible to minor, adverse impacts external to the wilderness areas; and the beneficial impacts of restoration of disturbed areas, there would be a long-term, minor to moderate, adverse cumulative impact on area vegetation. However, alternative B would contribute a very small increment to the overall cumulative impact on the wilderness areas' native vegetation.

Conclusion. Some long-term, negligible to minor, adverse impacts would occur in local areas due to the establishment of designated routes and from visitor use. The existence and spread of nonnative plants would continue to have a negligible to minor, long-term, adverse impact on native vegetation. However, efforts to restore native vegetation, remove user-created trails and campsites, and establish and monitor wilderness character and visitor use management measures would probably have long-term, beneficial impacts on native vegetation in localized areas.

When the effects of alternative B are added to the effects of other past, present, and foreseeable future actions, there would be a negligible to minor, long-term, adverse cumulative impact on native vegetation. The actions in alternative B would add both small long-term, beneficial and small long-term, adverse increments to this overall cumulative impact.

Terrestrial Wildlife

Analysis. In alternative B, human use in the wilderness areas would be concentrated on designated routes, in washes, and at particular points of interest such as Boy Scout Canyon. Animals sensitive to human activities already avoid these areas when people are present. Wildlife that occupy these areas of concentrated use, such as various reptiles, birds, and small mammals, are mostly adapted to the presence of people and would not be noticeably affected by the actions in alternative B.

In this alternative, some wildlife may be displaced or habitat may be damaged in local areas where disturbance would occur due to the increased use of designated routes compared to alternative A. However, the designated routes would occur in areas that have already been disturbed by people. Given the previous wildlife and habitat disturbances, the long-term, adverse effects on wildlife and habitat from the designation and use of routes would be negligible to minor in localized areas.

Efforts to restore native vegetation communities would occur in alternative B, expanding habitat for wildlife, and resulting in a long-term, beneficial impact on wildlife populations in the wilderness areas. Likewise, the closure of unofficial user-created trails and the restoration of these areas would result in a reduction of wildlife displacement due to the reduction of human use and would increase the availability of habitat for wildlife that are sensitive to the presence of people, resulting in long-term, beneficial impacts on native wildlife and habitat.

In alternative B, an old road in Pinto Valley would be reduced in width and converted to a hiking / horse and pack stock route; the native vegetation in these areas would be restored, increasing habitat for native wildlife populations. These actions would have long-term, beneficial impacts on the area's wildlife.

In this alternative, new access points would be established at various locations outside and adjacent to the wilderness boundary. This would result in localized, negligible to minor, adverse, short-term impacts on wildlife due to the loss of habitat or the displacement of wildlife from noise and the presence of humans during the construction of these new access points. The presence of humans at these new access points after construction will have localized, negligible to minor, adverse, long-term impacts on wildlife. Although the installation of information signs and kiosks would occur in previously disturbed areas, some habitat would be lost or damaged during construction, resulting in negligible, adverse, and long-term impacts in localized areas.

The development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would result in long-term, negligible to minor adverse impact on wildlife habitat in the camping area but would also reduce the displacement of wildlife and damage to habitat from visitors camping within the wilderness area, as visitors would now camp in the newly designated camping area adjacent to the Jimbilnan Wilderness boundary. This would result in a long-term, beneficial impact on wildlife and habitat within the Jimbilnan Wilderness. Also in this alternative, the Lower Grapevine Canyon Road adjacent to the Spirit Mountain Wilderness would be closed for resource protection, resulting in long-term, beneficial impacts on wildlife and habitat adjacent to the Spirit Mountain Wilderness.

Dispersed camping would be allowed in the Spirit Mountain Wilderness, which could have localized, negligible, long-term, adverse effects on wildlife and habitat from visitors displacing wildlife or damaging their habitat.

As in all of the alternatives, some animals such as various reptiles would continue to occasionally be injured or killed by illegal off-highway vehicle use or be displaced by visitors creating unofficial routes through wildlife habitat. Some animals such as birds, mice, squirrels, and rabbits would probably continue to be attracted to food being offered by visitors. The overall adverse effects on wildlife from visitor activities in alternative B would be the same as those in alternative A: long-term, localized and negligible, resulting in no measurable changes to the wilderness areas' wildlife populations.

Alternative B would prohibit resource collection in wilderness areas administered by the National Park Service, resulting in a long-term beneficial impact on terrestrial wildlife in the wilderness areas.

In this alternative, the restoration of user-created campsites to natural conditions at Tule Spring in the Ireteba Peaks Wilderness would result in long-term, beneficial impacts on the wildlife habitat in this area.

In this alternative, limiting group sizes to no more than 12 people per group would reduce human use and the potential for groups to disturb wildlife. This would result in long-term beneficial impacts on the wildlife and habitat.

Alternative B would implement the Volunteer Wilderness Stewardship Program to aid in the management of the wilderness areas. Volunteer wilderness stewards would be

trained to monitor cultural and natural resources and visitor use in the areas. This program would result in an overall long-term, beneficial impact on the wilderness areas' natural resources, as the volunteers would assist park staff in monitoring efforts that the park staff may not be able to provide on their own. This program would also provide important and timely feedback on resource conditions to park staff so they can implement mitigation measures before the impacts have a greater effect on the resources.

The installation of informational signs and kiosks would also probably have a long-term, beneficial impact on area wildlife and habitat by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

Ensuring that pets are under leash control at all times would help keep pets from intimidating and harassing wildlife, including desert bighorn sheep. This would have a long-term, beneficial impact on terrestrial wildlife.

Cumulative Effects. Terrestrial wildlife in parts of the wilderness areas have been altered by hunting and the presence of visitors and NPS and BLM employees in localized areas. In the past, wild horses and burros have been removed from some of the areas, which extirpated these populations or reduced them to very low numbers in the wilderness areas. The removal of wild horses and burros has benefited native wildlife species by reducing competition and reducing disturbance around water sources. The alteration of wildlife habits and movements due to future external actions would probably result in long-term, negligible to minor, adverse impacts on native wildlife. On the other hand, past and continuing efforts to prevent the spread of nonnative vegetation species, restore native vegetation, and restore riparian areas would result in long-term, beneficial impacts on some wildlife populations, such as birds and small mammals.

The proposed construction of the Boulder City Bypass (preferred alternative) would result in the loss of 45 to 85 acres of wildlife habitat in the recreation area (FHA and NDOT 2005). The highway would add to the difficulty in desert bighorn sheep movements within the northern Eldorado Mountains and fragment habitat, resulting in a major, adverse impact in this area.

The proposed Searchlight wind energy project would also result in the permanent loss of 152–160 acres of wildlife habitat (BLM 2012b), resulting in the loss of shelter, breeding and foraging opportunities. Operation of the windmills also would pose barriers to wildlife behavior patterns. Some of these impacts may adversely affect wildlife that use the Nellis Wash Wilderness, including bats and raptors such as golden eagles.

When the potential minor effects from visitor use in the wilderness areas in alternative B are added to the past and future impacts external to the wilderness areas, there would be a long-term, negligible to minor, adverse cumulative impact on terrestrial wildlife populations. However, the actions in alternative B would contribute a very small increment to the overall impact.

Conclusion. Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use of the wilderness areas. There would also be long-term, beneficial impacts on some wildlife populations due to vegetation restoration efforts and the closure and restoration of roads and unofficial user-created trails in the wilderness areas.

When the beneficial and adverse impacts of alternative B are added to the impacts that have occurred in the wilderness areas, there would be a long-term, negligible to minor, adverse cumulative impact on the areas' wildlife populations and habitats. However, the actions in alternative B would contribute only a small long-term, beneficial increment and a very small long-term, adverse increment to this impact.

Special Status Species

Analysis. In alternative B, human use in the wilderness areas would be concentrated on designated routes, in washes, and at particular points of interest.

Under alternative B—even with ongoing education efforts—a few visitors may very occasionally harass tortoises when they see them. However, in general, continued dispersed visitor use of the wilderness areas would be expected to result in a negligible, long-term, adverse effect on desert tortoises. Likewise, visitation by hikers might result in the trampling of a few state-listed Las Vegas bear poppy, threecorner milkvetch, sticky buckwheat, and the BLM sensitive rosy twotone beardtongue, but this use is expected to have a long-term, negligible, adverse effect on the populations in the areas.

In alternative B, some desert tortoises may be displaced or habitat may be damaged in local areas where disturbance would occur due to the use of designated routes. The use of designated routes would occur in areas that have already been disturbed by people; this use would have a negligible to minor, long-term, localized, adverse impact on the wilderness area's desert tortoise species and habitat.

Under this alternative, the old road in Pinto Valley would be reduced in width and converted to a hiking / horse and pack animal route; the native vegetation areas along this route would be restored, increasing possible habitat for desert tortoise. This action would have a long-term, beneficial impact on the desert tortoise.

Development of new access points and the installation of information signs and kiosks would occur in areas that are not considered critical habitat, have already been disturbed, and are located outside of and adjacent to the wilderness boundary. The adverse impact on desert tortoise populations and habitats in these areas from the construction of parking areas, signs, and kiosks would be short-term and negligible.

Also in this alternative, the development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness could displace desert tortoise or damage habitat adjacent to the wilderness area. This could result in a localized, negligible to minor, long-term, adverse impact on desert tortoise and their habitat.

Dispersed camping would be allowed in the Spirit Mountain Wilderness, which could have negligible, long-term, and localized adverse effects on desert tortoise and their habitat through species displacement or damage to their habitat from visitor use.

Although the development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness could remove some potential tortoise habitat, it also could reduce the displacement of desert tortoise and the damage to habitat from visitors camping within the wilderness area. This would result in a long-term, beneficial impact on desert tortoise in the wilderness area.

Also in this alternative, several roads, including the Lower Grapevine Canyon Road adjacent to the Spirit Mountain Wilderness, would be closed for resource protection. This would reduce the potential for tortoises to be run over by vehicles, resulting in a long-term, beneficial impact on desert tortoise and habitat.

Ensuring that pets are under leash control at all times would help keep pets from intimidating and harassing wildlife, including desert bighorn sheep. This would have a long-term, beneficial impact on terrestrial wildlife.

As in all of the alternatives, some desert tortoise may continue to occasionally be injured or killed and the three state-listed plant species may be trampled by illegal off-highway vehicle use or be displaced from visitors creating unofficial routes through the species' habitat. The overall adverse effects on the desert tortoise and three state-listed plant species from visitor activities in alternative B

would be localized, negligible to minor, and long term.

In alternative B, user-created campsites would be restored to natural conditions at Tule Spring in the Ireteba Peaks Wilderness, resulting in long-term beneficial impacts on desert tortoises and habitat in this area.

Alternative B would implement the Volunteer Wilderness Stewardship Program to aid in the management of the wilderness areas. Volunteer wilderness stewards would be trained to monitor cultural and natural resources and visitor use in the areas. This program would result in overall long-term, beneficial impacts on the wilderness areas' natural resources, including desert tortoise, the three state-listed plant species, and the BLM sensitive plant species as volunteers would assist park staff in monitoring efforts that the park staff may not be able to provide on their own. This program would also provide important and timely feedback on resource conditions to park staff so they can implement mitigation measures before the impacts have a greater effect on the resources.

The installation of informational signs and kiosks would also probably have a long-term, beneficial impact on the desert tortoise and habitat by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

General impacts due to alternative B on the BLM sensitive wildlife species would be the same as those analyzed under the wildlife section and for the desert tortoise above.

Cumulative Effects. Threatened and endangered species' critical habitat in parts of the wilderness areas has been altered by the past occupation by burros, the development of user-created trails, and illegal off-highway vehicle use. Until illegal off-highway vehicle use is eliminated in several wilderness areas, such as Black Canyon and Eldorado, this use would probably modify and degrade desert tortoise habitat and result in the harassment or even loss of some tortoises, as well as the loss of some state-listed plants (Las Vegas bear poppy, threecorner milkvetch, sticky buckwheat) and a BLM sensitive plant (rosy twotone beardtongue).

The loss and alteration of habitat due to future external actions, including possible wildfires in Spirit Mountain, would probably result in a long-term, negligible to minor, adverse impact on desert tortoise. External actions that have resulted in the loss of desert tortoise habitat and populations include urbanization, proliferation of roads, off-highway activity, grazing, habitat invasion by nonnative species, increased frequency of wildfires, placement of landfills and other waste disposal facilities, vandalism and collection of tortoises, disease, presence of environmental contaminants, predation by ravens and other species, and global climate change, among other factors (USFWS 2008).

The proposed construction and operation of the Boulder City Bypass (preferred alternative) and Searchlight wind energy project would result in the loss of habitat, including critical desert tortoise habitat (FHA and NDOT 2005, BLM 2012b). The highway and wind project would fragment desert tortoise habitat, and may result in the loss of some animals, resulting in a minor to moderate, adverse impact in this area.

On the other hand, continuing habitat restoration efforts in the wilderness areas would help protect tortoise habitat under alternative B, which would result in a long-term, beneficial impact on desert tortoise, as well as the state-listed plant species and related critical habitat. The translocation of desert tortoises on BLM lands, possibly including near the Spirit Mountain, Eldorado and Ireteba Wilderness areas, also could help re-establish and increase tortoise populations in these areas.

When the potential adverse effects from visitor use in the wilderness areas in alternative B are added to past actions, illegal off-highway vehicle use, and future impacts external to the wilderness areas, there would be a long-term, negligible to minor, adverse cumulative impact on desert tortoise, the

three state listed plant species, and a BLM sensitive plant species in the wilderness areas. However, alternative B would contribute a very small increment to the overall cumulative impact.

Conclusion. Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use of the wilderness areas. There would also be long-term, beneficial impacts on some desert tortoise, the three state-listed plant populations, and a BLM sensitive plant species due to vegetation restoration efforts, tortoise fencing, and the closure and restoration of unofficial user-created trails in the wilderness areas. Overall, alternative B may affect, but would not be likely to adversely affect, the desert tortoise.

When the beneficial and adverse impacts of alternative B are added to the impacts that have occurred and are likely to occur in the wilderness areas, there would be a long-term, negligible to minor, adverse cumulative impact on the areas' desert tortoise and the three state listed plant and a BLM sensitive plant populations and habitats. However, the actions in alternative B would contribute only a small long-term, beneficial increment and a very small long-term, adverse increment to this impact.

Natural Soundscape

Analysis. The natural soundscape in most portions of the wilderness areas would not be affected by the actions taken in alternative B.

Alternative B would establish new designated routes, which would help confine users and concentrate user noise to these routes. This could result in increased disruption of the natural soundscape along the designated routes, as visitors would be encouraged to stay on these routes with other visitors rather than to seek individual routes through the development of user-created unofficial trails. This would result in a negligible to minor, long-term, adverse impact on the natural soundscape in the wilderness areas.

The closure of unofficial user-created trails would result in more concentrated areas of visitor use, thus containing visitor noise to the newly designated routes, resulting in long-term, beneficial impacts on the natural soundscape.

Under this alternative, the old Pinto Valley road would be reduced in width and converted to hiking / horse and pack animal route; this would eliminate illegal off-highway vehicle use and restore the natural soundscape in this area and would have a long-term, beneficial impact on the natural soundscape.

Development of new access points and the installation of information signs and kiosks would occur in areas that are located outside of and adjacent to the wilderness boundary. The adverse impact on the natural soundscape in these areas from the construction of parking areas, signs, and kiosks would be short term and negligible.

Also in this alternative, the development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would concentrate visitor noise adjacent to the wilderness area, resulting in a localized, negligible to minor, long-term, adverse impact on the area's natural soundscape in the vicinity of the wilderness area.

Also in this alternative, several roads, including the Lower Grapevine Canyon Road adjacent to the Spirit Mountain Wilderness, would be closed for resource protection, resulting in a long-term, beneficial impact on natural soundscapes in the wilderness areas due to the elimination of illegal off-highway or other vehicle use.

Monitoring sounds within the wilderness areas and from aircraft overflights would continue under alternative B; this may provide information regarding the impacts on the natural soundscapes, which could result in the development of management actions to mitigate these impacts. Instituting and monitoring wilderness character and visitor use management measures should help ensure

that an unacceptable increase in disruption of the natural soundscape due to visitors does not occur in the wilderness areas. Establishing limits on group sizes, especially in areas of high use and at points of interest, and eliminating illegal off-highway vehicle use would result in long-term, beneficial impacts in the areas' natural soundscapes.

The installation of informational signs and kiosks would also probably have a long-term, beneficial impact on area natural soundscapes by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

Cumulative Effects. The natural soundscapes in the wilderness areas would probably continue to be impacted by aircraft overflights, illegal off-highway vehicle use, and restoration activities in localized areas. Also, in some of the wilderness areas, boating traffic can be heard from Lake Mead and Lake Mohave, resulting in long-term, negligible to minor, adverse impacts in the areas' natural soundscapes.

The construction and use of the Boulder City Bypass highway would result in substantial increases in noise levels close to the highway, resulting in a moderate to major, adverse impact on the soundscape. Depending on vehicle use levels and wind direction, noise from the highway may occasionally be heard in the Black Canyon Wilderness.

The construction and operation of the Searchlight wind energy project would also result in an increase in noise levels. It was estimated that operation of the windmills would increase noise levels in the northwestern part of the Nellis Wash Wilderness from 15 to 25 decibels (BLM 2012b), resulting in an adverse impact on the natural soundscape in this area.

When the effects of alternative B are added to the impacts from overflights, boat traffic, external developments, and management activities in the areas, there potentially could be a moderate, long-term, adverse cumulative impact on the natural soundscapes in some of the wilderness areas—primarily in Black Canyon and Nellis Wash. However, alternative B would add a very small increment to the overall adverse cumulative impact.

Conclusion. Some natural soundscapes would be degraded due to visitor use in localized areas such as along routes, in washes, in high use areas such as at Boy Scout Canyon, and in some wilderness areas where boating traffic on Lake Mead and Lake Mohave can be heard. These adverse impacts would probably be negligible to minor and long term in extent.

When the impacts inside the wilderness areas are added to past and foreseeable future impacts from visitor use and the addition of external developments outside the wilderness boundary, there would be a long-term, moderate adverse cumulative impact on the areas' natural soundscapes—although the actions in alternative B would add a very small increment to this overall impact. Continuing efforts to monitor and establish a baseline for natural soundscapes in the wilderness areas, and the development and implementation of mitigation measures would result in a long-term, beneficial impact on the natural soundscapes. Instituting and monitoring wilderness character and visitor use management measures that would address group sizes, illegal off-highway vehicle use, and general noise disturbances would also result in long-term, beneficial impacts on the natural soundscape in the wilderness areas.

When the beneficial and adverse impacts of alternative B are added to the impacts that have occurred and external future actions that might affect the wilderness areas, there would be a long-term, moderate, adverse cumulative impact on the areas' natural soundscapes.

ALTERNATIVE C

Soils

Analysis. Previous uses of the wilderness areas, such as cattle grazing and mining, as well as the presence of feral burros led to the establishment of unofficial trails, increased soil compaction and erodibility, and in some areas decreased cryptogamic soil crust density.

In alternative C, some soils would be lost or substantially altered in local areas where ground disturbance would occur due to the use of designated routes compared to alternative A. However, the designated routes would occur in areas that have already been disturbed by people and would have a negligible to minor, long-term, localized, adverse impact on the wilderness area's soils.

Under this alternative, the old Pinto Valley road would be reduced in width and converted to a hiking / horse and pack animal route; the native vegetation areas along this route would be restored. This action would have a long-term, beneficial impact on soils.

Visitors would be encouraged to stay on the designated routes; however, as in alternative A, soils in some of the wilderness areas would probably continue to be compacted and eroded by hikers at some points of interest, such as Boy Scout Canyon. In sloped areas, user-created, unofficial routes would result in increased soil erosion from stormwater runoff. These long-term, adverse impacts would probably be negligible to minor and localized in extent.

The creation of new access points and the installation of information signs and kiosks would also occur in areas that have been previously disturbed and are outside of the wilderness boundary. Additional top soil would be removed or compacted due to these actions and due to some increased use, resulting in a minor to moderate, adverse, long-term, and localized impact on soils in these areas. Also in this alternative, the development and use of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would remove or compact top soil adjacent to the wilderness area, resulting in a minor to moderate, long-term and localized, adverse impact on the soils adjacent to the Jimbilnan Wilderness.

In alternative C, the Lower Grapevine Canyon Road adjacent to the Spirit Mountain Wilderness would be closed for resource protection, resulting in a long-term, beneficial impact on soils adjacent to the wilderness area. The development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would reduce the removal and compaction of soils caused by visitors camping within the wilderness area, as they would now camp in the newly designated camping area adjacent to the Jimbilnan Wilderness. This would result in a long-term, beneficial impact on soils within the Jimbilnan Wilderness.

Alternative C would also provide visitors only day use opportunities in the Spirit Mountain Wilderness. Compared to alternative A, this would eliminate new visitor-created camping sites and result in long-term, beneficial impacts; however, overall, soil erosion, removal, or compaction would still be caused by visitor use on the newly designated routes, resulting in negligible to minor, long-term, and localized, adverse impacts on the soils in this area.

In alternative C, efforts to remove and restore user-created unofficial routes would help reduce erosion, compared to present conditions, and would result in a long-term, beneficial impact on soils. Establishing a route to the top of Hamblin Peak in the Pinto Valley Wilderness and two routes on Spirit Mountain would reduce the impact of soil erosion from visitor-created trails, resulting in long-term beneficial impact.

This alternative also calls for restoration of user-created campsites to natural conditions at Tule Spring in the Ireteba Peaks Wilderness, resulting in long-term, beneficial impacts on the soils in this area.

Instituting and monitoring wilderness character and visitor use management measures should also help ensure that an unacceptable increase in the number of user-created trails (and resulting increased soil erosion) does not occur in the wilderness areas. In addition, limiting group sizes to no more than 12 people per group would reduce the potential for the development of user-created trails and soil erosion. Compared to the no-action alternative, this alternative would result in a long-term, beneficial impact on wilderness area soils.

The installation of informational signs and kiosks would also probably have a long-term, beneficial impact on wilderness area soils by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

Cumulative Effects. Soils in parts of the wilderness areas have been altered by past occupation by burros, cattle grazing, and the development of user-created trails. These past uses of the wilderness areas led to the establishment of unofficial trails, increased soil compaction and erodibility, and decreased cryptogamic soil crust density. The loss and alteration of soils due to past land uses and future external actions such as exotic plant management, vegetation restoration, and fire management, would probably result in negligible to minor, long-term, adverse impacts on area soils. When these past and future impacts are added to the potential adverse and beneficial effects of alternative C, there would be a long-term, minor to moderate, adverse cumulative impact on area soils. However, the actions in alternative C would contribute a very small increment to the overall impact.

Conclusion. Some soils would be eroded and lost and some soil properties would be altered. This would be due to the use of designated routes and from visitor use in localized areas, such as in washes and at specific points of interest. Overall, these adverse impacts would probably be minor and long term in extent. On the other hand, establishing a route up Hamblin Peak and two routes up Spirit Mountain would help reduce soil erosion in these areas. Also, establishing and monitoring wilderness character and visitor use management measures should help prevent the development of new user-created trails and resulting soil erosion, compaction or loss; this would have a long-term, beneficial impact.

When the impacts of alternative C are added to other impacts from past and foreseeable future actions, there would be the potential for a long-term, minor to moderate, adverse cumulative impact on area soils—although the actions in alternative C would add a very small increment to this overall cumulative impact.

Vegetation

Analysis. As in alternatives A and B, vegetation in most portions of the wilderness areas would not be affected by alternative C.

In alternative C, some vegetation would be lost or substantially altered in local areas where ground disturbance would occur due to the use of designated routes. However, the designated routes would occur in previously disturbed areas where native vegetation has already been substantially altered. Given the previous vegetation disturbance and the use of appropriate mitigation measures (e.g., revegetating disturbed areas and taking steps to avoid the spread of nonnative plants), the long-term, adverse effects on native vegetation from the use of designated routes would be negligible to minor in localized areas.

The removal of user-created unofficial routes in several of the wilderness areas, the restoration of vegetation in disturbed areas, and the removal of nonnative invasive species, such as tamarisk at spring sites, would have long-term, beneficial impacts. Under this alternative, the old road in Pinto Valley would be reduced in width and converted to a hiking / horse and pack animal route; the native vegetation along this route would be restored. This action would have a long-term, beneficial impact on the area's vegetation.

In alternative C, new access points would be created in various locations outside and adjacent to the wilderness boundary, resulting in localized, negligible to minor, adverse, long-term impacts on vegetation due to the loss of vegetation from the construction of these new access points. Although the installation of information signs and kiosks would occur in previously disturbed areas outside wilderness, some vegetation could be lost, trampled, or damaged in the wilderness areas due to increased use of these areas, resulting in negligible, adverse, and long-term impacts in localized areas.

The development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would result in a negligible to minor, long-term adverse impact on vegetation in the camping area, but also would reduce the damage to vegetation from visitors camping within the wilderness area, as they would now camp in the newly designated camping area adjacent to the wilderness area. This would result in a long-term, beneficial impact on vegetation in the wilderness area. Also in this alternative, the Nevada Telephone Cove Road adjacent to the Spirit Mountain Wilderness would be closed for resource protection, resulting in a long-term, beneficial impact on vegetation adjacent to the Spirit Mountain Wilderness.

In alternative C, most wilderness area visitors would be encouraged to stay on newly developed designated routes and would not affect native vegetation. More native vegetation might be adversely affected in local areas due to people wandering off the routes and trampling or altering native vegetation, the development of user-created trails. None of these impacts would affect the overall integrity, distribution, or presence of native plant communities in the wilderness areas. Thus, visitor use would probably have a long-term, negligible to minor, adverse impact on the wilderness areas' native vegetation in local areas.

Alternative C would also provide visitors only day use opportunities in the Spirit Mountain Wilderness. Compared to alternative A, this would eliminate the loss of native vegetation due to user-created campsites and result in long-term, beneficial impacts; however, overall, vegetation could still be trampled or altered by visitor use, resulting in negligible to minor, long-term, localized, adverse impacts on the soils in this area.

The spread of nonnative plants, such as tamarisk, Russian olive, Russian knapweed, and salt cedar, due to visitor use would probably continue to be a problem in the wilderness areas in alternative C. Opportunities for greater access and visitor use in the wilderness areas would increase the potential for the spread of nonnative species, which would replace native plant communities. Continued use of mitigation measures should help contain the spread of some nonnative species in limited areas. Even with these measures and visitor education efforts, some nonnative plants might be introduced or spread by visitors (as well as by the wind and other animal species) in the wilderness areas. Thus, pockets of nonnative species would continue to be present during the life of this plan. It is difficult to determine the impact this would have on native species, due to uncertainties about the type of species that might be introduced and the locations and frequencies of such introductions. However, it is expected that even with continuing monitoring and weed control efforts, the impacts would result in negligible to minor, long-term, localized, adverse impacts.

Alternative C would prohibit resource collection in wilderness areas administered by the National Park Service, resulting in a long-term, beneficial impact on vegetation.

In this alternative, the restoration of user-created campsites to natural conditions at Tule Spring in the Ireteba Peaks Wilderness would result in long-term, beneficial impacts on vegetation. Also, the establishment of a route in Pinto Valley would involve the restoration of native vegetation, which would be a long-term beneficial impact.

The establishment and monitoring of wilderness character and visitor use management measures in this alternative would help prevent the spread of additional user-created unofficial routes, and thus prevent the loss and disturbance of vegetation from trampling or removal by visitors. particularly in popular areas like Pinto Valley. This would have a long-term, beneficial impact on native vegetation in localized areas.

Alternative C would implement the Volunteer Wilderness Stewardship Program to aid in the management of the wilderness areas. Volunteer wilderness stewards would be trained to monitor cultural and natural resources and visitor use in the areas. This program would result in an overall long-term, beneficial impact on the wilderness areas' natural resources, as volunteers would assist park staff in monitoring efforts that the park staff may not be able to provide on their own. This program would also provide important and timely feedback on resource conditions to park staff so they can implement mitigation measures before the impacts have a greater effect on the resources.

The installation of informational signs and kiosks also would probably have a long-term, beneficial impact on the wilderness areas' vegetation by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

Cumulative Effects. Vegetation in many parts of the wilderness areas has been altered by past occupation by burros, cattle grazing, the development of user-created trails, and the spread of nonnative plants, resulting in a moderate to major, adverse effect to native vegetation. The loss and alteration of vegetation due to future external actions, such as possible future wildland fires, would probably result in a negligible to minor, long-term, adverse cumulative impact on the areas' native vegetation. On the other hand, vegetation restoration efforts would continue, probably focusing on noticeably disturbed areas (from visitor use, poaching and other illegal uses, and the spread of nonnative species). This would have a long-term, beneficial effect on vegetation in localized areas.

The recreation area's exotic plant management plan (NPS 2010) provides an integrated approach for managing nonnative species, but none of the identified priority areas are in the wilderness areas. As noted in the "Affected Environment" section, the spread of nonnative plants is a problem in the wilderness areas. Nonnative species have been spreading in different locations due to past visitor activities and natural sources such as wind and birds. In addition, even with educational efforts, some nonnative plants such as tamarisk, Russian olive, Russian knapweed, and salt cedar could be introduced or spread by visitors in the wilderness areas. It is difficult to determine the impact of these nonnative species on native vegetation due to the uncertainties about the type of species that might be introduced in the future, and the locations and frequencies of introductions. In spite of monitoring and weed control efforts, the adverse effect of the introduction and spread of nonnative species is unknown, but could range from minor to major and be long-term in duration.

When the potential negligible to minor, adverse effects of alternative C are added to the past moderate to major impacts; future negligible to minor, adverse impacts external to the wilderness areas; and the beneficial impacts of restoration of disturbed areas, there would be a long-term, minor to moderate, adverse cumulative impact on area vegetation. However, alternative C would contribute a very small increment to the overall cumulative impact on the wilderness areas' native vegetation.

Conclusion. Some long-term, negligible to minor, adverse impacts would occur in local areas due to the development of proposed new, designated routes and from visitor use. The existence and spread of nonnative plants would continue to have a negligible to minor, long-term, adverse impact on native vegetation. However, efforts to restore native vegetation, remove user-created trails, and establish and monitor wilderness character

and visitor use management measures would probably have long-term, beneficial impacts on native vegetation in localized areas.

When the effects of alternative C are added to the effects of other past, present, and foreseeable future actions, there would be a negligible to minor, long-term, adverse cumulative impact on native vegetation. The actions in alternative C would add both small beneficial and small adverse increments to this overall cumulative impact.

Terrestrial Wildlife

Analysis. In alternative C, human use in the wilderness areas would be concentrated on designated routes, in washes, and at particular points of interest such as Boy Scout Canyon. Animals sensitive to human activities already avoid these areas when people are present. Wildlife that occupy these areas of concentrated use, such as various reptiles, birds, and small mammals are mostly adapted to the presence of people and would not be noticeably affected by the actions in alternative C.

In this alternative, some wildlife may be displaced or habitat may be damaged in local areas where disturbance would occur due to the increased use of designated routes compared to alternative A. However, the designated routes would occur in areas that have already been disturbed by people. Given the previous wildlife and habitat disturbances, the long-term, adverse effects on wildlife and habitat from the use of designated routes would be negligible to minor in localized areas.

Efforts to restore native vegetation communities would occur in alternative C, expanding habitat for wildlife and resulting in a long-term, beneficial impact on wildlife populations in the wilderness areas. Likewise, the closure of unofficial user-created trails and the restoration of these areas would result in a reduction of human use, and would increase the availability of habitat for wildlife that are sensitive to the presence of people, resulting in long-term, beneficial impacts on native wildlife and habitat.

In alternative C, an old road in Pinto Valley would be reduced in width and converted to a hiking / horse and pack stock route; the native vegetation in this area would be restored, increasing habitat for native wildlife populations. This action would have a long-term, beneficial impact on the area's wildlife.

In this alternative, new access points would be created at various locations outside and adjacent to the wilderness boundary. This would result in localized, negligible to minor, adverse, short-term impacts on wildlife due to the loss of habitat or the displacement of wildlife from noise and the presence of humans during construction of these new access points. The presence of humans at these new access points after construction would have localized, negligible to minor, adverse, long-term impacts on wildlife. Although the installation of information signs and kiosks would occur in previously disturbed areas, some habitat would be lost or damaged during construction, resulting in negligible, adverse, and long-term impacts in localized areas.

The development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would result in a long-term, negligible to minor adverse impact on wildlife habitat in the camping area, but would also reduce the displacement of wildlife and the damage to habitat from visitors camping within the wilderness area, as visitors would now camp in the newly designated camping area adjacent to the Jimbilnan Wilderness boundary. This would result in a long-term, beneficial impact on wildlife and habitat within the Jimbilnan Wilderness. Also in this alternative, the Nevada Telephone Cove Road adjacent to the Spirit Mountain Wilderness would be closed for resource protection, resulting in long-term, beneficial impacts on wildlife and habitat adjacent to the Spirit Mountain Wilderness.

As in all of the alternatives, some animals such as various reptiles would continue to

occasionally be injured or killed by illegal off-highway vehicle use or be displaced by visitors creating unofficial routes through wildlife habitat. Some animals, such as birds, mice, squirrels, and rabbits, would probably continue to be attracted to food being offered by visitors. The overall adverse effects on wildlife from visitor activities in alternative C would be the same as those in alternative A: long term, localized and negligible, resulting in no measurable changes to the wilderness areas' wildlife populations.

Alternative C would also provide visitors only day use opportunities in the Spirit Mountain Wilderness. Compared to alternative A, this would result in long-term, beneficial impacts; however, overall, wildlife and habitat could still be adversely affected by visitor use, resulting in negligible to minor, long-term, localized, adverse impacts on the wildlife and habitat in this area.

Alternative C would prohibit resource collection in the wilderness areas administered by the National Park Service, resulting in a beneficial, long-term impact on terrestrial wildlife in the wilderness areas.

In this alternative, the restoration of user-created campsites to natural conditions at Tule Spring in the Ireteba Peaks Wilderness would result in long-term, beneficial impacts on wildlife habitat in this area.

In this alternative, limiting group sizes to no more than 12 people per group would reduce human use and the potential for groups disturbing wildlife. This would result in long-term, beneficial impacts on the wildlife and habitat.

This alternative would implement the Volunteer Wilderness Stewardship Program to aid in the management of the wilderness areas. Volunteer wilderness stewards would be trained to monitor cultural and natural resources and visitor use in the areas. This program would result in an overall long-term, beneficial impact on the wilderness areas' natural resources, as volunteers would assist park staff in monitoring efforts the park staff may not be able to provide on their own. This program would also provide important and timely feedback on resource conditions to park staff so they can implement mitigation measures before the impacts have a greater effect on the resources.

The installation of informational signs and kiosks would also probably have a long-term, beneficial impact on national recreation area wildlife and habitat by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

Ensuring that pets are under leash control at all times would help keep pets from intimidating and harassing wildlife, including desert bighorn sheep. This would have a long-term, beneficial impact on terrestrial wildlife.

Cumulative Effects. Terrestrial wildlife in parts of the wilderness areas have been altered by hunting and the presence of visitors and NPS and BLM employees in localized areas. In the past, wild horses and burros have been removed from some of the areas, which extirpated or reduced populations of these species to very low numbers in the wilderness areas. The removal of wild horses and burros has benefited native wildlife species by reducing competition and reducing disturbance around water sources. The alteration of wildlife habits and movements due to future external actions such as future wildland fires would probably result in long-term, negligible to minor, adverse impacts on native wildlife. On the other hand, past and continuing efforts to prevent the spread of nonnative vegetation species, restore native vegetation, and restore riparian areas would result in long-term, beneficial impacts on some wildlife populations, such as birds and small mammals.

The proposed construction of the Boulder City Bypass (preferred alternative) would result in the loss of 45–85 acres of wildlife habitat (FHA and NDOT 2005). The highway would add to the difficulty in desert bighorn sheep movements within the northern Eldorado Mountains and fragment habitat,

resulting in a major, adverse impact in this area.

The proposed Searchlight wind energy project would also result in the permanent loss of 152–160 acres of wildlife habitat (BLM 2012b), resulting in the loss of shelter, breeding, and foraging opportunities. Operation of the windmills also would pose barriers to wildlife behavior patterns. Some of these impacts may adversely affect wildlife that use the Nellis Wash Wilderness, including bats and raptors like golden eagles.

When the potential minor effects from visitor use in the wilderness areas in alternative C are added to the past and future impacts external to the wilderness areas, there would be a long-term, negligible to minor, adverse cumulative impact on terrestrial wildlife populations. However, the actions in alternative C would contribute a very small increment to the overall impact.

Conclusion. Long-term, negligible, adverse impacts would continue to occur in localized areas due to visitor use of the wilderness areas. There would also be long-term, beneficial impacts on some wildlife populations due to vegetation restoration efforts and the closure and restoration of roads and unofficial user-created trails in the wilderness areas.

When the beneficial and adverse impacts of alternative C are added to the impacts that have occurred in the wilderness areas, there would be a long-term, negligible to minor, adverse cumulative impact on the areas' wildlife populations and habitats. However, the actions in alternative C would contribute only a small long-term, beneficial increment and a very small long-term, adverse increment to this impact.

Special Status Species

Analysis. In alternative C, human activity in the wilderness areas would be concentrated on designated routes, in washes, and at particular points of interest.

Under alternative C—even with ongoing education efforts—a few visitors may rarely harass tortoises when they see them. However, in general, even if use levels slightly increase, continued dispersed visitor use of the wilderness areas would be expected to result in a long-term, negligible, adverse effect on desert tortoises in the wilderness areas. Likewise, increased visitation by hikers might result in the trampling of a few state listed plant species (Las Vegas bear poppy, threecorner milkvetch, sticky buckwheat) and the BLM sensitive rosy twotone beardtongue, but this is expected to have a long-term, negligible adverse effect on the populations in the areas.

In alternative C, some desert tortoises may be displaced or habitat may be in local areas where disturbance would occur due to the use of designated routes. Some state-listed critically endangered plants also may be damaged or lost due to the designation of routes in the Jimbilnan and Pinto Valley Wilderness areas. However, the designated routes would occur in areas that are not considered critical habitat, and have already been disturbed by people; this would have a negligible, long-term, and localized adverse impact on the wilderness areas' desert tortoises and the state-listed plant species and habitat. Given the previous disturbances to these species and their habitat, the long-term, adverse effects on the desert tortoise and habitat and the three state listed plant species from the use of designated routes would be negligible to minor in localized areas.

Efforts to restore native vegetation communities would occur in alternative C. This effort could expand habitat for the desert tortoise and the three state-listed plant species, and would have a long-term, beneficial impact on desert tortoise populations found in the wilderness areas. Likewise, the closure of unofficial user-created trails and the restoration of these areas would result in a reduction in human use, resulting in a reduction in species displacement. A reduction in human use would increase the availability of habitat for the desert tortoise that are sensitive to the

presence of people, resulting in long-term, beneficial impacts on desert tortoise and habitat.

Under this alternative, the old Pinto Valley road would be reduced in width and converted to a hiking / horse and pack animal route and the native vegetation in this area would be restored, increasing possible habitat for desert tortoise. This action would have a long-term, beneficial impact on the desert tortoise and habitat.

Development of new access points and the installation of information signs and kiosks would occur in areas that are not considered critical habitat, that have already been disturbed, and are located outside the wilderness boundary. The adverse impact on desert tortoise populations and habitats in these areas from the construction of parking areas, signs, and kiosks would be short term and negligible.

Although the development of a designated camping area along Boathouse Cove Road, adjacent to the Jimbilnan Wilderness, could displace desert tortoise or damage habitat, the development of such a designated camping area also could reduce the displacement of desert tortoise and the damage to habitat from visitors camping within the wilderness area; this could result in a long-term beneficial impact on the desert tortoise.

Also in this alternative, several roads, including the Lower Grapevine Canyon Road (Approved Road 13) adjacent to the Spirit Mountain Wilderness, would be closed for resource protection. This would reduce the potential for tortoises to be run over by vehicles, resulting in a long-term, beneficial impact on the desert tortoise and habitat.

Ensuring that pets are under leash control at all times would help keep pets from intimidating and harassing wildlife, including desert bighorn sheep. This would have a long-term, beneficial impact on terrestrial wildlife.

As in all of the alternatives, some desert tortoise may continue to occasionally be injured or killed and the three state-listed plant species may be trampled by illegal off-highway vehicle use or become displaced from visitors creating unofficial routes through desert tortoise habitat. The overall adverse effects to the desert tortoise and three state-listed plant species from visitor activities in alternative C would be localized and negligible to minor.

Alternative C would also provide visitors only day use opportunities in the Spirit Mountain Wilderness. Compared to alternative B, this would result in long-term, beneficial impacts; however, overall, the desert tortoise and habitat could still be adversely affected by visitor use, resulting in negligible to minor, long-term, and localized adverse impacts on these species and habitat in this area.

In alternative C, the user-created campsites would be restored to natural conditions at Tule Spring in the Ireteba Peaks Wilderness, resulting in long-term, beneficial impacts on the desert tortoise and habitat in this area.

Alternative C would implement the Volunteer Wilderness Stewardship Program to aid in the management of the wilderness areas. Volunteer wilderness stewards would be trained to monitor cultural and natural resources and visitor use in the areas. This program would result in an overall long-term, beneficial impact on the wilderness areas' natural resources, including the desert tortoise, the three state-listed plant species, and the BLM sensitive plant species as it would assist park staff in monitoring efforts that the staff may not be able to provide on its own. This program would also provide important and timely feedback on resource conditions to park staff so they can implement mitigation measures before the impacts have a greater effect on the resources.

The installation of informational signs and kiosks would also probably have a long-term, beneficial impact on wilderness area desert tortoise and habitat by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

General impacts on the BLM sensitive wildlife species due to alternative C would be the same as those analyzed under the wildlife section and for the desert tortoise above.

Cumulative Effects. Desert tortoise critical habitat in parts of the wilderness areas has been altered by past occupation by burros, development of user-created trails, and illegal off-highway vehicle use. Illegal off-highway vehicle use is expected to continue in several wilderness areas, such as Black Canyon and Eldorado, probably modifying and degrading desert tortoise habitat and resulting in the harassment or even loss of some tortoises, as well as the loss of some state-listed Las Vegas bear poppy, threecorner milkvetch, sticky buckwheat, and BLM sensitive rosy twotone beardtongue. The loss and alteration of habitat due to future external actions including possible wildfires in the Spirit Mountain Wilderness would probably result in a long-term, negligible to minor, adverse impact on threatened and endangered species. External actions that have resulted in the loss of desert tortoise habitat and populations include urbanization, proliferation of roads, off-highway activity, grazing, habitat invasion by nonnative species, increased frequency of wildfires, placement of landfills and other waste disposal facilities, vandalism and collection of tortoises, disease, presence of environmental contaminants, predation by ravens and other species, and global climate change, among other factors (USFWS 2008).

The proposed construction and operation of the Boulder City Bypass (preferred alternative) and Searchlight wind energy project would result in the loss of habitat, including critical desert tortoise habitat (FHA and NDOT 2005, BLM 2012b). The highway and wind project would fragment desert tortoise habitat, and may result in the loss of some animals, resulting in a minor to moderate, adverse impact in this area.

On the other hand, continuing habitat restoration efforts in the wilderness areas would help protect tortoise habitat under alternative C, which would be a long-term, beneficial impact on the wilderness areas' desert tortoise as well as the three state-listed plant species. The translocation of desert tortoises on BLM lands, possibly including near the Spirit Mountain, Eldorado, and Ireteba Peaks wilderness areas, also could help reestablish and increase tortoise populations in these areas.

When the potential adverse effects from increased visitation in the wilderness areas in alternative C are added to past actions, continuing illegal off-highway vehicle use, and future impacts external to the wilderness areas, there would be a long-term, negligible to minor, adverse cumulative impact on desert tortoise and the three state-listed plant species and BLM sensitive plant species in the wilderness areas. However, alternative C would contribute a very small increment to the overall cumulative impact.

Conclusion. Alternative C would have both adverse and beneficial impacts on the wilderness areas' desert tortoise and three state-listed plant species populations and habitats. Most of these species populations and habitats in the wilderness areas would not change as a result of the actions in this alternative. No actions would affect desert tortoise areas known to be important for breeding, or foraging, or as key migration routes. No actions would interfere with feeding, reproduction, or other activities necessary for the survival of the species. Long-term, negligible, adverse impacts would continue to occur in localized areas due to continuing and increased visitor use of the wilderness areas. There also would be long-term, beneficial impacts on some desert tortoise and state-listed and BLM sensitive plant species populations due to vegetation restoration efforts, tortoise fencing, and the closure and restoration of unofficial user-created trails in the wilderness areas. Overall, alternative C may affect, but would not be likely to adversely affect, the desert tortoise.

When the beneficial and adverse impacts of alternative C are added to the impacts that have occurred and are likely to occur in the wilderness areas, there would be a long-term, negligible to minor, adverse cumulative

impact on the desert tortoise and three state listed plant and BLM sensitive plant species populations and habitats. However, the actions in alternative C would contribute only a small long-term, beneficial increment and a very small long-term, adverse increment to this impact.

Natural Soundscape

Analysis. The natural soundscapes in most portions of the wilderness areas would not be affected by the implementation of alternative C. The potential for increased visitor use and some continued illegal off-highway vehicle use would have negligible to minor, adverse impacts on the wilderness areas' natural soundscapes under this alternative. Also, in some of the wilderness areas, boating traffic can be heard from Lake Mead and Lake Mohave, resulting in negligible to minor, adverse impacts on the areas' natural soundscapes.

Alternative C would establish new designated routes, which would help confine users and user noise to the routes. This could result in increased disruption of the natural soundscape along those routes, as visitors would be encouraged to stay on the designated routes with other visitors rather than to seek individual routes through the development of user-created unofficial trails. This would result in a negligible to minor, short-term, adverse impact on the natural soundscape in the wilderness areas.

Efforts to restore native vegetation communities would occur in alternative C and might provide a buffer to noise that might occur within the wilderness areas. This effort would result in a long-term, beneficial impact on the natural soundscape in the wilderness areas. Likewise, the closure of unofficial user-created trails would result in more concentrated areas of visitor use, thus containing visitor noise to the newly designated routes; this would result in long-term beneficial impacts on the natural soundscape.

Under this alternative, the old road in Pinto Valley would be reduced in width and converted to a hiking / horse and pack animal route, cutting off illegal off-highway vehicle use and restoring the natural soundscape in this area. This action would have a long-term, beneficial impact on the wilderness areas' natural soundscape.

Development of new access points and the installation of information signs and kiosks would occur in areas that are located outside of the wilderness. The adverse impact on the natural soundscape in these areas from the construction of parking areas, signs, and kiosks would be short-term and negligible.

Also in this alternative, the development of a designated camping area along Boathouse Cove Road adjacent to the Jimbilnan Wilderness would concentrate visitor noise in the vicinity of the wilderness area, resulting in a negligible to minor, long-term, and localized adverse impact on the wilderness areas' natural soundscape.

Also in this alternative, several roads, including the Lower Grapevine Canyon Road (Approved R 13) adjacent to Spirit Mountain Wilderness, would be closed for resource protection, resulting in long-term, beneficial impact on natural soundscapes in the wilderness areas from reduced illegal off-highway or other vehicle use.

Alternative C would also provide visitors only day use opportunities in the Spirit Mountain Wilderness. Compared to alternative B, this would result in long-term, beneficial impacts; however, overall, the natural soundscape could still be degraded by visitor use, resulting in negligible to minor, short-term, and localized adverse impacts on the natural soundscape in this area.

Monitoring sounds within the wilderness areas and from aircraft overflights would continue under alternative C; this may provide information regarding the impacts on the natural soundscapes that could be used to develop management actions to mitigate these impacts. Instituting and monitoring

wilderness character and visitor use management measures should help ensure that an unacceptable increase in disruption of the natural soundscape due to visitors does not occur in the wilderness areas. Limiting group size, especially in areas of high use and at points of interest, and reducing the occurrences of illegal off-highway vehicle use would result in long-term, beneficial impacts in the areas' natural soundscapes.

The installation of informational signs and kiosks also would probably have a long-term, beneficial impact on wilderness area natural soundscapes by educating visitors about the wilderness areas and the principles of Leave No Trace outdoor ethics.

Cumulative Effects. The natural soundscapes in the wilderness areas would probably continue to be impacted by aircraft overflights, continued illegal off-highway vehicle use, and restoration activities in localized areas. Also, in some of the wilderness areas, boating traffic can be heard from Lake Mead and Lake Mohave, resulting in negligible to minor, adverse impacts in the areas' natural soundscapes.

Occasionally sounds may be heard in the northern portions of the Pinto Valley and Jimbilnan Wilderness areas from Nevada Department of Wildlife helicopters, which are capturing/transplanting bighorn sheep and maintaining wildlife water developments in the Muddy Mountains Wilderness.

The construction and use of the Boulder City Bypass highway would result in substantial increases in noise levels close to the highway, resulting in a moderate to major, adverse impact on the soundscape. Depending on vehicle use levels and wind direction, noise from the highway may occasionally be heard in the Black Canyon Wilderness.

The construction and operation of the Searchlight wind energy project would also result in an increase in noise levels. It was estimated that operation of the windmills would increase noise levels in the northwestern part of the Nellis Wash Wilderness from 15 to 25 decibels (BLM 2012b), resulting in an adverse impact on the natural soundscape in this area.

When the effects of increased visitation in alternative C are added to the impacts from overflights, external developments, boat traffic, and management activities in the areas, there potentially could be a moderate, long-term cumulative impact on the natural soundscapes in some of the wilderness areas—primarily the Black Canyon and Nellis Wash wilderness areas. However, alternative C would add a very small increment to the overall adverse cumulative impact.

Conclusion. Most of the wilderness areas' soundscapes would not be affected by the actions in alternative C. However, some natural soundscapes would be degraded due to increased visitor use in localized areas such as along routes, in washes, in high use areas such as Boy Scout Canyon, and in some wilderness areas where boating traffic on nearby lakes can be heard. These adverse impacts would probably be minor and short-term in extent. When the impacts inside the wilderness areas are added to past and foreseeable future impacts from increased visitation and the addition of external developments outside the wilderness boundary, there would be the potential for a long-term, moderate adverse cumulative impact on the areas' natural soundscapes—although the actions in alternative C would add a very small increment to this overall impact.

Continuing efforts to monitor and establish a baseline for natural soundscapes in the wilderness areas, and developing and implementing mitigation measures, would result in a negligible to minor, short-term, beneficial impact on the natural soundscapes in the wilderness areas. Also, instituting and monitoring wilderness character and visitor use management measures that address group sizes, illegal off-highway vehicle use, and general noise disturbances would result in minor to moderate, beneficial impact on the natural soundscape in the wilderness areas. When the beneficial and adverse impacts of

alternative C are added to the impacts that have occurred and external future actions that might affect the wilderness areas, there would be a long-term, moderate, adverse cumulative impact on the areas' natural soundscapes.

IMPACTS ON WILDERNESS CHARACTER

ALTERNATIVE A – NO ACTION

Natural

Under the no-action alternative, the wilderness areas would continue to appear natural. No actions would occur under this alternative that would result in the loss of natural conditions, or restore natural conditions in the wilderness areas. Thus, there would be no change to natural conditions resulting from this alternative.

Undeveloped

In this alternative, no new permanent improvements or human occupation would occur that would change the character of the area. A few old roads, such as double and single track roads in the Pinto Valley Wilderness, and a few other structures, such as old mines, would continue to degrade the undeveloped quality in some of the wilderness areas. In addition, there would continue to be occasional illegal off-highway vehicle incursions into wilderness areas, which would degrade this quality. But the affected areas would be confined to a few locations in the wilderness areas. Overall, there would continue to be a long-term, minor adverse impact on the undeveloped quality.

Untrammeled

The vast majority of the wilderness areas would remain untrammeled in this alternative. Some management activities such as limited wildfire suppression, nonnative species control, and other resource management activities (e.g., tortoise translocations by the Bureau of Land Management) would continue to occasionally occur and have a trammeling effect. This alternative would result in a continuation of some minor adverse effects from management activities, but would not result in any new impacts on the untrammeled nature of the wilderness areas.

Opportunities for Solitude and Primitive, Unconfined Recreation

Nothing in this alternative would affect the outstanding opportunities for solitude currently available in the wilderness areas. The amount of visitor use would continue to be limited by (1) natural limitations of travel in the rugged backcountry, (2) the inhospitable summer climate, (3) the existing lack of visitor amenities, and (4) camping day use limits. In this alternative, these conditions would continue relatively unchanged. As a result, visitor numbers in the wilderness areas (outside of Grapevine Canyon and the Redstone interpretive trail) would continue to be quite low. There would be no new effects on opportunities for solitude in the eight wilderness areas from implementing this alternative.

There would continue to be little to no notable NPS presence (in the form of regulations, management activity, or personnel) in the eight areas, with the exception of occasional ranger-led walks or infrequent backcountry ranger patrols.

One installation that may adversely affect some visitors' sense of solitude would be the continued presence of the register on the summit of Spirit Mountain. But this would have a negligible adverse effect on this quality.

A few recreation installations and management actions would continue to degrade opportunities for primitive and unconfined recreation in localized areas. The presence of climbing bolts in the Black Canyon, Spirit Mountain, and Bridge Canyon wilderness areas, and signs on wilderness boundaries, and the 15-day limit on camping

at one site on NPS lands would continue to have a negligible to minor, adverse impact on this wilderness character quality. But overall visitors would continue to have largely unrestricted access to and within the wilderness areas and to have opportunities for primitive (nonmechanized) activities such as hiking, backpacking, wildlife watching, photography, climbing, bouldering, and canyoneering. Almost unlimited opportunities for primitive, unconfined recreation would continue. The beneficial effect of having ample opportunities for primitive, unconfined recreation would continue and there would be no new effect on these opportunities as a result of implementing the no-action alternative.

Other Features of Value (Cultural Resources)

In the Spirit Mountain and Bridge Canyon wilderness areas the landscapes are important cultural resources for American Indian tribes, as described in the "Affected Environment" section. Under alternative A visitors would continue to be present in these areas, hiking climbing, and bouldering, and using fixed anchors. These uses may increase in the future. The presence of hikers, climbers, and boulderers would continue to potentially alter traditional uses and practices, occasionally disrupting religious activities. Some ethnographic resources may knowingly or unknowingly be disturbed or altered. The continued use of fixed anchors within the Spirit Mountain traditional cultural property would continue to be seen as conflicting with tribal cultural values and their heritage. This impact would be apparent in localized areas in the two wilderness areas, and would be a long-term, moderate adverse impact.

Cumulative Effects

Land development related to the fast-growing population of the Southern Nevada region is quickly reducing the availability of the once open and seemingly empty desert areas in the region. Areas with wilderness designations are legally protected from development in perpetuity. The remaining naturalness and untrammeled character of these undeveloped areas is likely to increase in importance as the surrounding lands experience commercial, industrial, and residential expansion. These protected natural areas provide a long-term beneficial impact that can be described in tangible and intangible terms.

Opportunities for people to find solitude and to enjoy primitive, unconfined recreation can be found in the 20 designated wilderness areas in Clark County managed by the Bureau of Land Management, the U.S. Forest Service, and the National Park Service, including the 8 wilderness areas considered in this plan. Opportunities and locations for wilderness experiences are numerous in the region—a long-term beneficial impact for residents and visitors.

The recreation area's exotic plant management plan recognizes the constraints wilderness places on management of nonnative species in wilderness and the need to complete minimum requirement analyses. However, none of the sites identified in the plan as priority areas are in the wilderness areas. Thus, the plan would have little to no effect on wilderness character.

Continuing occasional use of helicopters by the state for desert bighorn management and maintenance of wildlife water developments in the Muddy Mountains Wilderness would result in visual and noise impacts that would adversely affect the undeveloped wilderness character quality in the Pinto Valley and possibly the Jimbilnan wilderness areas.

Several past and reasonably foreseeable future solar and wind energy developments would adversely affect opportunities for solitude in several of the wilderness areas. Existing powerlines are visible along the northeastern boundary of the Spirit Mountain Wilderness, the eastern boundary of the Nellis Wash Wilderness, the northern boundary of the Ireteba Peaks Wilderness (along with an associated road), and from the Black Canyon

and Eldorado wilderness areas. In the Eldorado Wilderness the glint and glare from mirrors in the Nevada Solar One concentrating solar thermal plant would be visible from high locations. The proposed Searchlight Wind Energy Project on the Eldorado Mountains would be visible in the Spirit Mountain and Nellis Wash wildernesses, and generate noise that may be heard in the Nellis Wash Wilderness. The development of roads in this area also may provide increased access, particularly to the Nellis Wash Wilderness, decreasing opportunities for solitude. The construction and use of the four-lane Boulder City Bypass highway would be near the Black Canyon Wilderness, and may cause visual and noise impacts in the wilderness area.

Although there would be external developments that would affect the wilderness character of some of the wilderness areas (i.e., Black Canyon, Nellis Wash), the no-action alternative would not contribute to the effects of other past, present, and future actions. In the case of the Bridge Canyon Wilderness, continuing visitor use would affect the area's wilderness character in localized areas, but there would be no other known past, present or reasonably foreseeable actions that would result in cumulative impacts. In the case of the Spirit Mountain Wilderness, there would be continuing wilderness character impacts of visitor use under alternative A that could combine with past and future actions external to the park: when the continuing impacts of alternative A are added to the existing and future external energy developments there could be a moderate, long-term adverse cumulative impact. However, alternative A would add a small increment to this overall adverse cumulative impact.

The translocation of desert tortoise on BLM lands, including possibly the Spirit Mountain, Ireteba Peaks, and Eldorado wilderness areas, could result in short-term, adverse impacts on the untrammeled quality of wilderness character, by introducing human manipulation into the ecosystem, but also would beneficially affect the natural quality of wilderness character (BLM 2012c).

Overall, although there have been and probably will be external actions that affect the wilderness character of some of the wilderness areas, alternative A would not contribute to or result in cumulative effects in most of the wilderness areas. There would be the potential for a moderate, long-term adverse cumulative impact in the Spirit Mountain Wilderness, although alternative A would add a small increment to the overall adverse cumulative impact.

Conclusion

Implementing the no-action alternative would have no effect on the qualities of wilderness character in most of the wilderness areas, including natural conditions, opportunities for solitude, or primitive and unconfined recreation. However, there would continue to be a long-term, moderate, adverse impact on other features of wilderness character (cultural resources), in the Spirit Mountain and Bridge Canyon wilderness areas due to continuing hiking, climbing, bouldering, and use of fixed anchors. There would also continue to be a long-term minor adverse impact on the undeveloped character in several wilderness areas due to the presence of old roads and structures. Alternative A would not result in cumulative effects to the areas' wilderness character, with the exception of Spirit Mountain where there could be a long-term, moderate, adverse cumulative impact (although alternative A would add a small increment to this cumulative impact.).

ALTERNATIVE B – PREFERRED ALTERNATIVE

Natural

The formalizing of several wilderness access points would probably slightly increase use levels and result in some vegetation trampling and alteration. This would probably have a long-term, negligible to minor adverse impact on natural conditions in these areas.

Likewise, the establishment of routes in Pinto Valley and Boy Scout Canyon would probably slightly increase use in these areas. This would result in a long-term, negligible to minor adverse impact on the natural quality in localized areas due to visitors wandering off the routes and trampling and altering some native vegetation. However, the establishment of the Pinto Valley route would also include the restoration of native vegetation along the old road, which would be a long-term minor beneficial impact.

The marked route to the top of Hamblin Peak in Pinto Valley would reduce the impact of soil erosion from visitor-created trails, resulting in a minor, beneficial impact in this area.

Efforts would be made to restore user-created campsites to natural conditions at Tule Spring, which would have a long-term minor beneficial impact. Implementing the wilderness character monitoring and visitor use management framework described in the alternatives chapter of this plan would involve monitoring resources to determine if unacceptable impacts are occurring from visitor use. If so, actions would be taken to address the cause of the impacts. These efforts would have long-term, minor, beneficial impacts on natural conditions in the planning area.

Overall, the long-term impacts on the areas' natural conditions of the wilderness areas would be negligible to minor and beneficial.

Undeveloped

In this alternative, the wilderness areas would continue to have a few nonrecreational structures, such as mines, as well as signs. No new permanent improvements or human occupation would occur that would change the character of the area.

A couple actions in alternative B would affect this wilderness character quality. The conversion of one old road in Pinto Valley to a route would remove this old development and would be a long-term, minor beneficial impact. In addition, closure of roads accessing several wilderness areas would have a long-term minor beneficial impact on the undeveloped quality by eliminating occasional illegal vehicle incursions. Overall, alternative B would have a negligible, beneficial effect on the undeveloped character of the wilderness areas.

Untrammeled

The vast majority of wilderness would remain untrammeled in this alternative. Activities that are nonconforming but allowed, such as limited wildfire suppression, nonnative species control, environmental restoration, and other resource management actions, would occur and have a trammeling effect. Because these activities would probably continue at the same level as in the no-action alternative, there would be no new impact from this alternative.

Opportunities for Solitude and Primitive, Unconfined Recreation

This alternative would potentially affect the opportunities for solitude in the wilderness areas. Opportunities for solitude would continue to be somewhat less at the more popular destinations such as Hamblin Peak, Boy Scout Canyon, Spirit Mountain, Redstone, and Grapevine Canyon. The level of visitor use would most likely increase in the five wilderness areas that receive improved access and information—Pinto Valley, Black Canyon, Eldorado, Spirit Mountain, and Bridge Canyon. This increased use would be concentrated at access points and on marked routes to destinations, which could adversely affect some visitors' wilderness experience. This is not anticipated to be a concern except for a few busy weekends per year, and there would be ample opportunities for solitude outside of these concentration points. Implementing the wilderness character monitoring and visitor use management framework described in the alternatives

chapter of this plan would involve monitoring the level of visitor use to determine if unacceptable impacts, such as crowding, are occurring. If so, actions such as limiting or dispersing use would be taken to reduce the level of effect. Thus, the adverse impacts would be long term but negligible on opportunities for solitude in several sites in five wilderness areas.

The removal of fixed anchors and equipment in the Spirit Mountain Wilderness and the reduction in concentration of some of bolt-intensive face climbs at certain climbing areas in the Bridge Canyon Wilderness would reduce the number of climbers in these areas and increase opportunities for solitude. However, because only a few climbers are typically present at these areas, the impact on opportunities for solitude would result in a long-term, minor, beneficial impact.

Visitor numbers in the Jimbilnan, Ireteba Peaks, and Nellis Wash wilderness areas would continue to be quite low, preserving outstanding opportunities for solitude.

A slight increase in NPS presence in the form of additional management activity and personnel (staff or volunteers) in the eight areas would be needed to implement alternative B. But this administrative use would be spread out over time and space and would be present only for a relatively short time at any one site (although occurring periodically). Thus, there would be long-term, negligible, adverse impacts on solitude in the wilderness areas from administrative activities.

The closure of three cherry-stemmed roads in Black Canyon, Spirit Mountain, and Bridge Canyon would stop motorized vehicles using these roads, improving opportunities for solitude in the adjacent wilderness areas. However, very few vehicles use these roads, so this action would have a long-term, negligible, beneficial impact.

Exceptional opportunities for primitive and unconfined recreation would continue to be available in the wilderness areas under this alternative. Although encouraged to use designated access points and designated routes, visitors would have generally unrestricted access to and within the wilderness areas for primitive (nonmechanized) activities such as hiking, backpacking, wildlife watching, photography, and canyoneering. Hunting would still be allowed according to state regulations.

Confining horse and pack stock use on a designated route and washes in the Pinto Valley Wilderness would limit this use. However, very few horse and pack stock visitors are likely to be affected by this restriction. Consequently, this action would have a long-term, negligible to minor, adverse impact on primitive, unconfined recreation.

Limiting group size to 12 would be another restriction that would affect the primitive, unconfined recreation quality for some users. However, most groups entering the wilderness areas are much smaller than this and would not be affected by the action. Larger groups also could break into smaller groups and still enter the wilderness. Thus, the limit on group size would have a long-term, minor adverse impact on this quality.

Another impact on primitive, unconfined recreation would be the requirement for dogs to be on leash in the wilderness areas (excluding dogs with hunters). This would be perceived as confining these visitors' use of the wilderness areas, and would have a long-term, minor to moderate adverse impact on this quality.

As in alternative A, the continuing presence of climbing bolts in the Black Canyon Wilderness, specifically Boy Scout Canyon, would decrease self-reliant primitive recreation opportunities. But relatively few people would be affected by the presence of the bolts, resulting in a long-term, negligible to minor, adverse impact on this quality.

The restrictions on the use of fixed anchors in the Spirit Mountain Wilderness and in some bolt-intensive faces in the Bridge Canyon Wilderness would adversely affect the

primitive, unconfined experience of some climbers and boulderers in these areas. But fixed anchors reduce self-reliant recreation and removing these installations would improve opportunities for primitive recreation.

In addition, areas close to sensitive resources, such as bird nesting areas, would be closed to climbing or scrambling during nesting periods. For occupied raptor nests, rock climbing would be prohibited up to 0.5 mile from the nest sites. Use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would be prohibited. This would adversely affect some climbers' opportunities for primitive, unconfined recreation. But there would still be opportunities for climbers and boulderers to experience primitive, unconfined recreation in most of the wilderness areas.

Increased information and access would improve opportunities for primitive and unconfined recreation under this alternative, resulting in a long-term, negligible to minor, beneficial impact. However, the additional designated access points and designated routes would decrease self-reliant recreation. This may cause a long-term, negligible, adverse impact on primitive, unconfined recreation opportunities for some visitors.

Overall, alternative B would have both beneficial and adverse impacts on opportunities for solitude and primitive, unconfined recreation. There would be a long-term, minor adverse impact on opportunities for primitive, unconfined recreation in the wilderness areas, primarily due to the actions taken to manage climbing in the Spirit Mountain and Bridge Canyon wilderness areas. But there also would be minor, long-term beneficial impacts on solitude in localized areas in the Spirit Mountain and Bridge Canyon wilderness areas due to the reduction in the number of climbers.

Other Features of Value (Cultural Resources)

Under alternative B the ban on climbing with fixed anchors in the Spirit Mountain Wilderness, and reduction of some bolt-intensive face climbs in the Bridge Canyon Wilderness would help reduce impacts (including perceived impacts) to cultural resources important to tribes—removal of hardware and a reduction in the number of climbers would help honor the tribal concerns over visitor use in the Spirit Mountain traditional cultural property. The closure of roads surrounded by the Spirit Mountain Wilderness and the closure of Approved Road 18 surrounded by the Bridge Canyon Wilderness would also help reduce impacts from off-highway vehicles on cultural resources important to tribes. In addition, the prohibition on the use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would help reduce cultural impacts. Also, the installation of a kiosk in the vicinity of Spirit Mountain that notes the importance of the area to local tribes would help reduce or avoid potential impacts from visitors in the area. However, climbing would continue in the areas, some fixed anchors would continue to be used in the Bridge Canyon Wilderness, and people would continue hiking up Spirit Mountain on user-created trails, all of which would continue to adversely affect (or be perceived to adversely affect) cultural resources important to tribes in these two wilderness areas.

Overall, alternative B would probably have a minor to moderate, long-term beneficial impact on this wilderness character quality, primarily due to the changes in climbing that would occur in the two wilderness areas.

Cumulative Effects

Land development related to the fast-growing population of the Southern Nevada region is quickly reducing the availability of the once open and seemingly empty desert areas in the region. Areas with wilderness designations are

legally protected from development in perpetuity. The remaining naturalness of these undeveloped areas is likely to increase in importance as the surrounding lands are taken over by commercial, industrial, and residential expansion. These protected natural areas provide long-term, beneficial impacts that can be described in tangible and intangible terms.

Opportunities for people to find solitude and enjoy primitive, unconfined recreation can be found in the 20 designated wilderness areas in Clark County managed by BLM, the U.S. Forest Service, and the National Park Service, including the 8 wilderness areas considered in this plan. Opportunities and locations for wilderness experiences are numerous in the region—resulting in a long-term, beneficial impact for residents and visitors.

The recreation area's exotic plant management plan recognizes the constraints wilderness places on management of nonnative species in wilderness and the need to complete minimum requirement analyses. However, none of the sites identified in the plan as priority areas are in the wilderness areas. Thus, the plan would have little to no effect on wilderness character.

Continuing occasional use of helicopters by the state for desert bighorn management and maintenance of wildlife water developments in the Muddy Mountains Wilderness would result in visual and noise impacts that would adversely affect the undeveloped wilderness character quality in the Pinto Valley and possibly the Jimbilnan wilderness areas.

Several past and reasonably foreseeable future solar and wind energy developments would adversely affect opportunities for solitude in several of the wilderness areas. Existing powerlines are visible along the northeastern boundary of the Spirit Mountain Wilderness, the eastern boundary of the Nellis Wash Wilderness, the northern boundary of the Ireteba Peaks Wilderness (along with an associated road), and from the Black Canyon and Eldorado wilderness areas. In the Eldorado Wilderness the glint and glare from mirrors in the Nevada Solar One concentrating solar thermal plant would be visible from high locations. The proposed Searchlight Wind Energy Project on the Eldorado Mountains would be visible in the Spirit Mountain and Nellis Wash wilderness areas, and generate noise that may be heard in the Nellis Wash Wilderness. The development of roads in this area also may provide increased access, particularly to the Nellis Wash Wilderness, decreasing opportunities for solitude. The construction and use of the four-lane Boulder City Bypass highway near the Black Canyon Wilderness also may cause visual and noise impacts in the wilderness area.

The translocation of desert tortoise on BLM lands, including possibly the Spirit Mountain, Ireteba Peaks, and Eldorado wilderness areas, could result in short-term, adverse impacts on the untrammeled quality of wilderness character, by introducing human manipulation into the ecosystem, but also would beneficially affect the natural quality of wilderness character (BLM 2012c).

Taking together all of the past, present, and future actions occurring within and outside the wilderness areas, and adding the beneficial contribution of alternative B, for most of the wilderness areas there would be no cumulative impacts because there would be no known external actions affecting the areas. In the case of the Nellis Wash Wilderness there would probably be adverse impacts from external developments, but no actions would be taken under alternative B that would combine into a cumulative impact. Likewise, for the Bridge Canyon Wilderness, actions in alternative B would affect the area's wilderness character in localized areas, but there would be no other known past, present, or reasonably foreseeable actions that would result in cumulative impacts. However, when the effects of actions in alternative B are combined with other external developments, there would be the potential for a long-term, moderate, adverse cumulative impact on the wilderness character of Black Canyon and Spirit Mountain. This cumulative effect would be primarily due to external developments outside the wilderness boundary, affecting

opportunities for solitude. However, alternative B would add a slight beneficial increment to the overall adverse cumulative impact.

Cumulative Effects

Land development related to the fast-growing population of the Southern Nevada region is quickly reducing the availability of the once open and seemingly empty desert areas in the region. Areas with wilderness designations are legally protected from development in perpetuity. The remaining naturalness of these undeveloped areas is likely to increase in importance as the surrounding lands are taken over by commercial, industrial, and residential expansion. These protected natural areas provide long-term, beneficial impacts that can be described in tangible and intangible terms.

Opportunities for people to find solitude and enjoy primitive, unconfined recreation can be found in the 20 designated wilderness areas in Clark County managed by the Bureau of Land Management, U.S. Forest Service, and the National Park Service, including the 8 wilderness areas considered in this plan. Opportunities and locations for wilderness experiences are numerous in the region—resulting in a long-term, beneficial impact for residents and visitors.

The recreation area's exotic plant management plan recognizes the constraints wilderness places on management of nonnative species in wilderness and the need to complete minimum requirement analyses. However, none of the sites identified in the plan as priority areas are in the wilderness areas. Thus, the plan would have little to no effect on wilderness character.

Continuing occasional use of helicopters by the state for desert bighorn management and maintenance of wildlife water developments in the Muddy Mountains Wilderness would result in visual and noise impacts that would adversely affect the undeveloped wilderness character quality in the Pinto Valley and possibly the Jimbilnan wilderness areas.

Several past and reasonably foreseeable future solar and wind energy developments would adversely affect opportunities for solitude in several of the wilderness areas. Existing powerlines are visible along the northeastern boundary of the Spirit Mountain Wilderness, the eastern boundary of the Nellis Wash Wilderness, the northern boundary of the Ireteba Peaks Wilderness (along with an associated road), and from the Black Canyon and Eldorado wilderness areas. In the Eldorado Wilderness the glint and glare from mirrors in the Nevada Solar One concentrating solar thermal plant would be visible from high locations. The proposed Searchlight Wind Energy Project on the Eldorado Mountains would be visible in the Spirit Mountain and Nellis Wash wilderness areas, and generate noise that may be heard in the Nellis Wash Wilderness. The development of roads in this area also may provide increased access, particularly to the Nellis Wash Wilderness, decreasing opportunities for solitude. The construction and use of the four-lane Boulder City Bypass highway near the Black Canyon Wilderness also may cause visual and noise impacts in the wilderness area.

The translocation of desert tortoise on BLM lands, including possibly the Spirit Mountain, Ireteba Peaks, and Eldorado wilderness areas, could result in short-term, adverse impacts on the untrammeled quality of wilderness character, by introducing human manipulation into the ecosystem, but also would beneficially affect the natural quality of wilderness character (BLM 2012c).

Taking together all of the past, present, and future actions occurring within and outside the wilderness areas, and adding the beneficial contribution of alternative B, for most of the wilderness areas there would be no cumulative impacts because there would be no known external actions affecting the areas. In the case of the Nellis Wash Wilderness there would probably be adverse impacts from external developments, but no actions would be taken under alternative B that would combine into a cumulative impact. Likewise, for the Bridge Canyon Wilderness, actions in

alternative B would affect the area's wilderness character in localized areas, but there would be no other known past, present, or reasonably foreseeable actions that would result in cumulative impacts. However, when the effects of actions in alternative B are combined with other external developments, there would be the potential for a long-term, moderate, adverse cumulative impact on the wilderness character of Black Canyon and Spirit Mountain. This cumulative effect would be primarily due to external developments outside the wilderness boundary, affecting opportunities for solitude. However, alternative B would add a slight beneficial increment to the overall adverse cumulative impact.

Conclusion

Implementing alternative B would not affect the wilderness character of most of the wilderness areas. In areas that are affected by the alternative, there would be both beneficial and adverse impacts on different wilderness character qualities in different areas.

Weighing all the wilderness character qualities for the eight wilderness areas, overall, alternative B would have a long-term, minor beneficial impact on wilderness character, primarily due to the implementation of a visitor use management framework and to efforts to improve the natural quality in the Pinto Valley Wilderness and to improve the solitude quality and other features of value in the Spirit Mountain and Bridge Canyon wilderness areas. When the effects of alternative B are added to the impacts of other past, present, and future actions, primarily external to the wilderness areas, most of the wilderness areas would not experience cumulative impacts. However, there could be a long-term, moderate, adverse cumulative impact on wilderness character in the Black Canyon and Spirit Mountain wildernesses, primarily regarding opportunities for solitude. Alternative B would add a slight beneficial increment to the overall adverse cumulative impact.

ALTERNATIVE C

Natural

Under alternative C, the wilderness areas would continue to appear to most visitors as largely natural.

In this alternative several access points would be formalized (more than in alternative B), which would probably slightly increase use levels and result in some vegetation trampling and alteration. This would probably have a long-term, negligible to minor adverse impact on natural conditions in these areas.

A number of routes would be established under alternative C, including routes in Pinto Valley, Boy Scout Canyon, and Lower Grapevine, among others. This would result in a long-term, negligible to minor adverse impact on the natural quality in localized areas due to visitors wandering off the routes and trampling and altering some native vegetation. However, the establishment of the Pinto Valley route would also include the restoration of native vegetation along the old road, which would be a long-term minor beneficial impact.

Establishing one route on Hamblin Peak in the Pinto Valley Wilderness and two routes to the top of Spirit Mountain would reduce soil erosion from visitor-created trails, resulting in a minor, beneficial impact on the areas' natural conditions.

As with alternative B, in alternative C efforts would be made to restore user-created campsites to natural conditions at Tule Spring, which would have a long-term minor beneficial impact.

Implementing the wilderness character monitoring and visitor use management framework described in the alternatives chapter of this plan would involve monitoring resources to determine if unacceptable impacts are occurring from visitor use. If so, actions would be taken to address the cause of the impacts. These efforts would have long-

term, minor, beneficial impacts on natural conditions in the planning area.

Overall, the long-term impacts on natural conditions of the wilderness areas would be negligible to minor and beneficial.

Undeveloped

In this alternative, the wilderness areas would continue to have a few nonrecreational structures, such as mines, as well as signs. No new permanent improvements or human occupation would occur that would change the character of the area. Closure of roads accessing several wilderness areas would have a long-term minor beneficial impact on the undeveloped quality by eliminating occasional illegal vehicle incursions.

Untrammeled

While the majority of wilderness would remain untrammeled in this alternative, activities that are nonconforming but allowed on a limited basis, such as wildfire suppression, nonnative species control, environmental restoration, and other resource management actions, would occur and have a trammeling effect. Because these activities would probably continue at the same level as in the no-action alternative, there would be no impact.

Opportunities for Solitude and Primitive, Unconfined Recreation

This alternative would affect the opportunities for solitude in the wilderness areas. Opportunities for solitude would continue to be somewhat less at the more popular destinations such as Hamblin Peak, Boy Scout Canyon, Spirit Mountain, Redstone, and Grapevine Canyon. Implementing this alternative would most likely increase the level of use over current levels in most wilderness areas due to the increased access and information. This increased use would be concentrated at access points and on marked routes to destinations, which could adversely impact some visitors' opportunities for solitude. Use levels at concentration points would vary by time of year and day of the week and opportunities for solitude would be available away from these concentration points. In addition, implementing the wilderness character monitoring and visitor use management framework described in the alternatives chapter would involve monitoring the level of visitor use to determine if unacceptable impacts, such as crowding, are occurring. If so, actions would be taken to reduce the cause of the impacts, such as educating visitors and limiting or dispersing use. Thus, overall adverse impact on solitude would be long-term but negligible in the wilderness areas.

As in alternative A, the continuing presence of climbing bolts in the Black Canyon Wilderness, specifically Boy Scout Canyon, would decrease self-reliant primitive recreation opportunities. But relatively few people would be affected by the bolts, resulting in a long-term, negligible to minor, adverse impact on this quality.

The removal of fixed anchors and equipment in the Spirit Mountain Wilderness and the reduction in concentration of some of bolt-intensive face climbs at certain climbing areas in the Bridge Canyon Wilderness would reduce the number of climbers in these areas and increase opportunities for solitude. Because only a few climbers are typically present at these areas, the impact on opportunities for solitude would result in a long-term, minor, beneficial impact.

Overall, the impacts of alternative C on opportunities for solitude would be long term, minor, and adverse due to improved access and consequent increased visitation in several wilderness areas. But there would be minor, long-term beneficial impacts on solitude in localized areas in the Spirit Mountain and Bridge Canyon Wilderness areas due to the reduction in the number of climbers.

A slight increase in NPS presence in the form of additional management activity and personnel (staff or volunteers) in the eight areas would be needed to implement alternative C. But this administrative use would be spread out over time and space and would be present only for a relatively short time at any one site (although reoccurring periodically). Thus, there would be long-term, negligible, adverse impacts on solitude in the wilderness areas from administrative activities.

The closure of three cherry-stemmed roads in Black Canyon, Spirit Mountain, and Bridge Canyon would stop motorized vehicles using these roads, improving opportunities for solitude in the adjacent wilderness areas. However, very few vehicles use these roads, so this action would have a long-term, negligible, beneficial impact.

Exceptional opportunities for primitive and unconfined recreation would continue to be available in the wilderness areas under alternative C. Although encouraged to use designated access points and designated routes, visitors would have generally unrestricted access to and within the wilderness areas for primitive (nonmechanized) activities such as hiking, backpacking, wildlife watching, photography, and canyoneering. Hunting would continue to be allowed and regulated by the state.

Confining horse and pack stock use on a designated route and washes in the Pinto Valley Wilderness would limit this use. However, very few horse and pack stock visitors are likely to be affected by this restriction. Consequently, this action would have a long-term, negligible to minor, adverse impact on primitive, unconfined recreation.

Limiting group size to 12 would be another restriction that would affect the primitive, unconfined recreation quality for some users. However, most groups entering the wilderness areas are much smaller than this and would not be affected by the action. Larger groups also could break into smaller groups and still enter the wilderness. Thus, the limit on group size would have a long-term, minor adverse impact on this quality.

Another impact on primitive, unconfined recreation would be the requirement for dogs to be on leash in the wilderness areas (excluding dogs with hunters). This would be perceived as confining these visitors' use of the wilderness areas, and would have a long-term, minor to moderate adverse impact on this quality.

Increased information and access would improve opportunities for primitive and unconfined recreation under this alternative, resulting in a long-term, negligible to minor, beneficial impact. However, the additional designated access points and designated routes would decrease self-reliant recreation. This may cause a long-term, negligible, adverse impact on primitive, unconfined recreation opportunities for some visitors.

The closure of the Spirit Mountain Wilderness to overnight use would adversely affect some visitors' opportunity for primitive, unconfined recreation in this area. But only a few people are likely to be affected by this camping restriction, and they could still go into the area while finding other nearby wilderness areas to camp. Thus, the action would have a moderate, long-term adverse on primitive, unconfined recreation in this area.

The restrictions on the use of fixed anchors in the Spirit Mountain Wilderness and in some bolt-intensive faces in the Bridge Canyon Wilderness would adversely affect the primitive, unconfined experience of some climbers in these areas. But fixed anchors reduce self-reliant recreation and removing these installations would improve opportunities for primitive recreation.

In addition, areas close to sensitive resources, such as bird nesting areas, would be closed to climbing or scrambling during nesting periods. For occupied raptor nests, rock climbing would be prohibited up to 0.5 mile from the nest sites. Use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would be prohibited.

This would adversely affect some climbers' opportunities for primitive, unconfined recreation. However, there would still be many opportunities for climbers and boulderers to experience primitive, unconfined recreation in most of the wilderness areas.

Overall, alternative C would have both beneficial and adverse impacts on opportunities for solitude and primitive, unconfined recreation. There would a long-term, minor to moderate adverse impact on opportunities for primitive, unconfined recreation in the wilderness areas, primarily due to the actions taken to limit overnight use in the Spirit Mountain Wilderness and to manage climbing in the Spirit Mountain and Bridge Canyon wilderness areas. But there also would be minor, long-term beneficial impacts on solitude in localized areas in the Spirit Mountain and Bridge Canyon wilderness areas due to the reduction in the number of climbers.

Exceptional opportunities for primitive and unconfined recreation would continue to be available in the wilderness areas under alternative C. Under this alternative, visitors could participate in primitive (nonmechanized) activities such as hiking, backpacking, wildlife watching, photography, and canyoneering without having to obtain permits. Hunting would continue to be allowed and regulated by the state. Horse use would be allowed on some routes.

Increased information and access would improve opportunities for primitive and unconfined recreation under this alternative, resulting in a long-term, negligible to minor, beneficial impact. However, with the additional designated access points and designated routes, visitors may feel restricted to these areas and inhibited from venturing into other areas of the wildernesses. This may cause a long-term, negligible, adverse impact on primitive, unconfined recreation opportunities for some visitors.

The restrictions on the use of fixed anchors in the Spirit Mountain Wilderness and in some bolt-intensive faces in the Bridge Canyon Wilderness would adversely affect the primitive, unconfined experience of some climbers in these areas. But there would still be opportunities for climbers to experience primitive, unconfined recreation in most of the wilderness areas.

Overall, alternative C would have a long-term, minor adverse impact on opportunities for primitive, unconfined recreation in the wilderness areas, primarily due to the actions taken to manage climbing in the Spirit Mountain and Bridge Canyon wilderness areas.

Other Features of Value (Cultural Resources)

Under alternative C the ban on climbing with fixed anchors in the Spirit Mountain Wilderness, and reduction of some bolt-intensive face climbs in the Bridge Canyon Wilderness would help reduce impacts (including perceived impacts) to cultural resources important to tribes—removal of hardware and a reduction in the number of climbers would help honor the tribal concerns over visitor use in the Spirit Mountain traditional cultural property. The closure of roads surrounded by the Spirit Mountain Wilderness and the closure of Approved Road 18 surrounded by the Bridge Canyon Wilderness would also help reduce impacts from off-highway vehicles on cultural resources important to tribes. In addition, the prohibition of camping in the Spirit Mountain Wilderness and the prohibition on the use of climbing equipment (including climbing chalk) within a minimum of 50 feet of rock art would help reduce cultural impacts. Also, the installation of a kiosk in the vicinity of Spirit Mountain that notes the importance of the area to local tribes would help reduce or avoid potential impacts from visitors in the area.

On the other hand, under this alternative additional access opportunities would be provided, including designated routes up to the Spirit Mountain summit, and a designated route in the upper Grapevine Canyon in

Bridge Canyon Wilderness, which could increase use levels. Just the presence of additional visitors in these areas could be perceived by tribal members as adversely affecting cultural resources in these areas. In addition, climbing would continue in the areas, and fixed anchors would continue to be used in the Bridge Canyon Wilderness, which would continue to adversely affect (or be perceived to adversely affect) cultural resources important to tribes in these two wilderness areas. Overall, alternative C would probably have a minor, long-term beneficial impact on this wilderness character quality, primarily due to the changes in climbing that would occur in the two wilderness areas.

Cumulative Effects

Land development related to the fast-growing population of the Southern Nevada region is quickly reducing the availability of the once open and seemingly empty desert areas in the region. Areas with wilderness designations are legally protected from development in perpetuity. The remaining naturalness of these undeveloped areas is likely to increase in importance as the surrounding lands are taken over by commercial, industrial, and residential expansion. These protected natural areas provide long-term tangible and intangible beneficial impacts.

Opportunities for people to find solitude and enjoy primitive, unconfined recreation can be found in the 20 designated wilderness areas in Clark County managed by the Bureau of Land Management, the U.S. Forest Service, and the National Park Service, including the 8 wilderness areas considered in this plan. Opportunities and locations for wilderness experiences are numerous in the region, resulting in a long-term, beneficial impact on residents and visitors.

The recreation area's exotic plant management plan recognizes the constraints wilderness places on management of nonnative species in wilderness and the need to complete minimum requirement analyses. However, none of the sites identified in the plan as priority areas are in the wilderness areas. Thus, the plan would have little to no effect on wilderness character.

Continuing occasional use of helicopters by the state for desert bighorn management and maintenance of wildlife water developments in the Muddy Mountains Wilderness would result in visual and noise impacts that would adversely affect the undeveloped wilderness character quality in the Pinto Valley and possibly the Jimbilnan wilderness areas.

Several past and reasonably foreseeable future solar and wind energy developments would adversely affect opportunities for solitude in several of the wilderness areas. Existing powerlines are visible along the northeastern boundary of the Spirit Mountain Wilderness, the eastern boundary of the Nellis Wash Wilderness, the northern boundary of the Ireteba Peaks Wilderness (along with an associated road), and from the Black Canyon and Eldorado wilderness areas. In the Eldorado Wilderness the glint and glare from mirrors in the Nevada Solar One concentrating solar thermal plant would be visible from high locations. The proposed Searchlight Wind Energy Project on the Eldorado Mountains would be visible in the Spirit Mountain and Nellis Wash wilderness areas, and generate noise that may be heard in the Nellis Wash Wilderness. The development of roads in this area also may provide increased access, particularly to the Nellis Wash Wilderness, decreasing opportunities for solitude. The construction and use of the four-lane Boulder City Bypass highway near the Black Canyon Wilderness also may cause visual and noise impacts in the wilderness area.

The translocation of desert tortoise on BLM lands, including possibly the Spirit Mountain, Ireteba Peaks, and Eldorado wilderness areas, could result in short-term, adverse impacts on the untrammeled quality of wilderness character, by introducing human manipulation into the ecosystem, but also would beneficially affect the natural quality of wilderness character (BLM 2012c).

Taking together all of the past, present, and future actions occurring within and outside the wilderness areas, and adding the beneficial contribution of alternative C, for most of the wilderness areas there would be no cumulative impacts because there would be no known external actions affecting the areas. When the beneficial effects of actions in alternative C are combined with other external actions, there would be the potential for a long-term, moderate, adverse cumulative impact on the Black Canyon, Nellis Wash, and Spirit Mountain wilderness areas. This cumulative effect would be primarily due to external developments outside the wilderness boundary, affecting opportunities for solitude. However, alternative C would add a small beneficial increment to the overall adverse cumulative impact.

Conclusion

Alternative C would not affect the wilderness character of most of the wilderness areas. In areas that are affected by the alternative, there would be both beneficial and adverse impacts on different wilderness character qualities in different areas.

Weighing all the wilderness character qualities for the eight wilderness areas, overall, alternative C would have a long-term, minor beneficial impact on wilderness character, primarily due to the implementation of a visitor use management framework and to efforts to improve the natural quality in the Pinto Valley Wilderness and to improve the solitude quality and other features of value in the Spirit Mountain and Bridge Canyon wilderness areas. When the effects of alternative C are added to the impacts of other past, present, and future actions, primarily external to the wilderness areas, most of the wilderness areas would not experience cumulative impacts. There could be a long-term, moderate, adverse cumulative impact on wilderness character, primarily opportunities for solitude, in the Black Canyon, Nellis Wash, and Spirit Mountain wilderness areas. However, alternative C would add a small beneficial increment to the overall adverse cumulative impact.

IMPACTS ON CULTURAL RESOURCES

ALTERNATIVE A – NO ACTION

Archeological Resources

Visitation levels would remain unchanged but visitation could impact archeological sites. Archeological sites adjacent to or easily accessible from visitor use areas or routes would continue to be vulnerable to inadvertent damage and vandalism, resulting in a loss of surface archeological materials, alteration of artifact distribution, and a reduction of contextual evidence. Continued ranger patrols and an emphasis on visitor education regarding the significance and fragility of such resources and how visitors can reduce their impacts on them, would discourage vandalism and inadvertent impacts and minimize adverse impacts. Any adverse impacts could be mitigated through stabilization of the sites and the elimination of user-created trails to disturbed or vulnerable sites. Implementation of the no-action alternative would result in negligible to minor, long-term or permanent adverse impacts on archeological resources.

No archeological resources would be altered due to development because no development of new facilities is included in alternative A. Cultural resource management would continue without change under alternative A. The survey of archeological and historic resources would continue, along with the protection of historic structures according to existing NPS guidelines and standards. Under alternative A, visitor access to the wilderness areas would continue to be dispersed with no designated routes, and illegal off-highway vehicle use possibly would continue, potentially resulting in adverse impacts on archeological sites.

Archeological site monitoring would continue as in the past with an emphasis on the prevention of deterioration and the maintenance of sites in good condition. Sites eligible for listing or currently listed in the National Register of Historic Places would continue to be preserved and stabilized in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995).

Cumulative Effects. Archeological sites could be disturbed, exposed, or otherwise impacted by human activity represented at current use levels. It is likely that the no-action alternative would not contribute to the effects of other past, present, and future actions and so there would be no discernible cumulative effects on archeological resources.

Conclusion. In alternative A there would be some long-term indirect negligible to minor adverse impacts on the wilderness areas' archeological sites as current practices continue and visitation remains light. There would be no adverse effect under section 106 of the National Historic Preservation Act for archeological sites in the various wilderness areas.

Ethnographic Resources

Affiliated American Indian tribes have expressed their discomfort with the presence of visitors at Spirit Mountain. American Indians desiring privacy for religious activities would be disrupted occasionally by the presence of hikers at Spirit Mountain. Impacts on ethnographic resources currently come from continued and possible increasing visitation. The presence of visitors at a traditional cultural property potentially alters traditional use and practice. At present, impacts are currently negligible to minor; however, with increased visitation the impact, especially in the vicinity of Spirit Mountain, could be long term and moderately adverse.

Ethnographic resources would be protected by existing laws and policies, including the

American Indian Religious Freedom Act, the Native American Graves Protection Act, section 110 (sacred sites) of the National Historic Preservation Act, Executive Order 13007, and NPS *Management Policies 2006*, and thus would probably not be adversely affected under alternative A.

Cumulative Effects. No past, ongoing, or reasonably foreseeable future actions by others would be expected to combine with the actions proposed in the no-action alternative to have a cumulative impact on ethnographic resources.

Conclusion. Alternative A would have some adverse impacts on the wilderness areas' only traditional cultural property, Spirit Mountain, located in the Spirit Mountain Wilderness. Continued use of the area without instituting some controls on visitor use through the establishment of designated trailheads and signs may result in continuing negligible to minor adverse impacts as visitation remains light. A negligible to minor adverse impact would constitute no adverse effect under section 106. However, if a moderate adverse impact is noted, the determination of effect on this national register-listed property for section 106 requirements would be an adverse effect.

ALTERNATIVE B – PREFERRED ALTERNATIVE

Alternatives B and C would both implement the Volunteer Wilderness Stewardship Program to aid in management of the wilderness areas. Volunteer wilderness stewards would be trained to monitor cultural and natural resources and visitor use in the areas. This program would result in an overall beneficial impact on the wilderness areas' cultural resources as it would assist park staff by having stewards focus on monitoring efforts that park staff may not be able to provide on their own. This program would also provide important and timely feedback on resource conditions to park staff so they can implement mitigation measures before the impacts have a greater effect on the resources.

Archeological Resources

Archeological site monitoring would continue as in the past with an emphasis on the prevention of deterioration and the maintenance of sites in good condition. Sites eligible for listing or currently listed in the National Register of Historic Places would continue to be preserved and stabilized in accordance with *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* (1995). The impacts described below would be true for all wilderness areas under alternative B.

As appropriate, archeological surveys and/or monitoring would precede any ground disturbance, and any archeological resources located near or in areas where new access points, parking areas, and trailheads would be established would be avoided. Ground disturbance would be limited to areas void of archeological sites. The creation of new access points, including trailheads and parking areas, and the installation of information kiosks would also occur outside of the wilderness boundary or in areas that have been previously disturbed. No adverse effects would be anticipated.

Instituting and monitoring wilderness character and visitor use management measures would help ensure that an unacceptable increase in disturbance levels, as defined by the Southern Nevada Agency Partnership Cultural Site Program and in the number of incidences of graffiti or other vandalism on rock art and other archeological sites, does not occur in the wilderness areas. Compared to the no-action alternative, this alternative would result in beneficial impacts on archeological resources through better monitoring and condition assessment.

Providing visitors information about the significance and fragility of archeological resources, and how visitors can reduce impacts on them, would discourage vandalism

and inadvertent impacts and minimize adverse impacts. Any adverse impacts would be negligible to minor and permanent.

In alternative B, where new wilderness access points are established, there probably would be an increase in visitor use; however, there would be a related reduction in the potential for visitors accessing the wilderness area from random points near archeological sites that might be impacted. Directing visitor entry to designated locations that have been cleared for use would lessen the potential for visitor impacts on archeological sites adjacent to or easily accessible from visitor use areas or routes. Any adverse impacts would be negligible to minor and permanent.

Cumulative Effects. Increased visitation resulting from growing populations in adjacent areas in conjunction with actions proposed in alternative B could lead to increased disturbance of archeological sites through the direction of use to formalized trailheads.

Conclusion. Overall, there would be a potential negligible to minor adverse impact from actions proposed in alternative B. Most of the wilderness areas' archeological resources would not be affected by the actions in alternative B. With the creation of designated routes and increased visitor use in localized areas such as along routes, in washes, and at specific points of interest, there may be some minor adverse impacts on archeological sites from trampling or vandalism. Overall, these adverse impacts would probably be minor, although permanent. On the other hand, establishing and monitoring wilderness character and visitor use management measures should help prevent any moderate adverse impacts on archeological sites and instead could have a beneficial impact through increased preservation and monitoring. Under section 106, the determination of effect would be no adverse effect for the negligible to minor impacts.

Because alternative B would have no adverse effects, it would not contribute to the adverse cumulative effects described above.

Ethnographic Resources

Ethnographic resources in the wilderness areas may be affected by the removal of some fixed climbing anchors in alternative B. Depending on site-specific characteristics of rock faces, removals may have a minor adverse impact due to scarring that could occur during the removal process. Attempts would be made to minimize adverse impacts on rock faces, including ceasing removal activities if needed.

In addition, increased visitation in alternative B may cause some negligible to minor adverse impacts. These impacts would not impact the national register listing. Ethnographic resources would be protected by existing laws and policies, including the American Indian Religious Freedom Act, the Native American Graves Protection Act, section 110 (sacred sites) of the National Historic Preservation Act, Executive Order 13007, and NPS *Management Policies 2006*, and thus would not likely be adversely affected under alternative B.

The only defined traditional cultural property within any of the wilderness areas covered by this environmental impact statement is located within the Spirit Mountain Wilderness. The popularity of hiking on Spirit Mountain is likely to increase in the future. In this alternative, only day use would be permitted. Existing user-created trails to the summit would be removed and the landscape restored. These activities and the related increased visitor use would cause potential negligible to minor long term adverse impacts under alternative B.

As with other wilderness areas, informational signs and kiosks would be placed in various locations such as at trailheads, access points, and parking areas outside of the wilderness boundary to educate users about the wilderness area and Leave No Trace outdoor ethics. Visitors would increase their understanding and appreciation for ethnographic resources in the wilderness area. This would help minimize adverse impacts

from visitor use, resulting in overall beneficial impacts on this ethnographic resource.

Cumulative Effects. Removal of some fixed climbing anchors and increased visitor use in wilderness areas would have minor long-term adverse cumulative impacts on ethnographic resources. The negligible to minor long-term adverse impacts of alternative B, in combination with the minor to moderate cumulative adverse impacts of increasing visitation would result in potentially moderate adverse cumulative impacts.

Conclusion. Alternative B would have some negligible to minor long-term adverse impacts on the wilderness areas' only traditional cultural property, Spirit Mountain, located in the Spirit Mountain Wilderness. A negligible to minor adverse impact would be considered a no adverse effect under section 106. However, if a moderate adverse impact is noted, the determination of effect on this national register-listed property for section 106 would be an adverse effect. Implementation of alternative B would result in negligible to minor, long-term adverse effects to ethnographic resources. The determination of effect for section 106 requirements would be no adverse effect.

ALTERNATIVE C

Alternatives B and C would both implement the Volunteer Wilderness Stewardship Program to aid in the management of the wilderness areas. Volunteer wilderness stewards will be trained to monitor cultural and natural resources and visitor use in the areas. This program would result in an overall beneficial impact on the wilderness areas' cultural resources, as it would assist park staff by having stewards focus on monitoring efforts that park staff may not be able to provide on their own. This program would also provide important and timely feedback on resource conditions to park staff so they can implement mitigation measures before the impacts have a greater effect on the resources.

Archeological Resources

Archeological site monitoring would continue as in the past with an emphasis on the prevention of deterioration and the maintenance of sites in good condition. Sites eligible for listing or currently listed in the National Register of Historic Places would continue to be preserved and stabilized in accordance with *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* (1995). The impacts described below would be true for all wilderness areas under alternative C.

As appropriate, archeological surveys and/or monitoring would precede any ground disturbance, and any archeological resources located near or in areas where new access points, parking areas, and trailheads would be established would be avoided. Ground disturbance would be limited to areas void of archeological sites. The creation of new access points, including trailheads and parking areas, and the installation of information kiosks would occur outside of the wilderness boundary or in areas that have been previously disturbed or would be located outside of the wilderness boundary. No adverse effects would be anticipated.

Instituting and monitoring wilderness character and visitor use management measures would help ensure that an unacceptable increase in disturbance levels, as defined by the Southern Nevada Agency Partnership Cultural Site Program and in the number of incidences of graffiti or other vandalism on rock art and other archeological sites, does not occur in the wilderness areas. Compared to the no-action alternative, this alternative would result in beneficial impacts on archeological sites through better monitoring and condition assessment.

Providing visitors information about the significance and fragility of archeological resources, and how visitors can reduce impacts on them, would discourage vandalism and inadvertent impacts and minimize adverse impacts. Any adverse impacts would be negligible to minor and permanent.

In alternative C, where new wilderness access points are established, there probably would be an increase in visitor use; however, there would be a related reduction in the potential for visitors accessing the wilderness area from random points near archeological sites that might be impacted. Directing visitors to entry sites that had been cleared for use would lessen the potential for visitor impacts on archeological sites adjacent to or easily accessible from visitor use areas or routes. Any adverse impacts would be negligible to minor and permanent.

Cumulative Effects. Increased visitation resulting from growing populations in adjacent areas in conjunction with actions proposed in alternative C could lead to increased disturbance of archeological sites through the direction of use to formalized trailheads.

Conclusion. The creation of designated routes and increased visitor use in localized areas such as along routes, in washes, and at specific points of interest, would create some negligible to minor adverse impacts on archeological sites due to trampling or vandalism; however, most of these impacts would probably be avoidable. If they occur, these adverse impacts probably would be negligible to minor, although long term. Additionally, establishing and monitoring wilderness character and visitor use management measures should help prevent moderate adverse impacts on archeological sites and instead could have a moderate beneficial impact through increased preservation and monitoring. Under section 106, the determination of effect would be no adverse effect for the negligible to minor impacts.

Ethnographic Resources

Ethnographic resources in the wilderness areas may be affected by the removal of some fixed climbing anchors in alternative C. Depending on site-specific characteristics of rock faces, removals may have a minor adverse impact due to scarring that could occur during the removal process. Attempts would be made to minimize adverse impacts on rock faces, including ceasing removal activities if needed.

Ethnographic resources would be protected by existing laws and policies, including the American Indian Religious Freedom Act, the Native American Graves Protection Act, section 110 (sacred sites) of the National Historic Preservation Act, Executive Order 13007, and NPS *Management Policies 2006*, and thus would probably not be adversely affected under alternative C.

The only traditional cultural property within any of the wilderness areas covered by this environmental impact statement is located within the Spirit Mountain Wilderness. The popularity of hiking on Spirit Mountain is likely to increase in the future. In this alternative, only day use would continue to be permitted, and a designated route up Spirit Mountain would be established and maintained. Existing user-created routes to the summit would be removed and the landscape restored. These activities and the related increased visitor use would cause potential negligible to minor long term adverse impacts under alternative C.

As with other wilderness areas, informational signs and kiosks would be placed in various locations such as at trailheads, access points, and parking areas outside of the wilderness boundary to educate users about the wilderness area and Leave No Trace outdoor ethics. This would help minimize adverse impacts from visitor use, resulting in overall beneficial impacts on this ethnographic resource.

Cumulative Effects. Removal of some fixed climbing anchors and increased visitor use in wilderness areas would have minor long-term adverse cumulative impacts on ethnographic resources. The negligible to minor long-term adverse impacts of alternative C, in combination with the minor to moderate cumulative adverse impacts of increasing

visitation, would result in potentially moderate adverse cumulative impacts.

Conclusion. Alternative C would have some adverse negligible to minor long-term impacts on the wilderness areas' only traditional cultural property, Spirit Mountain—located in the Spirit Mountain Wilderness. A negligible to minor adverse impact would be a no adverse effect under section 106. However, if a moderate adverse impact is noted, the determination of effect on this national register-listed property for section 106 would be an adverse effect. It is likely that directed use in the Spirit Mountain Wilderness would serve to keep impacts in the negligible to a minor range. Implementation of alternative C would result in negligible to minor, long-term adverse effects to ethnographic resources. The determination of effect for section 106 requirements would be no adverse effect.

IMPACTS ON VISITOR USE AND EXPERIENCE

ALTERNATIVE A – NO ACTION

Analysis

Use of the wilderness areas generally would continue to be limited by (1) natural limitations of travel in the rugged backcountry, (2) the inhospitable summer climate, and (3) the existing lack of development such as marked routes and trailheads. In this alternative, these conditions would continue relatively unchanged and little effort would be expended by the agencies on orienting, informing, or educating the public about the wilderness areas. As a result, visitor numbers in the wilderness areas (outside of Grapevine Canyon) would continue to be quite low.

Visitors would continue to have unrestricted access to the wilderness areas and would have opportunities for nonmotorized activities such as hiking, backpacking, nature study, photography, climbing, canyoneering, hunting, and attending occasional ranger-led walks under this alternative. Under alternative A, climbing would continue to be allowed throughout all the wilderness areas, as provided for under the Wilderness Act and NPS and BLM management policies. No new actions would be taken by the agencies under this alternative to manage climbing in the wilderness areas. There would also continue to be no restrictions on group size and no restrictions for allowance of pets in wilderness areas. This would result in a continuation of current long-term, minor, beneficial impacts on visitor use and experiences in wilderness.

The wildernesses' rugged nature and lack of formally marked trails or access points would continue to inhibit use by some visitors. Those visitors who enter the wilderness with a lack of information and navigation skills could have negative experiences when they are unable to reach their intended destination or get lost in these areas; this would result in a continuing short-term, minor to moderate, adverse impact for some visitors' quality of experience.

On the other hand, visitors who enter these areas fully prepared (e.g., map, compass, GPS, survival gear) would probably have a positive wilderness experience because of the lack of managerial presence. Almost unlimited opportunities for solitude and primitive, unconfined recreation would continue—creating a long-term minor beneficial impact.

Cumulative Effects

The fast-growing population of the southern Nevada region and related development pressures are recognized by local, regional, state, and federal entities as major concerns affecting the region's environmental, economic, and community values.

Regardless of growth issues, there are many opportunities for people to participate in outdoor recreation in southern Nevada. In addition to Lake Mead National Recreation Area, there is the Red Rock Canyon National Conservation Area just west of Las Vegas, Mount Charleston in Humboldt-Toiyabe National Forest within an hour's drive, and thousands of acres of open public land managed by the Bureau of Land Management. There are 12 designated wilderness areas in Clark County managed by the BLM and the U.S. Forest Service, in addition to the 8 wilderness areas considered in this plan. Thus, opportunities and locations for outdoor recreation and wilderness experiences are numerous in the region, creating a long-term, beneficial impact for residents and visitors.

Hiking has remained one of the most popular outdoor activities. Participation in hiking is relatively stable with close to a third of Americans aged 16 and older participating in the activity. In Nevada, just over 50% of the

population participated in a trail-related activity in 2007 (Outdoor Industry Foundation 2007), so the presence of opportunities for outdoor recreation, specifically hiking, creates a long-term beneficial impact for residents and visitors. However, overall trends in outdoor recreation indicate that the number of people recreating in the outdoors has been relatively flat since 1997 (Outdoor Industry Foundation 2006). The visitation numbers for Lake Mead National Recreation Area have declined since 1995.

Continuing occasional use of helicopters by the state for desert bighorn management and maintenance of wildlife water developments in the Muddy Mountains Wilderness would result in visual and noise impacts that would adversely affect the visitor experience in the Pinto Valley and possibly the Jimbilnan Wilderness areas.

Several past and reasonably foreseeable future solar and wind energy developments could adversely affect the visitor experience, including opportunities for solitude in several of the wilderness areas. Existing powerlines are visible along the northeastern boundary of the Spirit Mountain Wilderness, the eastern boundary of the Nellis Wash Wilderness, the northern boundary of the Ireteba Peaks Wilderness (along with an associated road), and from the Black Canyon and Eldorado wilderness areas. In the Eldorado Wilderness the glint and glare from mirrors in the Nevada Solar One concentrating solar thermal plant would be visible from high locations. The proposed Searchlight Wind Energy Project on the Eldorado Mountains would be visible in the Spirit Mountain and Nellis Wash wildernesses and would generate noise that may be heard in the Nellis Wash Wilderness. The development of roads in this area also may provide increased access for visitors, particularly to the Nellis Wash Wilderness, but could decrease opportunities for solitude if improved access led to increased use. The construction and use of the four-lane Boulder City Bypass highway would be near the Black Canyon Wilderness, and might cause visual and noise impacts for visitors in the wilderness area.

Although there would be external developments that would affect visitor experiences inside some of the wilderness areas (i.e., Black Canyon, Nellis Wash), the no-action alternative would not contribute to the effects of other past, present, and future actions. Cumulative impacts from visual and noise intrusions would probably have long-term, negligible to moderate impacts on the visitor experience in certain areas of the wilderness.

Conclusion

Implementing the no-action alternative would result in the continuation of adverse and beneficial impacts on visitor use of the wilderness areas. This alternative would not change how visitors use the areas; therefore, this alternative would have no new impact on visitor use or experience.

Overall, there would be long-term, negligible to moderate, adverse impacts in certain areas of the wilderness when the effects of alternative A are added to possible cumulative increases in noise and visual intrusions from external sources. There would also be long-term, negligible to minor beneficial impacts when the beneficial effects from opportunities to experience solitude in alternative A are added to beneficial effects from extensive wilderness hiking opportunities that exist in the region.

ALTERNATIVE B – PREFERRED ALTERNATIVE

Analysis

Alternative B would provide improved opportunities for visitors to access most of the wilderness areas when compared to alternative A. Additional developments such as marked routes, trailheads, and signs at a few locations in Pinto Valley, Black Canyon,

Eldorado, Spirit Mountain, and Bridge Canyon wilderness areas would allow easier access for persons with all levels of wilderness experience. Orientation information provided at visitor contact stations and on-site kiosks would allow visitors to choose the type of wilderness experience that meets their skill set and time constraints. This would result in a long-term, minor, beneficial impact on the visitor experience. These actions also would probably increase the number of visitors and concentrate visitor use at access points and designated routes, which could adversely affect some visitors' wilderness experience. However, this is not expected to be a concern except for during a few busy weekends per year, and there would be many opportunities for solitude outside of these areas of concentrated use. Thus, the adverse impacts of these actions would be long term but negligible.

Visitors would have somewhat improved access to five of the wilderness areas and have opportunities for appropriate nonmotorized activities such as hiking, backpacking, nature study, photography, climbing, canyoneering, hunting, and occasional ranger-led walks under this alternative. A route in Pinto Valley would be maintained for horseback or pack stock use to provide opportunities for this type of visitor use.

In alternative B, climbing would continue to be allowed in all wilderness areas, and would be managed as described in the overall climbing management directions in chapter 2. In addition, in this alternative the use and replacement of fixed anchors and equipment would be managed according to policies set forth in Director's Order 41 (see the discussion of Spirit Mountain and Bridge Canyon wilderness areas). The removal of fixed anchors and equipment in the Spirit Mountain Wilderness and the reduction in concentration of some bolt-intensive face climbs at certain climbing areas in the Bridge Canyon Wilderness would reduce the number of climbers using the climbing areas at one time, therefore increasing opportunities for solitude. Because only a few climbers are typically present at these areas at a given time, the impact on opportunities for solitude would result in a long-term, minor, beneficial impact on the visitor experience. Although the reduction in bolt-intensive face climbs would be directed by Director's Order 41, there would probably be long-term, negligible to minor adverse impacts for some climbers who would no longer have access to some of the existing bolt-intensive face climbing opportunities in these areas.

Visitor numbers in the Jimbilnan, Ireteba Peaks, and Nellis Wash wilderness areas would continue to be quite low, preserving outstanding opportunities for solitude.

Under this alternative, there would be a maximum group size limit imposed to provide high-quality visitor experiences and resource protection. Implementing the wilderness character monitoring and visitor use management framework described in the alternatives chapter of this plan would involve monitoring the level of visitor use to determine if unacceptable impacts, such as crowding, are occurring. If so, actions—such as limiting or dispersing use—would be taken to reduce the level of effect. This would result in a beneficial impact on visitor experience because it would prevent crowding at destination points that might occur under the no-action alternative. On the other hand, such actions would result in an adverse impact on visitors who might have to change their plans. Because the need for such actions is not expected to occur very often, the level of impact (both beneficial and adverse) is expected to be negligible.

For resource protection reasons, pets would be required to be under leash control at all times in wilderness. This would result in long-term, negligible adverse impacts on some visitors.

Under the preferred alternative, no actions would be taken to improve access into Jimbilnan, Ireteba Peaks, and Nellis Wash wildernesses. Thus, visitor use in these areas would most likely remain quite low, and outstanding opportunities for solitude would be maintained as in alternative A. This would

continue a long-term, beneficial impact for those visitors seeking this type of experience.

Cumulative Effects

The fast-growing population of the southern Nevada region and related development pressures are recognized by local, regional, state, and federal entities as major concerns affecting the region's environmental, economic, and community values. Areas that are designated as wilderness are legally protected from development in perpetuity. These undeveloped areas are likely to increase in importance as the surrounding lands are taken over by commercial, industrial, and residential expansion. The beneficial impact or value of wilderness can be measured in experiential, scientific, and spiritual terms.

There are many opportunities for people to participate in outdoor recreation in southern Nevada. In addition to Lake Mead National Recreation Area, there is Red Rock Canyon National Conservation Area just west of Las Vegas, Mount Charleston in Humboldt-Toiyabe National Forest within an hour's drive, and thousands of acres of open public land managed by the Bureau of Land Management. There are 12 designated wilderness areas in Clark County managed by the BLM and the U.S. Forest Service, in addition to the 8 wilderness areas considered in this plan. Opportunities and locations for outdoor recreation and wilderness experiences are numerous in the region, creating a long-term, beneficial impact for residents and visitors.

Hiking has remained one of the most popular outdoor activities. Participation in hiking is relatively stable with close to a third of Americans aged 16 and older participating in the activity. In Nevada, just over 50% of the population participated in a trail-related activity in 2007 (Outdoor Industry Foundation 2007), so the presence of opportunities for outdoor recreation, specifically hiking, results in a long-term, minor to moderate, beneficial impact for residents and visitors. However, overall trends in outdoor recreation indicate that the number of people recreating in the outdoors has been relatively flat since 1997 (Outdoor Industry Foundation 2006). The visitation numbers for Lake Mead National Recreation Area have been declining since 1995.

Continuing occasional use of helicopters by the state for desert bighorn management and maintenance of wildlife water developments in the Muddy Mountains Wilderness would result in visual and noise impacts that would adversely affect the visitor experience in the Pinto Valley and possibly the Jimbilnan wilderness areas.

Several past and reasonably foreseeable future solar and wind energy developments could adversely affect the visitor experience, including opportunities for solitude in several of the wilderness areas. Existing powerlines are visible along the northeastern boundary of the Spirit Mountain Wilderness, the eastern boundary of the Nellis Wash Wilderness, the northern boundary of the Ireteba Peaks Wilderness (along with an associated road), and from the Black Canyon and Eldorado wilderness areas. In the Eldorado Wilderness the glint and glare from mirrors in the Nevada Solar One concentrating solar thermal plant would be visible from high locations. The proposed Searchlight Wind Energy Project on the Eldorado Mountains would be visible in the Spirit Mountain and Nellis Wash wildernesses, and would generate noise that may be heard in the Nellis Wash Wilderness. The development of roads in this area also may provide increased access for visitors, particularly to the Nellis Wash Wilderness, but could decrease opportunities for solitude if improved access leads to increased use. The construction and use of the four-lane Boulder City Bypass highway would be near the Black Canyon Wilderness, and might cause visual and noise impacts for visitors in the wilderness area.

Cumulative impacts from possible visual and noise intrusions would probably have long-term, negligible to moderate impacts on the visitor experience in certain areas of the wilderness. There would also be long-term,

negligible to minor beneficial impacts when the beneficial effects from opportunities to experience solitude in alternative B are added to beneficial effects from extensive wilderness hiking opportunities that exist in the region.

When the effects of alternative B are added to other past, present, and future actions, the overall cumulative impact would have both beneficial and adverse impacts depending on the area of wilderness being used, the desired visitor experience, expectations, and activities that visitors would like to attain.

Conclusion

Alternative B would have a long-term, minor, beneficial impacts on visitor opportunities to experience solitude and long-term, minor, adverse impacts on opportunities for visitors with pets and climbers interested in bolt-intensive face climbing.

Cumulative impacts from possible visual and noise intrusions would probably have long-term, negligible to moderate impacts on the visitor experience in certain areas of the wilderness. There would also be long-term, negligible to minor beneficial impacts when the beneficial effects from opportunities to experience solitude in alternative B are added to beneficial effects from extensive wilderness hiking opportunities that exist in the region.

When the effects of alternative B are added to other past, present, and future actions, the overall cumulative impact would have both beneficial and adverse impacts depending on the area of wilderness being used, the desired visitor experience, expectations, and activities that visitors would like to attain.

ALTERNATIVE C

Analysis

Alternative C would provide more opportunities for visitors to access the wilderness areas when compared to alternatives A or B. Additional development such as marked routes, trailheads, and signs would be placed in several locations throughout all the wilderness areas. This would allow easier access to persons with all levels of wilderness experience. Orientation information provided at visitor contact stations and on-site kiosks would allow visitors to choose the type of wilderness experience that meets their skill set and time restraints. This would result in a long-term, minor, beneficial impact on visitor experience.

The addition of these developments would probably increase visitation, and use would be more concentrated at access points and designated routes, which could adversely impact some visitors' wilderness experience and opportunities for solitude. This relative crowding probably would not occur most days of the year and there would be many opportunities for solitude away from these concentrated areas. Thus, the adverse impacts of these actions would be long term and negligible to minor.

Visitors would have greatly improved access to the wilderness areas and would have opportunities for appropriate nonmotorized activities such as hiking, backpacking, nature study, photography, climbing, canyoneering, hunting, and occasional ranger-led walks under this alternative. A route in Pinto Valley would be maintained for horseback and pack stock use to provide opportunities for this type of visitor.

In alternative C, climbing would continue to be allowed in all wilderness areas, and would be managed as described in the overall climbing management directions in chapter 2. In addition, in this alternative the use and replacement of fixed anchors and equipment would be managed according to policies set forth in Director's Order 41 (see the discussion of Spirit Mountain and Bridge Canyon wilderness areas). The removal of fixed anchors and equipment in the Spirit Mountain Wilderness and the reduction in concentration of some of bolt-intensive face climbs at certain climbing areas in the Bridge Canyon Wilderness would reduce the number

of climbers using the climbing areas at one time, therefore increasing opportunities for solitude. Because only a few climbers are typically present at these areas at a given time, the impact on opportunities for solitude would result in a long-term, minor, beneficial impact on the visitor experience. Although the reduction in bolt-intensive face climbs would be directed by Director's Order 41, there would probably be long-term, negligible to minor adverse impacts for some climbers who would no longer have access to some of the existing bolt-intensive face climbing opportunities in these areas.

Visitor numbers in the Jimbilnan, Ireteba Peaks, and Nellis Wash wilderness areas would continue to be quite low, preserving outstanding opportunities for solitude. Under this alternative, there would be a maximum group size limit imposed to provide high-quality visitor experiences and resource protection. Implementing the wilderness character monitoring and visitor use management framework described in the "Wilderness Character Monitoring and Visitor Use Management" section of this plan would involve monitoring the level of visitor use to determine if unacceptable impacts, such as crowding, are occurring. If so, actions such as limiting or dispersing use would be taken to reduce the level of effect. Such actions would result in a beneficial impact on visitor experience because they would prevent crowding at destination points that might occur under the no-action alternative. On the other hand, such actions would create an adverse impact on visitors who might have to change their plans. Because the need for such action is not expected to occur very often, the level of impact (both beneficial and adverse) is expected to be negligible.

For resource protection reasons, pets would be required to be under leash control at all times in wilderness. This would result in long-term, negligible adverse impacts on some visitors.

Cumulative Effects

The fast-growing population of the southern Nevada region and related development pressures are being recognized by local, regional, state, and federal entities as major concerns affecting the region's environmental, economic, and community values. Areas with wilderness designations are legally protected from development in perpetuity. These undeveloped areas are likely to increase in importance as the surrounding lands are taken over by commercial, industrial, and residential expansion. The beneficial impact or value of wilderness can be measured in experiential, scientific, and spiritual terms.

There are many opportunities for people to participate in outdoor recreation in southern Nevada. In addition to Lake Mead National Recreation Area, there is Red Rock Canyon National Conservation Area just west of Las Vegas, Mount Charleston in Humboldt-Toiyabe National Forest within an hour's drive, and thousands of acres of open public land managed by the Bureau of Land Management. There are 12 designated wilderness areas in Clark County managed by the Bureau of Land Management and the U.S. Forest Service in addition to the eight wilderness areas considered in this plan. Opportunities and locations for outdoor recreation and wilderness experiences are numerous in the region, resulting in a long-term beneficial impact for residents and visitors.

Hiking has remained one of the most popular outdoor activities. Participation in hiking is relatively stable with close to a third of Americans aged 16 and older participating in the activity. In Nevada, just over 50% of the population participated in a trail-related activity in 2007 (Outdoor Industry Foundation 2007), so the presence of opportunities for outdoor recreation, specifically hiking, is a long-term minor to moderate beneficial impact for residents and visitors. However, overall trends in outdoor recreation indicate that the number of people recreating in the outdoors has been relatively flat since 1997 (Outdoor Industry Foundation 2006). The visitation numbers for Lake Mead

National Recreation Area have been declining since 1995.

Cumulative impacts from possible visual and noise intrusions would probably have long-term, negligible to moderate impacts on the visitor experience in certain areas of the wilderness. There would also be long-term, negligible to minor beneficial impacts when improved visitor orientation and access opportunities in alternative C are added to beneficial effects from extensive wilderness hiking opportunities that exist in the region.

When the effects of alternative C are added to other past, present, and future actions, the overall cumulative impact would be both beneficial and adverse depending on the area of wilderness being used, the desired visitor experience, expectations, and activities that visitors would like to attain.

Conclusion

Alternative C would have long-term, minor, beneficial impacts on visitor orientation and access opportunities and long-term, minor, adverse impacts on opportunities for visitors with pets and climbers interested in bolt-intensive face climbing.

Cumulative impacts from possible visual and noise intrusions would probably have long-term, negligible to moderate impacts on the visitor experience in certain areas of the wilderness. There would also be long-term, negligible to minor beneficial impacts when improved visitor orientation and access opportunities in alternative C are added to beneficial effects from extensive wilderness hiking opportunities that exist in the region.

When the effects of alternative C are added to other past, present, and future actions, the overall cumulative impact would be both beneficial and adverse depending on the area of wilderness being used, the desired visitor experience, expectations, and activities that visitors would like to attain.

OTHER REQUIRED IMPACT ANALYSIS

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are defined as impacts that cannot be fully mitigated or avoided. Under all of the alternatives there would be the potential for unavoidable adverse impacts on soils, vegetation, natural soundscape, ethnographic resources, and visitor use and experience. These unavoidable impacts would be negligible to minor in extent and would be primarily due to continuing or increasing visitor use in a few popular, localized areas (e.g., Boy Scout Canyon, Spirit Mountain). Likewise, with increased access being provided in alternatives B and C these areas would experience some degradation of wilderness character (e.g., natural character, opportunities for solitude). The removal of some fixed anchors in the Spirit Mountain and Bridge Canyon Wilderness areas would be considered an unavoidable minor adverse impact on the visitor experience of climbers in these areas.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

This question focuses on long-term, permanent effects on park resources. Irreversible commitments of resources are actions that result in loss of resources that cannot be restored. An effect on a resource is irreversible if it (the resource) cannot be reclaimed, restored, or otherwise returned to its predisturbance condition. Irretrievable commitments of resources are effects on resources that, once gone, cannot be replaced.

An irreversible impact in alternative A, and to a lesser degree in alternatives B and C, would be continuing soil erosion and loss of vegetation due to visitors walking through the wilderness areas, creating unofficial trails. With the designation of routes in alternatives B and C, these irreversible impacts would be expected to decline. No actions in the alternatives would result in the consumption of nonrenewable resources or use of renewable resources that would preclude other uses for a period of time. No facilities would be developed under any of the action alternatives that would result in irreversible and irretrievable commitments of resources.

RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

This question explores long-term effects of an alternative and whether or not the productivity of park resources is being traded for the immediate use of land. In all of the alternatives, the National Park Service and Bureau of Land Management would continue to manage the wilderness areas to maintain ecological processes and native biological communities and to provide recreational opportunities consistent with preservation of cultural and natural resources and wilderness character. Almost all of the wilderness areas would continue to be protected in their current, natural state and would maintain their long-term productivity. The primary short-term uses of the park would continue to be for recreational use. Under all of the alternatives there would be the potential for adverse impacts on soils and vegetation in a few localized, popular use areas, which could reduce the productivity of some natural resources. However, overall there would be no measurable effect on the wilderness areas' long-term productivity.

Chapter Six:
Consulatation and Coordination

PUBLIC AND AGENCY INVOLVEMENT

The draft wilderness management plan / environmental impact statement for eight wilderness areas in Lake Mead National Recreation Area and BLM lands represents thoughts of the NPS and BLM staff, American Indian groups, and the public. Consultation and coordination among the agencies occurred throughout the planning process. The public was provided an opportunity to be involved in scoping the project, identifying issues and concerns for the plan.

This section only describes public and agency involvement for the environmental impact statement. The draft wilderness management plan / environmental assessment (2010) includes information for consultations that occurred prior to the preparation of this environmental impact statement. During preparation of the environmental assessment, public review was conducted as well as consultations with agencies and tribal representatives. One newsletter was distributed and one set of public meetings was held prior to its publication. A newsletter for the environmental assessment, issued in 2006, described the planning effort and requested the public to identify issues and concerns the plan should address. Scoping meetings were held at Henderson and Laughlin, Nevada, in October 2006 and both the National Park Service and the Bureau of Land Management participated.

PUBLIC MEETINGS AND NEWSLETTERS

A notice of intent to prepare an environmental impact statement was published in the *Federal Register* on February 15, 2012. A newsletter, issued in March 2012 described the planning effort and requested the public to identify issues and concerns the plan should address. The public was asked to send their comments via the internet or mail. The public was requested to send their comments by April 20, 2012.

In February 2013 a preliminary alternatives newsletter was distributed to the public. The newsletter requested comments on the preliminary alternatives by April 12, 2013. Public open houses were also held in Bullhead City, Arizona, and Boulder City and Henderson, Nevada, on March 18–21, 2013. At these meetings, representatives of both the National Park Service and the Bureau of Land Management participated.

CONSULTATION WITH AGENCIES, OFFICIALS, AND ORGANIZATIONS

Section 7 Consultation with the U.S. Fish and Wildlife Service

The Endangered Species Act of 1973, as amended, requires in section 7 (a) (2) that each federal agency, in consultation with the Secretary of the Interior, ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. This section of the act sets out the consultation process, which is further implemented by regulation (50 CFR 93 402).

The planning team initiated informal consultation with the U.S. Fish and Wildlife Service on the desert tortoise, the only federally listed species known to occur in the wilderness areas. This informal consultation occurred during the development of the 2010 draft wilderness management plan / environmental assessment. The U.S. Fish and Wildlife Service concurred on September 12, 2008, with the NPS determination that the proposed action is not likely to adversely affect the desert tortoise (see appendix D). Because the 2013 wilderness management plan / environmental impact statement is not proposing new actions that would affect the

tortoise or its habitat, the earlier consultation covers this plan.

American Indians

The National Park Service and Bureau of Land Management recognize that indigenous peoples have traditional and contemporary interests and ongoing rights in lands now under NPS/BLM management, as well as concerns and contributions to make for the future for this wilderness management plan. Related to tribal sovereignty, the need for government-to-government American Indian consultations stems from the historic power of Congress to make treaties with American Indian tribes as sovereign nations. Consultations with American Indian tribes are required by various federal laws, executive orders, regulations, and policies. For example, such consultations are needed to comply with section 106 of the National Historic Preservation Act of 1966, as amended. Implementing regulations of the Council on Environmental Quality for the National Environmental Policy Act of 1969, as amended, also call for American Indian consultations.

Formal consultation with tribes associated with Lake Mead National Recreation Area was initiated in September 2008. A formal request to consult was sent to the Kaibab Paiute Tribe, the Las Vegas Paiute Tribe, the Moapa Paiute Tribe, the Shivwits Band of Paiute, the Paiute Indian Tribes of Utah, the Pahrump Paiute Tribe, the Chemehuevi Tribe, the Colorado River Indian Tribes, the Ft. Mojave Tribe, the Ft. Yuma Quechan Tribe, the Gila River Indian Community, the Havasupai Tribe, the Hopi Tribe, the Hualapai Tribe, the Salt River Pima-Maricopa Indian Community, the Yavapai-Prescott Indian Tribe, the Ak-Chin Indian Community, and the Zuni Tribe.

Representatives from the Chemehuevi Tribe, the Ft. Mojave Indian Tribe, the Hualapai Tribe, and the Southern Paiute Pahrump Paiute Tribe attended meetings with NPS staff on the tribes' issues and concerns regarding the management of the wilderness areas.

Section 106 Consultation with the Nevada State Historic Preservation Office

Agencies that have direct or indirect jurisdiction over historic properties are required by section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 270, et seq.), to take into account the effect of any undertaking on properties listed in or eligible for listing in the National Register of Historic Places. Lake Mead National Recreation Area superintendent William K. Dickinson informed and invited the Nevada State Historic Preservation Office (SHPO) as follows. By way of a letter dated August 12, 2008, to start meeting the requirements of 36 CFR 800, the superintendent informed SHPO Ronald M. James about the undertaking to write a wilderness plan for eight wilderness areas in Lake Mead National Recreation Area on adjacent BLM lands, and invited him and his staff to participate in the planning process and to comment on the draft plan as it progressed. SHPO comments and advice were welcome at any time on planning for possible decisions regarding protection and preservation of Lake Mead National Recreation Area's listed or eligible historic properties in the eight wilderness areas.

FUTURE CULTURAL RESOURCE COMPLIANCE REQUIREMENTS

Under the terms of stipulation VI.E of the 1995 *Programmatic Agreement Among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers*, the National Park Service has consulted with the Nevada State Historic Preservation Office to identify which actions qualify as programmatic exclusions under IV.A and B, and which other undertakings will

require further review and comment under 36 CFR 800.4-6.

Table 13 outlines those specific needs.

TABLE 13. FUTURE CULTURAL RESOURCE COMPLIANCE REQUIRED FOR IMPLEMENTATION OF SPECIFIC ACTIONS

Action	Compliance Requirement
▪ Routinely monitoring and stabilizing archeological sites. ▪ Monitoring historic structures to protect, preserve, maintain, and research them.	These items are programmatically excluded from future section 106 review and SHPO consultation in accordance with the 1995 *Programmatic Agreement among the National park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers.*
▪ Ground-disturbing activities for visitor facilities. ▪ If eligible for the National Register of Historic Places, discovery of archeological sites that cannot be avoided via survey of new routes or formalization of existing routes.	Future section 106 review and SHPO and tribal consultation would probably be necessary and required before construction at the project implementation planning or design stages.

PUBLIC OFFICIALS, AGENCIES, AND ORGANIZATIONS RECEIVING A COPY OF THIS DOCUMENT

FEDERAL AGENCIES

Bureau of Indian Affairs
- Director, Phoenix Area Office
- Eastern Nevada Agency

Bureau of Land Management
- Arizona State Office
- Arizona Strip Office
- Kingman Resource Center
- Lake Havasu Field Office
- Las Vegas Field Office
- National Training Center
- Nevada State Office
- Phoenix District Office
- Red Rock Canyon National Conservation Area
- Safford Field Office
- Southern Nevada District Office
- Tucson Field Office
- Yuma Field Office

Bureau of Reclamation
- Lower Colorado Dams Project Office
- Lower Colorado Region

Environmental Protection Agency
- Las Vegas EMS Laboratory
- Region IX

Federal Highway Administration

National Park Service
- Grand Canyon National Park
- Grand Canyon-Parashant National Monument
- Death Valley National Park

Natural Resources Conservation Service

U.S. Army Corps of Engineers
- Los Angeles District – Los Angeles Office
- Los Angeles District – Phoenix Office
- Sacramento Office
- St. George Office

U.S. Fish and Wildlife Service
- Flagstaff Office
- Las Vegas Office
- Desert National Wildlife Range
- Reno Field Station

U.S. Forest Service
- Humboldt-Toiyabe National Forest

U.S. SENATORS AND REPRESENTATIVES

Honorable Shelley Berkley, U.S. Representative
Honorable John Ensign, U.S. Senator
Honorable Dean Heller, U.S. Representative
Honorable Dina Titus, U.S. Representative
Honorable Harry Reid, U.S. Senator

STATE OFFICIALS

Honorable Jim Gibbons, Governor of Nevada

STATE AGENCIES

Nevada Division of Environmental Protection
Nevada State Historic Preservation Office
State of Nevada, Department of Administration – State Clearinghouse
State of Nevada, Department of Conservation and Natural Resources
State of Nevada, Department of Transportation – Las Vegas
State of Nevada, Department of Transportation – Carson City
State of Nevada, Department of Wildlife
State of Nevada, Division of Forestry
State of Nevada, Division of Parks
State of Nevada, Land Use Planning Advisory Committee
State of Nevada Natural Heritage Program
Valley of Fire State Park

AMERICAN INDIAN TRIBES AND ORGANIZATIONS

Ak-Chin Indian Community
Chemehuevi Tribe
Colorado River Indian Tribes
Ft. Mojave Tribe
Ft. Yuma Quechan Tribe
Gila River Indian Community
Havasupai Tribe
Hopi Tribe
Hualapai Tribe
Kaibab Paiute Tribe
Las Vegas Paiute Tribe
Moapa Paiute Tribe
Pahrump Paiute Tribe
Paiute Indian Tribes of Utah
Salt River Pima-Maricopa Indian Community
Shivwits Band of Paiute
Yavapai-Prescott Indian Tribe
Zuni Tribe

LOCAL AND REGIONAL GOVERNMENT AGENCIES

City of Boulder City
- Office of the City Manager
- Office of the Mayor

City of Bullhead City, Office of the Mayor
City of Henderson
- City Manager's Office
- Department of Public Works
- Office of the Mayor
- Planning Department

City of Las Vegas
- City Council Chambers
- Community Planning and Development
- Department of Public Works
- Office of the Mayor
- Parks & Leisure Activities

City of North Las Vegas
- City Council Offices
- City Manager's Office
- Community Planning and Zoning
- Office of Economic Development
- Office of the Mayor

Clark County
- Community and Economic Development
- Comprehensive Planning
- Conservation District
- Office of the County Manager
- County Commissioners

Community Association of Meadview
Mohave County, Kingman
Regional Transportation Commission
Commission on Tourism – Southern Nevada

ORGANIZATIONS AND BUSINESSES

Arizona Wilderness Coalition
Arizona Wildlife Federation
Boulder City Chamber of Commerce
Callville Bay Resort
Citizen Alert
Clean Water Coalition
Cottonwood Cove Resort
Defenders of Wildlife
Desert Bighorn Council
Desert Research Institute
Desert Tortoise Council
East Las Vegas Citizen's Advisory Council
Echo Bay Resort
Environmental Defense Fund
Fraternity of the Desert Bighorn
Friends of Nevada Wilderness
Grand Canyon Trust
Lake Mead Ferry Service
Lake Mead RV Village
Lake Mohave Resort
Las Vegas Boat Harbor
Las Vegas Chamber of Commerce
Las Vegas Jeep Club
Maricopa Audubon Society
Meadview Civic Association
Mesquite Chamber of Commerce
Moapa Valley Chamber of Commerce
Mule Deer Foundation
Nevada Wildlife Federation
Nevada Wilderness Project
Northern Wild Sheep and Goat Council
Partners in Conservation
Partners in Parks
Red Rock Audubon Society
Sierra Club
- Las Vegas
- Southern Nevada Field Office

Southern Nevada Environmental Forum
Southern Utah Wilderness Alliance
Temple Bar Marina
The Nature Conservancy – Great Basin Field Office

The Nature Conservancy – Southern Nevada Project
The Wilderness Society
California/Nevada Office
Wilderness Watch
Southern Nevada Water Authority

LIBRARIES

Boulder City Library
Clark County Community College, North Las Vegas
Clark County Library, Las Vegas
Green Valley Library, Henderson
James I. Gibson Library, Henderson
Laughlin Library
Las Vegas Public Library
Meadview Community Library
Mesquite Library
Moapa Valley Library, Overton
Mohave County Library, Kingman
Mohave County Library, Lake Havasu City
Sahara West Library, Las Vegas
Searchlight Library
Sunrise Public Library, Las Vegas
University of Arizona Library, Tucson
University of Nevada – Las Vegas
Washington County Library, St. George

MEDIA

Television Stations
- KLAS
- KTNV
- KVVU
- KVBC

News Radio Station
- KDWN

Newspapers
- Las Vegas Review Journal
- Las Vegas Sun
- Boulder City News
- The Arizona Daily Sun

INDIVIDUALS

The list of individuals is available from Lake Mead National Recreation Area headquarters.

Appendixes, Selected References, Preparers

APPENDIX A: PUBLIC LAW 107-282 (ABBREVIATED)

CLARK COUNTY CONSERVATION OF PUBLIC LAND
AND NATURAL RESOURCES ACT OF
2002

Public Law 107-282
107th Congress

An Act

To establish wilderness areas, promote conservation, improve public land, and provide for high quality development in Clark County, Nevada, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Clark County Conservation of Public Land and Natural Resources Act of 2002."

SEC. 2. TABLE OF CONTENTS.

The table of contents of this Act is as follows:

SEC. 3. DEFINITIONS.

In this Act:

(1) AGREEMENT.--The term "Agreement" means the Agreement entitled "Interim Cooperative Management Agreement Between the United States of the Interior Bureau of Land Management and Clark County," dated November 4, 1992.

(2) COUNTY.--The term "County" means Clark County, Nevada.

(3) SECRETARY.--The term "Secretary" means--

(A) the Secretary of Agriculture with respect to land in the National Forest System; or

(B) the Secretary of the Interior, with respect to other Federal land.

(4) STATE.--The term "State" means the State of Nevada.

TITLE II--WILDERNESS AREAS

SEC. 201. FINDINGS.

The Congress finds that--

(1) public land in the County contains unique and spectacular natural resources, including--

(A) priceless habitat for numerous species of plants and wildlife; and

(B) thousands of acres of pristine land that remain in a natural state;

(2) continued preservation of those areas would benefit the County and all of the United States by-

(A) ensuring the conservation of ecologically diverse habitat;

(B) conserving primitive recreational resources; and

(C) protecting air and water quality.

SEC. 202. ADDITIONS TO NATIONAL WILDERNESS PRESERVATION SYSTEM.

(a) Additions.--The following land in the State is designated as wilderness and as components of the National Wilderness Preservation System:

(1) ARROW CANYON WILDERNESS.--Certain Federal land managed by the Bureau of Land Management, comprising approximately 27,530 acres, as generally depicted on the map entitled "Arrow Canyon," dated October 1, 2002, which shall be known as the "Arrow Canyon Wilderness."

(2) BLACK CANYON WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area and an adjacent portion of Federal land managed by the Bureau of Land Management, comprising approximately 17,220 acres, as generally depicted on the map entitled "Eldorado/Spirit Mountain," dated October 1, 2002, which shall be known as the "Black Canyon Wilderness."

(3) BRIDGE CANYON WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area, comprising approximately 7,761 acres, as generally depicted on the map entitled "Eldorado/Spirit Mountain," dated October 1, 2002, which shall be known as the "Bridge Canyon Wilderness."

(4) ELDORADO WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area and an adjacent portion of Federal land managed by the Bureau of Land Management, comprising approximately 31,950 acres, as generally depicted on the map entitled "Eldorado/Spirit Mountain," dated October 1, 2002, which shall be known as the "Eldorado Wilderness."

(5) IRETEBA PEAKS WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area and an adjacent portion of Federal land managed by the Bureau of Land Management, comprising approximately 32,745 acres, as generally depicted on the map entitled "Eldorado/Spirit Mountain," dated October 1, 2002, which shall be known as the "Ireteba Peaks Wilderness."

(6) JIMBILNAN WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area, comprising approximately 18,879 acres, as generally depicted on the map entitled "Muddy Mountains," dated October 1, 2002, which shall be known as the "Jimbilnan Wilderness."

(7) JUMBO SPRINGS WILDERNESS.--Certain Federal land managed by the Bureau of Land Management, comprising approximately 4,631 acres, as generally depicted on the map entitled "Gold Butte," dated October 1, 2002, which shall be known as the "Jumbo Springs Wilderness."

(8) LA MADRE MOUNTAIN WILDERNESS.--Certain Federal land within the Toiyabe National Forest and an adjacent portion of Federal land managed by the Bureau of Land Management, comprising

approximately 47,180 acres, as generally depicted on the map entitled "Spring Mountains," dated October 1, 2002, which shall be known as the "La Madre Mountain Wilderness."

(9) LIME CANYON WILDERNESS.--Certain Federal land managed by the Bureau of Land Management, comprising approximately 23,233 acres, as generally depicted on the map entitled "Gold Butte," dated October 1, 2002, which shall be known as the "Lime Canyon Wilderness."

(10) MT. CHARLESTON WILDERNESS ADDITIONS.--Certain Federal land within the Toiyabe National Forest and an adjacent portion of Federal land managed by the Bureau of Land Management, comprising approximately 13,598 acres, as generally depicted on the map entitled "Spring Mountains," dated October 1, 2002, which shall be included in the Mt. Charleston Wilderness.

(11) MUDDY MOUNTAINS WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area and an adjacent portion of land managed by the Bureau of Land Management, comprising approximately 48,019 acres, as generally depicted on the map entitled "Muddy Mountains," dated October 1, 2002, which shall be known as the "Muddy Mountains Wilderness."

(12) NELLIS WASH WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area, comprising approximately 16,423 acres, as generally depicted on the map entitled "Eldorado/Spirit Mountain," dated October 1, 2002, which shall be known as the "Nellis Wash Wilderness."

(13) NORTH MCCULLOUGH WILDERNESS.--Certain Federal land managed by the Bureau of Land Management, comprising approximately 14,763 acres, as generally depicted on the map entitled "McCulloughs," dated October 1, 2002, which shall be known as the "North McCullough Wilderness."

(14) PINTO VALLEY WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area, comprising approximately 39,173 acres, as generally depicted on the map entitled "Muddy Mountains," dated October 1, 2002, which shall be known as the "Pinto Valley Wilderness."

(15) RAINBOW MOUNTAIN WILDERNESS.--Certain Federal land within the Toiyabe National Forest and an adjacent portion of Federal land managed by the Bureau of Land Management, comprising approximately 24,997 acres, as generally depicted on the map entitled "Spring Mountains," dated October 1, 2002, which shall be known as the "Rainbow Mountain Wilderness."

(16) SOUTH MCCULLOUGH WILDERNESS.--Certain Federal land managed by the Bureau of Land Management, comprising approximately 44,245 acres, as generally depicted on the map entitled "McCulloughs," dated October 1, 2002, which shall be known as the "South McCullough Wilderness."

(17) SPIRIT MOUNTAIN WILDERNESS.--Certain Federal land within the Lake Mead National Recreation Area and an adjacent portion of Federal land managed by the Bureau of Land Management, comprising approximately 33,518 acres, as generally depicted on the map entitled "Eldorado/Spirit Mountain," dated October 1, 2002, which shall be known as the "Spirit Mountain Wilderness."

(18) WEE THUMP JOSHUA TREE WILDERNESS.--Certain Federal land managed by the Bureau of Land Management, comprising approximately 6,050 acres, as generally depicted on the map entitled "McCulloughs," dated October 1, 2002, which shall be known as the "Wee Thump Joshua Tree Wilderness."

(b) BOUNDARY.--

(1) LAKE OFFSET.--The boundary of any portion of a wilderness area designated by subsection (a) that is bordered by Lake Mead, Lake Mohave, or the Colorado River shall be 300 feet inland from the high water line.

(2) ROAD OFFSET.--The boundary of any portion of a wilderness area designated by subsection (a) that is bordered by a road shall be at least 100 feet from the edge of the road to allow public access.

(c) MAP AND LEGAL DESCRIPTION.--

(1) IN GENERAL.--As soon as practicable after the date of enactment of this Act, the Secretary shall file a map and legal description of each wilderness area designated by subsection (a) with the Committee on Resources of the House of Representatives and the Committee on Energy and Natural Resources of the Senate.

(2) EFFECT.--Each map and legal description shall have the same force and effect as if included in this section, except that the Secretary may correct clerical and typographical errors in the map or legal description.

(3) AVAILABILITY.--Each <<NOTE: Public inspection.>> map and legal description shall be on file and available for public inspection in the appropriate offices of the Bureau of Land Management, National Park Service, or U.S. Forest Service, as applicable.

(d) WITHDRAWAL.--Subject to valid existing rights, the wilderness areas designated in this section are withdrawn from--

(1) all forms of entry, appropriation, and disposal under the public land laws;

(2) location, entry, and patent under the mining laws; and

(3) operation of the mineral leasing, mineral materials, and geothermal leasing laws.

SEC. 203. ADMINISTRATION.

(a) MANAGEMENT.--Subject to valid existing rights, each area designated as wilderness by this title shall be administered by the Secretary in accordance with the Wilderness Act (16 U.S.C. 1131 et seq.), except that--

(1) any reference in that Act to the effective date shall be considered to be a reference to the date of enactment of this Act; and

(2) any reference in that Act to the Secretary of Agriculture shall be considered to be a reference to the Secretary of the Interior with respect to lands administered by the Secretary of the Interior.

(b) LIVESTOCK.--Within the wilderness areas designated under this title that are administered by the Bureau of Land Management, the grazing of livestock in areas in which grazing is established as of the date of enactment of this Act shall be allowed to continue, subject to such reasonable regulations, policies, and practices that the Secretary considers necessary, consistent with section 4(d)(4) of the Wilderness Act (16 U.S.C. 1133(d)(4)), including the guidelines set forth in Appendix A of House Report 101-405.

(c) INCORPORATION OF ACQUIRED LANDS AND INTERESTS.--Any land or interest in land within the boundaries of an area designated as wilderness by this title that is acquired by the United States after the date of enactment of this Act shall be added to and administered as part of the wilderness area within which the acquired land or interest is located.

(d) WATER RIGHTS.--

(1) FINDINGS.--Congress finds that--

(A) the lands designated as Wilderness by this Act are within the Mojave Desert, are arid in nature, and include ephemeral streams;

(B) the hydrology of the lands designated as wilderness by this Act is locally characterized by complex flow patterns and alluvial fans with impermanent channels;

(C) the subsurface hydrogeology of the region is characterized by ground water subject to local and regional flow gradients and artesian aquifers;

(D) the lands designated as wilderness by this Act are generally not suitable for use or development of new water resource facilities and there are no actual or proposed water resource facilities and no opportunities for diversion, storage, or other uses of water occurring outside such lands that would adversely affect the wilderness or other values of such lands; and

(E) because of the unique nature and hydrology of these desert lands designated as wilderness by this Act and the existence of the Clark County Multi-Species Habitat Conservation Plan it is possible to provide for proper management and protection of the wilderness, perennial springs and other values of such lands in ways
different from those used in other legislation.

(2) STATUTORY CONSTRUCTION.--

(A) Nothing in this Act shall constitute or be construed to constitute either an express or implied reservation by the United States of any water or water rights with respect to the lands designated as Wilderness by this Act.

(B) Nothing in this Act shall affect any water rights in the State of Nevada existing on the date of the enactment of this Act, including any water rights held by the United States.

(C) Nothing in this subsection shall be construed as establishing a precedent with regard to any future wilderness designations.

(D) Nothing in this Act shall be construed as limiting, altering, modifying, or amending any of the interstate compacts or equitable apportionment decrees that apportion water among and between the State of Nevada and other States.

(E) Nothing in this subsection shall be construed as limiting, altering, modifying, or amending the Clark County Multi-Species Habitat Conservation Plan (MSHCP) with respect to the lands designated as Wilderness by this Act including the MSHCP's specific management actions for the conservation of perennial springs.

(3) NEVADA WATER LAW.--The Secretary shall follow the procedural and substantive requirements of the law of the State of Nevada in order to obtain and hold any water rights not in existence on the date of enactment of this Act with respect to
the wilderness areas designated by this Act.

(4) NEW PROJECTS.--

(A) As used in this paragraph, the term "water resource" facility means irrigation and pumping facilities, reservoirs, water conservation works, aqueducts, canals, ditches, pipelines, wells, hydropower projects, and transmission and other ancillary facilities, and other water diversion, storage, and carriage structures. The term "water resource" facility does not include wildlife guzzlers.

(B) Except as otherwise provided in this Act, on and after the date of the enactment of this Act, neither the President nor any other officer, employee, or agent of the United States shall fund, assist, authorize, or issue a license or permit for the development of any new water resource facility within the wilderness areas designated by this Act.

SEC. 204. ADJACENT MANAGEMENT.

(a) IN GENERAL.--Congress does not intend for the designation of wilderness in the State pursuant to this title to lead to the creation of protective perimeters or buffer zones around any such wilderness area.

(b) NONWILDERNESS ACTIVITIES.--The fact that nonwilderness activities or uses can be seen or heard from areas within a wilderness designated under this title shall not preclude the conduct of those activities or uses outside the boundary of the wilderness area.

SEC. 205. MILITARY OVERFLIGHTS.

Nothing in this title restricts or precludes--

(1) low-level overflights of military aircraft over the areas designated as wilderness by this title, including military overflights that can be seen or heard within the wilderness areas;

(2) flight testing and evaluation; or

(3) the designation or creation of new units of special use airspace, or the establishment of military flight training routes, over the wilderness areas.

SEC. 206. NATIVE AMERICAN CULTURAL AND RELIGIOUS USES.

Nothing in this Act shall be construed to diminish the rights of any Indian Tribe. Nothing in this Actshall be construed to diminish tribal rights regarding access to Federal lands for tribal activities, including spiritual, cultural, and traditional food-gathering activities.

SEC. 208. WILDLIFE MANAGEMENT.

(a) IN GENERAL.--In accordance with section 4(d)(7) of the Wilderness Act (16 U.S.C. 1133(d)(7)), nothing in this title affects or diminishes the jurisdiction of the State with respect to fish and wildlife management, including the regulation of hunting, fishing, and trapping, in the wilderness areas designated by this title.

(b) MANAGEMENT ACTIVITIES.--In furtherance of the purposes and principles of the Wilderness Act, management activities to maintain or restore fish and wildlife populations and the habitats to support such populations may be carried out within wilderness areas designated by this title where consistent with relevant wilderness management plans, in accordance with appropriate policies such as those set

forth in Appendix B of House Report 101-405, including the occasional and temporary use of motorized vehicles, if such use, as determined by the Secretary, would promote healthy, viable, and more naturally distributed wildlife populations that would enhance wilderness values and accomplish those purposes with the minimum impact necessary to reasonably accomplish the task.

(c) EXISTING ACTIVITIES.--Consistent with section 4(d)(1) of the Wilderness Act (16 U.S.C. 1133(d)) and in accordance with appropriate policies such as those set forth in Appendix B of House Report 101-405, the State may continue to use aircraft, including helicopters, to survey, capture, transplant, monitor, and provide water for wildlife populations, including bighorn sheep, and feral stock, horses, and burros.

(d) WILDLIFE WATER DEVELOPMENT PROJECTS.--Subject to subsection (f), the Secretary shall, authorize structures and facilities, including existing structures and facilities, for wildlife water development projects, including guzzlers, in the wilderness areas designated by this title if--

(1) the structures and facilities will, as determined by the Secretary, enhance wilderness values by promoting healthy, viable and more naturally distributed wildlife populations; and

(2) the visual impacts of the structures and facilities on the wilderness areas can reasonably be minimized.

(e) HUNTING, FISHING, AND TRAPPING.--The Secretary may designate by regulation areas in consultation with the appropriate State agency (except in emergencies), in which, and establish periods during which, for reasons of public safety, administration, or compliance with applicable laws, no hunting, fishing, or trapping will be permitted in the wilderness areas designated by this title.

(f) COOPERATIVE AGREEMENT.--No later than one year after the date of enactment of this Act, the Secretary shall enter into a cooperative agreement with the State of Nevada. The cooperative agreement shall specify the terms and conditions under which the State (including a designee of the State) may use wildlife management activities in the wilderness areas designated by this title.

SEC. 209. WILDFIRE MANAGEMENT.

Consistent with section 4 of the Wilderness Act (16 U.S.C. 1133), nothing in this title precludes a Federal, State, or local agency from conducting wildfire management operations (including operations using aircraft or mechanized equipment) to manage wildfires in the wilderness areas designated by this title.

SEC. 210. CLIMATOLOGICAL DATA COLLECTION.

Subject to such terms and conditions as the Secretary may prescribe, nothing in this title precludes the installation and maintenance of hydrologic, meteorologic, or climatological collection devices in the wilderness areas designated by this title if the facilities and access to the facilities are essential to flood warning, flood control, and water reservoir operation activities.

SEC. 211. NATIONAL PARK SERVICE LANDS.

To the extent any of the provisions of this title are in conflict with laws, regulations, or management policies applicable to the National Park Service for Lake Mead National Recreation Area, those laws, regulations, or policies shall control.

APPENDIX B:
MINIMUM REQUIREMENT DECISION PROCESS FOR NPS LANDS

THE MINIMUM REQUIREMENT DECISION PROCESS – PART I

Produce any required documentation on separate sheets.

Step 1

Determine whether the proposed action or components of the program takes place in designated wilderness, suitable, or potential wilderness.

In general, wilderness boundaries fall 100 feet from the center line of all paved and approved backcountry roads, and 300 feet from the high water elevation of Lakes Mead and Mohave.

If you are unsure if your proposed action would occur within wilderness boundaries, contact the wilderness coordinator.

Suitable and potential wilderness also exists within the recreation area. Lands designated as suitable or potential wilderness additions shall be managed by the Secretary insofar as practicable as wilderness until such time as said lands are designated as wilderness and will require the minimum requirement analysis.

If the proposed action will take place in designated, suitable, or potential wilderness, proceed to step 2.

If the proposed action or program will not take place in wilderness, suitable, or potential wilderness, proceed with the compliance review process.

Step 2

Determine whether the proposed action or program is required for the administration of the wilderness.

Director's Order 41 states: "In order to allow a prohibited activity, the activity must be necessary to manage the area as wilderness."

The action must also comply with all other applicable laws and policies

If the action is not required for the administration of the area, it is not allowed.

If the action is required for the administration of the area, document what wilderness management objective (see Director's Order 41) is being met and why this action is essential to meet that objective. Proceed to step 3.

Step 3

Determine if the objectives of the proposed action can be met with actions outside of wilderness.

Consider:

- Can the objective be met outside of wilderness?
- Will increased educational efforts help attain the objective?
- Will a reduction in visitor use (through disincentives, quota reductions, or closures) eliminate or reduce the need for the action? If so, will that reduction be an acceptable impact on the visitor experience?

If the objectives of the proposed action can be met with actions outside of, proceed with compliance process and conduct action outside of wilderness.

If the objectives of the proposed action cannot be met outside of wilderness, document the reasons and proceed to step 4.

Step 4

Develop a list of alternatives to meet the objective of the proposed action. Include ways to reduce or mitigate the impacts of each alternative.

Alternatives should be detailed and specific and include a no-action alternative.

Proposed actions that use motorized equipment or mechanized transport should include, at least the following alternatives: 1) no-action, 2) action using only nonmotorized equipment and nonmechanized transport, 3) action using motorized equipment and mechanized transport, and 4) some mixture of 1, 2, and 3. Or, provide justifications to rule out the alternatives.

Again, the preservation of wilderness resources and character will be given significantly more weight than economic efficiency and convenience.

If a compromise of wilderness character is unavoidable, only those actions that preserve wilderness character and/or have localized short-term adverse impacts will be accepted.

Proposed actions that do not use motorized equipment or mechanized transport should still include a range of alternatives that include varying degrees of administrative intrusion on wilderness character.

Consider ways to reduce or mitigate the impacts of each alternative:

- Can the action be timed to minimize impacts on the visitor experience or ecological health?
- Do your alternatives include all available options, tools and techniques?
- Can increased education help mitigate the impacts of the action?
- Can reduced use mitigate the impacts of the action?

List each alternative along with any applicable mitigation measures.

Step 5

Determine the effects of each alternative on wilderness health and character. Include cumulative effects.

Consider:

1. Biophysical effects
   - Describe any effects this action will have on the ecological health of the area, including air and water quality, vegetation, wildlife, introduction of nonnative species, erosion, siltation, wetlands, and rare, threatened, endangered, or sensitive species. Include both biological and physical effects. Consult subject matter experts as needed.
   - In potential wilderness additions, describe whether this action will make restoration to a wilderness condition more difficult when the area is designated as wilderness.

2. Experiential effects
   - Describe any effects this action will have on the experience of wilderness visitors. Consider the effects on the opportunity for solitude, natural quiet, self-reliance, surprise, and discovery.
   - Describe any effect this action will have on the natural appearance of the area.

3. Effects on wilderness character
   - Describe any interference with natural processes, constraints on the freedom of wildlife or visitors, increase of management presence, or other reduction of wildness that this action may cause.

Proceed to step 6 before documenting these effects.

Step 6

Determine the management concerns of each alternative.

Consider:

1. Health and safety concerns
   - Describe any health and safety concerns associated with this action. Include health and safety considerations of both employees and the public.

2. Societal / political / economic effects
   - Describe any political considerations such as memorandums of agreement, agency agreements, etc. that may be affected by this action.

– Estimate the economic costs of this action.

Describe the effects of each alternative as determined in steps 5 and 6. Quantify these effects when possible, and describe whether the effects are short- or long-term, adverse or beneficial, and localized or far-reaching.

Step 7

Choose a preferred alternative.

NPS management policies states:

"Potential disruption of wilderness character and resources and applicable safety concerns will be considered before, and given significantly more weight than, economic efficiency. If some compromise of wilderness resources or character is unavoidable, only those actions that have localized, short-term adverse impacts will be acceptable."

Using the information developed in steps 5 and 6, and using the law and policy guidelines presented in this document, choose a preferred action and carefully justify in writing your reasons for choosing this alternative. Submit this document to the wilderness coordinator when completed.

Step 8 (to be completed by environmental compliance specialist)

Proceed with appropriate NEPA compliance pathway.

Coordinate with environmental compliance specialist.

Step 9 (to be completed by environmental compliance specialist)

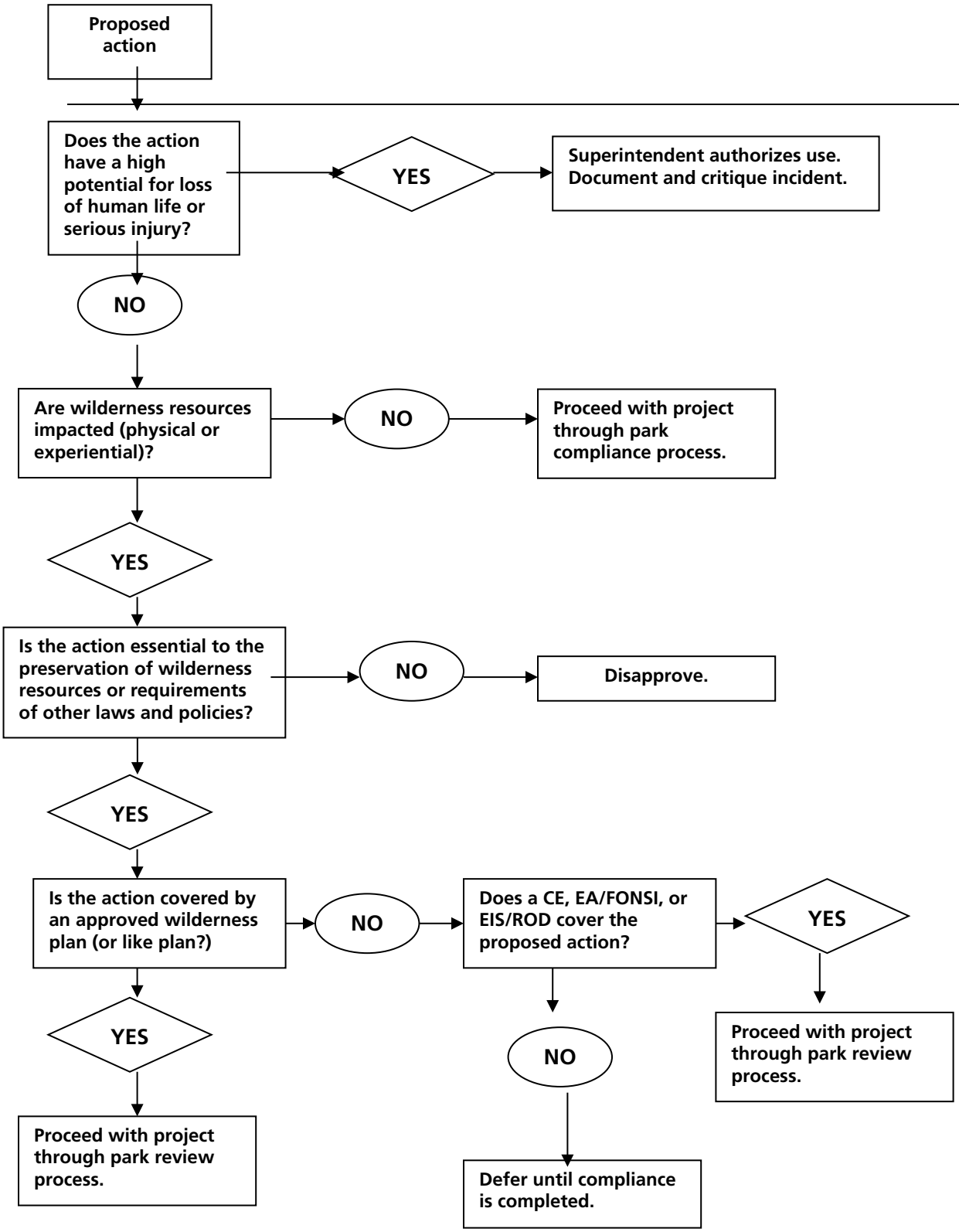
Proceed with notification and superintendent sign-off.

Following park staff reviews and appropriate environmental compliance, including public and agency notification:

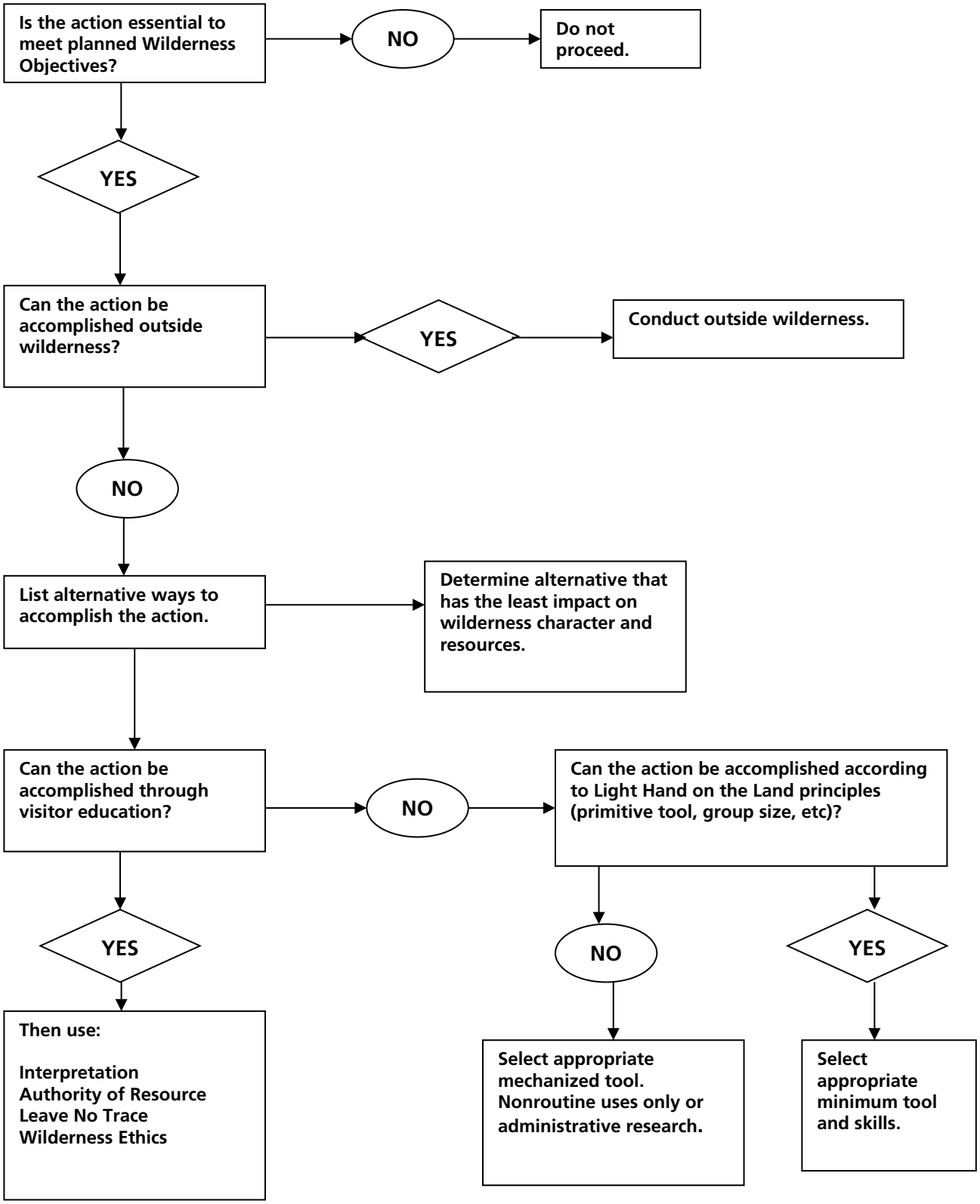
- Complete the Wilderness Project Review and Approval form.
- Complete the Proposed Action Summary Notice for an Action Within a Wilderness Area and provide to interested (commenting) parties and adjacent land management agencies (i.e., jointly managed wilderness units).
- Include these forms and the record of public notification in the compliance administrative record.

Flow Charts and Screening Questions

Minimum Tool Requirement Analysis
Part 1



Minimum Tool Requirement Analysis
Part 2



Minimum Requirement Analysis
Decision Screening Questions

These questions can help you evaluate your proposed action and complete the minimum requirement analysis.

1. Does your action insure that wilderness is not occupied and modified?

2. Does your action maintain or move the wilderness toward less human influence within legal constraints?

3. Does your rationale allow wilderness to retain solitude and elements of surprise and discovery?

4. Did you evaluate the traps of making decisions based on economy, convenience, comfort, or commercial value?

5. Did you look beyond the short-term outputs to ensure that future generations will be able to use and enjoy the benefits of an enduring resource of wilderness?

6. Does the alternative support the wilderness resource in its entirety rather than maximizing an individual resource?

7. Do you recognize the unique characteristics for this particular wilderness?

8. Does the action prevent the effects of human activities from dominating natural conditions and processes?

(To be completed by Environmental Compliance Specialist)

Proposed Action Summary Notice
Action within a Wilderness Area
Lake Mead National Recreation Area

Notice Date: Proposed Action Date:

Wilderness Name:

State: Designated Suitable Potential (circle one)

Notification Period Begins: Notification Period Ends:

Location within Wilderness:

Summary of Proposed Action:

(To be completed by Environmental Compliance Specialist)

Project Review and Approval Form for Activities in Wilderness

Proposed Action _____

Location / Wilderness Unit _____

Project Proponent _____

Check one:

- ❑ The proposed action is a temporary, one-time activity.
- ❑ The proposed action will be an ongoing, long-term activity.

Reviewed By:

_____

Environmental Compliance Specialist Date

Reviewed By:

_____

Wilderness Coordinator Date

Approved By:

_____

Superintendent Date

APPENDIX C:
MINIMUM REQUIREMENTS DECISION PROCESS FOR BLM LANDS

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE

WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

-- The Wilderness Act of 1964

Project Title:

MRDG STEP 1

Determine if Administrative Action is Necessary

Description of the Situation

What is the situation that may prompt administrative action?

Options Outside of Wilderness

Can action be taken outside of wilderness that adequately addresses the situation?

☐ YES

☐ NO

Explain:

Criteria for Determining Necessity

Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that ***requires*** *action? Cite law and section.*

☐ YES ☐ NO

Explain:

B. Requirements of Other Legislation

Is action necessary to meet the requirements of other federal laws? Cite law and section.

☐ YES ☐ NO

Explain:

C. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Unique Attributes or Other Features?

UNTRAMMELED

☐ YES ☐ NO

Explain:

MRDG Workbook: STEP 1 Page 3 of 38

UNDEVELOPED

☐ YES ☐ NO

Explain:

NATURAL

☐ YES ☐ NO

Explain:

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

☐ YES ☐ NO

Explain:

OTHER FEATURES OF VALUE

☐ YES ☐ NO

Explain:

Step 1 Decision

Is administrative action necessary in wilderness?

Decision Criteria	Summary Responses
A. Existing Rights or Special Provisions	Action IS NOT necessary to meet this criterion.
B. Requirements of Other Legislation	Action IS NOT necessary to meet this criterion.
C. Wilderness Character	
Untrammeled	Action IS NOT necessary to meet this criterion.
Undeveloped	Action IS NOT necessary to meet this criterion.
Natural	Action IS NOT necessary to meet this criterion.
Outstanding Opportunities	Action IS NOT necessary to meet this criterion.
Other Features of Value	Action IS NOT necessary to meet this criterion.

Is administrative action necessary in wilderness?

☐ YES

☐ NO

Explain:

MRDG Workbook: STEP 1 Page 6 of 38

Project Title:

MRDG STEP 2

Determine the Minimum Activity

Other Direction

Is there "special provisions" language in legislation (or other Congressional direction) that explicitly ***allows*** *consideration of a use otherwise prohibited by Section 4(c)?*

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

☐ YES

☐ NO

Describe Documents & Direction:

MRDG Workbook STEP 2 7 of 38

Components of the Action

What are the discrete components or phases of the action?

Component X	*Example: Transportation of personnel to the project site*
Component 1	
Component 2	
Component 3	
Component 4	
Component 5	
Component 6	
Component 7	
Component 8	
Component 9	

Proceed to the alternatives.

Refer to the **MRDG Instructions** regarding alternatives and the effects to each of the comparison criteria.

Project Title:

MRDG Step 2: Alternatives

Alternative 1:

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

MRDG Workbook: ALT 1 9 of 38

Component Activities

How will each of the components of the action be performed under this alternative?

	Component of the Action	Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1		
2		
3		
4		
5		
6		
7		
8		
9		

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Untrammeled Total Rating			0	

Explain:

MRDG Workbook: ALT 1 11 of 38

UNDEVELOPED

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Undeveloped Total Rating			0	

Explain:

MRDG Workbook: ALT 1 12 of 38

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Natural Total Rating			0	

Explain:

MRDG Workbook: ALT 1 13 of 38

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Solitude or Primitive & Unconfined Recreation Total Rating			0	

Explain:

MRDG Workbook: ALT 1 14 of 38

OTHER FEATURES OF VALUE

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Other Features of Value Total Rating			0	

Explain:

MRDG Workbook: ALT 1 15 of 38

Other Criteria

What is the effect of each component activity on other comparison criteria? What mitigation measures will be taken?

MAINTAINING TRADITIONAL SKILLS

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☑	☐	☐
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Maintaining Traditional Skills Total Rating			0	

Explain:

MRDG Workbook: ALT 1 16 of 38

SPECIAL PROVISIONS

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Special Provisions Total Rating			0	

Explain:

MRDG Workbook: ALT 1 17 of 38

ECONOMICS & TIME CONSTRAINTS

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Economics & Time Contraints Total Rating			0	

Explain:

MRDG Workbook: ALT 1 18 of 38

Safety of Visitors & Workers

What is the effect of each component activity on the safety of visitors and workers? What mitigation measures will be taken?

SAFETY OF VISITORS & WORKERS

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Safety of Visitors & Workers Total Rating			0	

Explain:

MRDG Workbook: ALT 1 19 of 38

Summary Ratings for Alternative 1

Wilderness Character	
Untrammeled	0
Undeveloped	0
Natural	0
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
Wilderness Character Summary Rating	0

Other Criteria	
Maintaining Traditional Skills	0
Special Provisions	0
Economics & Time Constraints	0
Other Criteria Summary Rating	0

Safety	
Safety of Visitors & Workers	0
Safety Summary Rating	0

Project Title:

MRDG Step 2: Alternatives

Alternative 2:

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

MRDG Workbook: ALT 2

21 of 38

Component Activities

How will each of the components of the action be performed under this alternative?

	Component of the Action	Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1		
2		
3		
4		
5		
6		
7		
8		
9		

MRDG Workbook: ALT 2 22 of 38

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Untrammeled Total Rating			0	

Explain:

MRDG Workbook: ALT 2 23 of 38

UNDEVELOPED

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Undeveloped Total Rating			0	

Explain:

MRDG Workbook: ALT 2 24 of 38

NATURAL

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Natural Total Rating			0	

Explain:

MRDG Workbook: ALT 2 25 of 38

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Solitude or Primitive & Unconfined Recreation Total Rating			0	

Explain:

MRDG Workbook: ALT 2 26 of 38

OTHER FEATURES OF VALUE

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Other Features of Value Total Rating			0	

Explain:

MRDG Workbook: ALT 2 27 of 38

Other Criteria

What is the effect of each component activity on other comparison criteria? What mitigation measures will be taken?

MAINTAINING TRADITIONAL SKILLS

Component Activity for this Alternative		Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☑	☐	☐
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Maintaining Traditional Skills Total Rating			0	

Explain:

MRDG Workbook: ALT 2 28 of 38

SPECIAL PROVISIONS

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Special Provisions Total Rating			0	

Explain:

MRDG Workbook: ALT 2 29 of 38

ECONOMICS & TIME CONSTRAINTS

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Economics & Time Contraints Total Rating			0	

Explain:

MRDG Workbook: ALT 2 30 of 38

Safety of Visitors & Workers

What is the effect of each component activity on the safety of visitors and workers? What mitigation measures will be taken?

SAFETY OF VISITORS & WORKERS

	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☑
1		☐	☐	☐
2		☐	☐	☐
3		☐	☐	☐
4		☐	☐	☐
5		☐	☐	☐
6		☐	☐	☐
7		☐	☐	☐
8		☐	☐	☐
9		☐	☐	☐
Totals		0	0	NE
Safety of Visitors & Workers Total Rating			0	

Explain:

MRDG Workbook: ALT 2 31 of 38

Summary Ratings for Alternative 2

Wilderness Character	
Untrammeled	0
Undeveloped	0
Natural	0
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
Wilderness Character Summary Rating	0

Other Criteria	
Maintaining Traditional Skills	0
Special Provisions	0
Economics & Time Constraints	0
Other Criteria Summary Rating	0

Safety	
Safety of Visitors & Workers	0
Safety Summary Rating	0

Project Title:

MRDG STEP 2: Alternatives Not Analyzed

Alternatives Not Analyzed

What alternatives were considered but not analyzed? Why were they not analyzed?

Project Title:

MRDG Step 2: Alternative Comparison

Alternative 1:

Alternative 2:

Alternative 3:

Alternative 4:

Wilderness Character	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Untrammeled	0	0	0	0	0	0	0	0
Undeveloped	0	0	0	0	0	0	0	0
Natural	0	0	0	0	0	0	0	0
Solitude or Primitive & Unconfined Rec.	0	0	0	0	0	0	0	0
Other Features of Value	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0
Wilderness Character Rating	0		0		0		0	

Other Criteria	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Maintaining Traditional Skills	0	0	0	0	0	0	0	0
Special Provisions	0	0	0	0	0	0	0	0
Economics & Time Constraints	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0
Other Criteria Rating	0		0		0		0	

Safety	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Safety of Visitors & Workers	0	0	0	0	0	0	0	0
Safety Rating	0		0		0		0	

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Alternative 5:

Alternative 6:

Alternative 7:

Alternative 8:

Wilderness Character	Alternative 5		Alternative 6		Alternative 7		Alternative 8	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Untrammeled	0	0	0	0	0	0	0	0
Undeveloped	0	0	0	0	0	0	0	0
Natural	0	0	0	0	0	0	0	0
Solitude or Primitive & Unconfined Rec.	0	0	0	0	0	0	0	0
Other Features of Value	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0
Wilderness Character Rating	0		0		0		0	

Other Criteria	Alternative 5		Alternative 6		Alternative 7		Alternative 8	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Maintaining Traditional Skills	0	0	0	0	0	0	0	0
Special Provisions	0	0	0	0	0	0	0	0
Economics & Time Constraints	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	0
Other Criteria Rating	0		0		0		0	

Safety	Alternative 5		Alternative 6		Alternative 7		Alternative 8	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Safety of Visitors & Workers	0	0	0	0	0	0	0	0
Safety Rating	0		0		0		0	

MRDG Workbook: ALT COMPARISON 35 of 38

Project Title:

MRDG Step 2: Decision

Refer to the **MRDG Instructions** before identifying the selected alternative and explaining the rationale for the selection.

Selected Alternative

Alternative 1:	☐	
Alternative 2:	☐	
Alternative 3:	☐	
Alternative 4:	☐	
Alternative 5:	☐	
Alternative 6:	☐	
Alternative 7:	☐	
Alternative 8:	☐	

Explain Rationale for Selection:

If more space is needed, continue on the next page…

Explain Rationale for Selection, Continued:

Describe Monitoring & Reporting Requirements:

Approval of Prohibited Uses

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

Prohibited Use	Quantity
☐ Mechanical Transport	
☐ Motorized Equipment	
☐ Motor Vehicles	
☐ Motorboats	
☐ Landing of Aircraft	
☐ Temporary Roads	
☐ Structures	
☐ Installations	

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance.

Refer to agency policies for the following review and decision authorities:

Prepared	Name	Position	
	Signature		Date
Recommended	Name	Position	
	Signature		Date
Recommended	Name	Position	
	Signature		Date
Approved	Name	Position	
	Signature		Date

APPENDIX D: CONSULTATION LETTERS

(This section to be completed by Fish and Wildlife Service) **File No. 84320-2008-I-0470**

Fish and Wildlife Service response:

If the agency determines that the proposed action *is not likely to adversely affect* the desert tortoise, Fish and Wildlife Service:

__XX__ concurs ____ does not concur with this determination.

Justification for response:

The Service concurs with the National Park Service's (NPS) determination that approving Wilderness Management Plans for eight wilderness areas on NPS and Bureau of Land Management lands "may affect, but is not likely to adversely affect" the desert tortoise. Our concurrence is based on the following:

- The net effects of the proposed action on the desert tortoise are anticipated to beneficial.
- Most actions will not involve take of desert tortoise and involve establishing: entry points to wilderness, turn-around areas, parking areas, sign and kiosk installation, etc.
- Any actions that would involve substantial surface disturbance and any potential to involve take of desert tortoise will be evaluated by NPS and/or BLM and the appropriate level of consultation will be followed which may involve formal consultation with the Service.
- Measures have been proposed by NPS and BLM to avoid adverse effects to desert tortoise as stated on page 4 of this form, including pre-disturbance surveys, provision of a desert tortoise education program, implementation of speed limits, rehabilitation of disturbed areas, and implementation of a litter-control program.

Conclusion: This response constitutes informal consultation under regulations promulgated in 50 CFR § 402.14, which establish procedures governing interagency consultation under section 7 of the Endangered Species Act of 1973, as amended. This informal consultation does not authorize any take of any listed species. NPS and BLM should evaluate all actions proposed to occur in association with the wilderness plans. Any action that may result in adverse effects to listed species are beyond the scope of this informal consultation and may require formal section 7 consultation with the Service. If you have any questions, please contact Michael Burroughs, in the Nevada Fish and Wildlife Office in Las Vegas at (702) 515-5230.

Signature (Service official): Amy McCavoy **Date:** 9/12/08

for Robert D. Williams, Field Supervisor

cc:

Assistant Field Manager, Division of Recreation and Renewable Resources, Las Vegas Field Office Bureau of Land Management, Las Vegas, Nevada

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United States Department of the Interior

NATIONAL PARK SERVICE

LAKE MEAD NATIONAL RECREATION AREA
601 NEVADA WAY
BOULDER CITY, NEVADA 89005

IN REPLY REFER TO

L3031 (LAME-RM)

August 13, 2008

Mr. Ronald M. James
State Historic Preservation Officer
Nevada Office of Historic Preservation
100 North Stewart Street
Carson City, NV 89701

Re: Lake Mead Wilderness Management Plan

Dear Mr. James:

In accordance with Section 106 of the National Historic Preservation Act of 1966, amended, and the Advisory Council's Regulations, 36 CFR Part 800, the National Park Service seeks your comments and consultation regarding a proposed undertaking to write a Wilderness Plan for Designated Wilderness Areas at Lake Mead National Recreation Area in Clark County, Nevada. The wilderness areas that will be covered by this plan (shown on the enclosed map) are the Jimbilnan Wilderness, Pinto Valley Wilderness, Black Canyon Wilderness, Eldorado Wildereness, Ireteba Peaks Wilderness, Nellis Wash Wilderness, Spirit Mountain Wilderness, and Bridge Canyon Wilderness. The purpose of this long-term, comprehensive plan is to define the overall management direction for these designated wilderness areas located primarily within the recreation area's boundary.

The process of developing a plan such as this follows a series of prescribed steps. The process is deliberate and intended to build consensus among the many participants, assure consistency in plan proposals, and provide for rational decision making. The planning team will comprehensively analyze the wilderness areas' cultural and natural resources, adjacent land uses, and local and national trends. This analysis will provide a philosophical framework and management zoning to guide resources management.

Public involvement from all constituencies will be sought throughout the course of the planning process. Federal, state, and local agencies, as well as wilderness interest groups and the general public, will be invited to review the plan. In addition, the park is consulting with several tribes in the area, including the Chemhuevi, the Fort Yuma Quechan, the Havasupai, the Hopi, the Haulapai, the Pauites, the Salt River Pima-Maricopa, the Yavapai, the Ak-Chin, the Zuni, the Colorado River Indian Tribe, the Fort Mojave Tribe, and the Gila River Indian Community.

Three of the above wilderness areas (Ireteba, Eldorado, and Spirit Mountain) include some Bureau of Land Management (BLM) lands. The BLM is an active participant in the planning process for these wilderness areas and will be included throughout the planning effort.

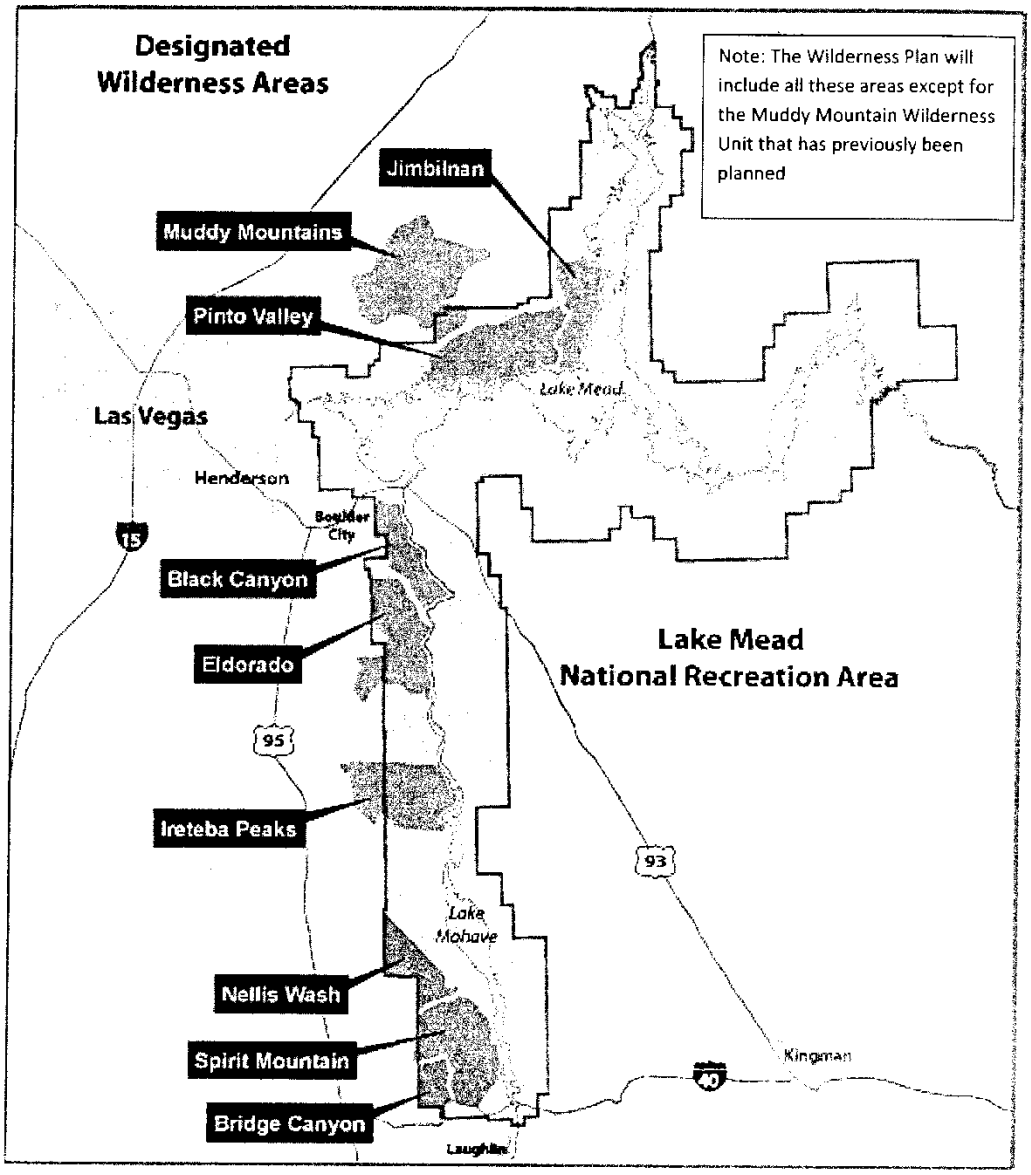
We look forward to your participation. As we conduct the public scoping process and begin writing the plan and environmental assessment, we will seek your comments. If you have any questions please contact Park Archaeologist Steve Daron at (702) 293-8859.

Sincerely,

William K. Dickinson
Superintendent

Enclosure

cc:
Greg Jarvis, Project Manager
National Park Service
Denver Service Center
P.O. Box 25287
Denver, Colorado 80225-0287


Designated
Wilderness Areas
Note: The Wilderness Plan will include all these areas except for the Muddy Mountain Wilderness Unit that has previously been planned
Jimbilnan
Muddy Mountains
Pinto Valley
Lake Mead
Las Vegas
Henderson
Boulder City
15
Black Canyon
Eldorado
Lake Mead
National Recreation Area
95
Ireteba Peaks
93
Lake
Mohave
Nellis Wash
Spirit Mountain
Kingman
40
Bridge Canyon
Laughlin

United States Department of the Interior

NATIONAL PARK SERVICE

LAKE MEAD NATIONAL RECREATION AREA
601 NEVADA HIGHWAY
BOULDER CITY, NEVADA 89005

IN REPLY REFER TO:
H3030(LAME-RM)

August 1, 2008

Dear_____:

You are invited to attend a meeting with the National Park Service, Lake Mead National Recreation Area (NRA) and affiliated tribes at the AVI Hotel and Casino, Fort Mojave Room, in Laughlin, Nevada on Thursday, September 11, 2008, at 9:00 am.

The designation of wilderness areas within the park and increased visitation to Lake Mead NRA since the 1986 General Management Plan was completed has prompted planning for park designated wilderness as well as the preparation of development concept plans (DCPs) for both Cottonwood Cove and Katherine Landing developed areas on Lake Mohave. We have included a map of the designated wilderness areas for your reference. Topics of discussion will include but are not limited to:

- Visitor impacts on Grapevine Canyon petroglyph site and Spirit Mountain
- Recreation in designated wilderness areas
- Interpretation and outreach
- Fire
- Restoration of disturbed areas
- Prevention and control of non-native species
- Expansion and improvements to Cottonwood Cove and Katherine Landing developed areas.

Your input will be important to the Wilderness and DCP planning processes. Please contact Park Planner Jim Holland at the Lake Mead NRA address above or by phone at 702-293-8986, if you plan to attend. We hope to see you there.

Sincerely,

William K. Dickinson
Enclosure (1)

APPENDIX E:
MEMORANDA OF UNDERSTANDING WITH THE NEVADA DEPARTMENT OF WILDLIFE

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Nevada State Office
1340 Financial Boulevard
Reno, Nevada 89502-7147
http://www.blm.gov/nv
December 19, 2012

In Reply Refer To:
6300 (NV930) I

EMS TRANSMISSION 12/19/12
Information Bulletin: No NV-2013-006

To: District Managers, Nevada

From: State Director

Subject: Transmittal of an amendment (Supplement 9) to the Memorandum of Understanding between the Bureau of Land Management and the Nevada Department of Wildlife

This bulletin transmits the final, signed state-level amendment to the Memorandum of Understanding (MOU) between the Bureau of Land Management (BLM) and the Nevada Department of Wildlife (NDOW) known as Supplement No. 9. This supplement to the MOU became effective upon its signing.

The supplement to the MOU is intended to provide guidance and procedures regarding the management of wildlife in designated BLM Wilderness Areas within the state of Nevada.

Please transmit the MOU to field offices and ensure its implementation.

Signed by:
Amy Lueders
State Director

Authenticated by:
Edison Garcia
Staff Assistant

Attachment
1-BLM-NDOW MOU Final Amendment Supplement No.9 (13 pp)

BLM MOU 6300-NV930-0402

AMENDMENT TO

MEMORANDUM OF UNDERSTANDING

Between:

THE BUREAU OF LAND MANAGEMENT

And

THE NEVADA DEPARTMENT OF WILDLIFE

Supplement No. 9

Wildlife Management in Nevada BLM Wilderness Areas

I. Purpose.

The purpose of this Memorandum of Understanding (MOU), Supplement No. 9, is to provide guidance and procedures for coordination and cooperation between the Bureau of Land Management (BLM) and the Nevada Department of Wildlife (NDOW) regarding the management of wildlife in designated BLM Wilderness Areas within the State of Nevada.

II. Objective.

The BLM and the NDOW are committed to the maintenance and restoration of fish and wildlife populations and habitats in Nevada within the jurisdictions of their respective agencies. Coordination and cooperation between the BLM and the NDOW, where

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jurisdictions involve designated Wilderness, is essential in order that BLM and NDOW may accomplish their respective missions relating to management of fish and wildlife and their habitats as well as the Congressional mandate to manage Wilderness Areas under the Wilderness Act of 1964.

III. Authorities.

A. Section 307(b) of the *Federal Land Policy and Management Act of 1976*, 43 U.S.C. 1737.

B. Nevada Revised Statutes (NRS) 501.105 and 501.331 whereby the NDOW is responsible for administering the policies and regulations necessary for the preservation, protection, management and restoration of wildlife within the State of Nevada.

C. NRS 501.351 and NRS 277.045 provide NDOW the authority to enter into cooperative and reciprocal agreements.

D. NRS 503.584 – 503.589 directs NDOW to cooperate with other states and legal entities to the maximum extent practicable for the conservation, protection, restoration and propagation of species of native fish, wildlife and other fauna that are threatened with extinction.

E. *Fish and Wildlife Coordination Act, 16 U.S.C. 661.*

F. *The Wilderness Act of 1964* (P.L. 88-577), 16 U.S.C. 1131-1136 as amended.

G. *Nevada Wilderness Protection Act of 1989* (P.L. 101-195).

H. *Black Rock Desert – High Rock Canyon Emigrant Trails National Conservation Act of 2000* (P.L. 106-554) as amended by P.L. 107-63 of 2001.

I. *Clark County Conservation of Public Land and Natural Resources Act of 2002* (P.L. 107-282).

J. *Sikes Act of 1960*, as amended, (P.L. 86-797), 16 U.S.C. 670g-6701, 670o.

K. Congressional Wildlife Management Guidelines agreed to by the International Association of Fish and Wildlife Agencies, the Wildlife Management Institute, the BLM, and the USFS, approved by the House Committee on Interior and Insular Affairs, and adopted as policy by the BLM on August 25, 1986 in Instruction Memorandum 86-665 and by the USFS in Forest Service Manual 2323.32.

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L. Resolution of the Nevada Board of Wildlife Commissioners concerning Wilderness Designations in Nevada adopted February 7, 2003.

M. *Lincoln County Conservation, Recreation, and Development Act of 2004* (P.L. 108-424).

N. *Tax Relief and Health Care Act of 2006* (P.L. 109-432), Title III - White Pine County Conservation, Recreation and Development, Subtitle B – Wilderness Areas.

O. Bureau of Land Management Environmental Assessment "DOI-BLM-NVL030-2012-0003-EA" and Decision Record dated January 13, 2012.

IV. Definitions.

A. *Exotic Species*: For purposes of this MOU, all species of mammals, birds, fish, reptiles or their progeny or eggs, not naturally occurring either presently or historically in any ecosystem of the United States.

B. *Endemic or Indigenous Species*: For purposes of this MOU, those species presently or historically occurring naturally within a specific geographical area.

C. *Native Species*: For purposes of this MOU, all species of animals naturally occurring, either presently or historically, in any ecosystem of the United States.

D. *Naturalized Species*: For purposes of this MOU, those exotic species which were already occurring in a self-sustaining wild state before the date of Wilderness designation.

V. The BLM and NDOW Agree to the Following.

Fish and wildlife are recognized as an important wilderness value. Fish and wildlife management activities in Nevada's BLM Wilderness Areas will be planned and carried out in conformance with the Wilderness Act's purpose of securing an "enduring resource of wilderness" for the American people. BLM Wilderness Areas in Nevada will be managed in such a manner that ecosystems are unaffected by human manipulation, and human influence does not impede the free play of natural forces or interfere with natural ecological succession.

Site-specific, time-sensitive, on-the-ground conditions will dictate slightly different applications and perhaps even dissimilar decisions in BLM Wilderness Areas in Nevada. These different applications and decisions are both appropriate and proper, if we are to

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allow nature to play the dominant role in wilderness management. The emphasis is on management of BLM Wilderness Areas and wilderness values as opposed to the management of a particular resource. Where there are competing resource alternatives, wilderness values take precedence and priority.

Italicized paragraphs in this section of the MOU contain language and guidance from the *Clark County Conservation of Public Land and Natural Resources Act of 2002,* the *Lincoln County Conservation, Recreation, and Development Act of 2004,* and the *Tax Relief and Health Care Act of 2006.*

A. Use of Motorized Equipment

The language in the Wilderness Act is viewed as direction that all management activities within BLM Wilderness in Nevada be done without motor vehicles, landing of aircraft, motorized equipment, or mechanical transport, unless truly necessary to administer the area as Wilderness. With regard to landing of aircraft, it is also against BLM regulation to drop or pick up materials, supplies, or persons from aircraft. Where the use of aircraft and motorboats has already become established prior to wilderness designation, they may be permitted to continue subject to such restrictions as the BLM deems desirable. The language in the Wilderness Act means that any such use should be rare and temporary, that no roads can be built, and that wilderness managers must determine such use is the minimum necessary to accomplish the task. Any on-the-ground use of motorized equipment or mechanical transport requires advance approval by the BLM.

The BLM, in consultation with the NDOW, must determine if the use of motor vehicles, motorized equipment, or mechanical transport in the development and /or implementation of a project *would promote healthy, viable, and more naturally distributed wildlife populations that would enhance wilderness values and accomplish those purposes with the minimum impact to wilderness values necessary to reasonably accomplish the task.*

B. Fish and Wildlife Research and Management Surveys

Research on fish and wildlife, their habitats and the recreational users of these resources is a legitimate activity in Nevada BLM Wilderness Areas when conducted in a manner compatible with the preservation of the wilderness environment. Methods that temporarily infringe on the wilderness environment may be approved by the BLM if alternative methods or locations outside wilderness are not available. Methods that involve dropping or picking up of any materials, supplies, or persons by means of aircraft require BLM approval. Methods that involve the use of aircraft that fly over but do not touch down in Wilderness, such as aerial surveillance and aerial wildlife population counts, do not require BLM

approval. Aircraft must be used in a manner that minimizes disturbance of other users, including humans and wildlife. Consider time of day, season of the year, route, appropriate maximum altitude of flight, and location of landing areas outside BLM Wilderness Areas.

All fish and wildlife studies within and over Nevada BLM Wilderness Areas must be conducted so as to preserve the natural character of the Wilderness. Capturing and marking of animals, radio telemetry, and occasional temporary installations may be permitted, if they are essential to studies that cannot be accomplished elsewhere. Installation of permanent base stations within BLM Wilderness is not permitted for monitoring of radio-instrumented animals.

The NDOW must obtain specific written approval or permits from the BLM before erecting any temporary installation. The BLM should only approve capture methods that minimize the impact on the wilderness environment.

C. Facility Development and Habitat Alteration

In rare instances, facility development and habitat alteration may be necessary to alleviate adverse impacts caused by human activities on fish and wildlife. Give first priority to locating facilities or habitat alterations outside BLM Wilderness Areas.

Flow-maintenance dams, water developments, water diversion devices, ditches and associated structures, and other fish and wildlife habitat developments necessary for fish and wildlife management, which were in existence before wilderness designation, may be permitted to remain in operation. These developments may be maintained, repaired, or replaced as long as the designed capacity and/or dimensions of the existing development are not exceeded. The BLM and the NDOW will jointly make decisions to remove existing water-related developments.

Clearing of debris that impedes the migratory movements of fish on primary spawning streams may be permitted, but only in a manner compatible with the wilderness resource. Use only non-motorized equipment to clear debris and use explosives only when the use of hand tools is not practical. Limit clearing of debris from spawning streams to those identified as being critical to the propagation of fish. If it is necessary to restore essential food plants after human disturbance, use only indigenous plant species.

Development of new or additional water supplies may be permitted, but only when essential to preserve the wilderness resource and to correct unnatural conditions resulting from human influence. Proposals for new structures or habitat alterations must be submitted to the BLM for approval.

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The BLM shall authorize structures and facilities if: *(1) the structures and facilities will, as determined by the BLM, enhance wilderness values by promoting healthy, viable and more naturally distributed wildlife populations; and (2) the visual impacts of the structures and facilities on the BLM Wilderness Areas can reasonably be minimized.*

D. Threatened and Endangered Species

Actions necessary to protect or recover Federally listed threatened or endangered species, including habitat manipulation and special protection measures as identified in threatened and endangered species recovery plans or other management agreements, may be implemented in Nevada BLM Wilderness Areas in previously occupied habitat, provided it is demonstrated that the actions cannot be done more effectively outside Wilderness. To prevent Federal listing, indigenous species that could become threatened or endangered or are listed as such by the State of Nevada will be protected. All transplants or habitat improvement projects require approval by the BLM.

E. Angling, Hunting, and Trapping

Angling, hunting, and trapping are legitimate wilderness activities subject to applicable State and Federal laws and regulations.

The BLM may, in coordination and consultation with the NDOW, *designate by regulation, areas and periods during which no hunting, fishing, or trapping will be permitted in BLM Wilderness Areas for reasons of public safety, administration, or compliance with applicable laws.*

F. Population Sampling

Scientific sampling of fish and wildlife populations is an essential procedure in the protection of natural populations in Nevada's BLM Wilderness Areas. Gill netting, battery-operated electrofishing, and other standard techniques of population sampling may be used. Sampling activities will be closely coordinated with the BLM and scheduled to avoid heavy public-use periods.

G. Chemical Treatment

Chemical treatment may be necessary to prepare waters for reestablishment of indigenous fish species, to protect or recover Federally listed threatened or endangered species, or to correct undesirable conditions resulting from the influence of man. Species of fish traditionally stocked before wilderness designation may be considered indigenous if the species is likely to survive. Use only registered piscicides, in consultation with the BLM, and according to label directions. Give preference to those piscicides that will have the

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least impact on non-target species and on the wilderness environment. NDOW will comply with Environmental Protection Agency processes delegated to the Nevada Division of Environmental Protection in attainment of permits and certifications of personnel applying chemicals to Nevada's waters within BLM Wilderness Areas. Schedule chemical treatments during periods of low human use and immediately dispose of fish in a manner agreed to by the BLM and the NDOW.

H. Spawn-Taking

The collection of fish spawn shall be permitted in Nevada BLM Wilderness Areas when alternative sources outside Wilderness Areas are unavailable or unreliable, or where spawn-taking was an established practice before wilderness designation. Use of techniques and facilities necessary to take and remove spawn, which were in existence before wilderness designation, may continue, except that motorized equipment will not be used. Facilities for spawn-taking stations approved by the BLM after wilderness designation must be removed after the termination of each season's operation. Decisions to prohibit spawn-taking, where it was an established practice before wilderness designation, will be made jointly by the BLM and the NDOW.

I. Fish Stocking

Fish stocking may be conducted by the NDOW in coordination with the BLM, using means appropriate for wilderness, when either of the following criteria is met: (1) to reestablish or maintain an indigenous species adversely affected by human influence; or (2) to perpetuate or recover a threatened or endangered species. NDOW, in consultation with the BLM, will select the indigenous or naturalized fish species for stocking. Species of fish traditionally stocked before wilderness designation may be considered indigenous if the species is likely to survive. Exotic species of fish shall not be stocked. Numbers and size of fish and time of stocking will be determined by the NDOW. Barren lakes and streams may be considered for stocking, if there is mutual agreement that no appreciable loss of scientific values or adverse effects on wilderness resources will occur. The BLM and NDOW will inventory barren lakes, streams and other suitable waters prior to proposing such stocking projects.

J. Aerial Fish Stocking

Aerial stocking of fish shall be allowed for those waters in Nevada BLM Wilderness Areas where this was an established practice before wilderness designation or where other practical means are not available. Aerial stocking requires consultation with the BLM. The NDOW will supply the BLM a list of those waters where stocking with aircraft was an established

practice before wilderness designation. To stock waters that had not been aerially stocked before wilderness designation, the NDOW will demonstrate to the BLM the need for using aircraft.

K. Transplanting Wildlife

Transplants (i.e., removal or reintroduction of terrestrial wildlife species in Nevada BLM Wilderness Areas) may be permitted if necessary: (1) to perpetuate or recover a threatened or endangered species; or (2) to restore the population of indigenous species eliminated or reduced by human influence. The possibility of utilizing sites and locations outside BLM Wilderness Areas will be investigated first. If sites and locations outside BLM Wilderness Areas are not available, transplants shall be made in a manner compatible with the wilderness character of the area. Transplant projects, including follow-up monitoring, require advance written approval from the BLM, if the action requires ground disturbing activities, motorized methods, and/or temporary holding and handling facilities.

L. Wildlife Damage Control

Wildlife damage control in Nevada BLM Wilderness Areas may be necessary to protect Federally listed threatened or endangered species, to prevent transmission of diseases or parasites affecting other wildlife and humans, for the benefit of reintroduced indigenous wildlife species, or to prevent serious losses of domestic livestock. Control of nonindigenous species also may be necessary to reduce conflicts with indigenous species. Acceptable control measures include lethal and nonlethal methods, depending upon need, justification, location, conditions, efficiency and applicability of State and Federal laws. These control measures must be consistent with Section 4(c) of the Wilderness Act of 1964 to insure that prohibited uses are avoided. Use only the minimum amount of control necessary to resolve wildlife damage problems. The Animal and Plant Health Inspection Service, the BLM, the NDOW, or other approved State agency will implement control measures pursuant to cooperative agreements or memoranda of understanding. Wildlife damage control measures involving the use of motorized vehicles, motorized equipment, and/or mechanical transport must be approved by the BLM on a case-by-case basis.

M. Visitor Management to Protect Wilderness Wildlife Resources

When necessary to reduce human disturbance to wildlife populations or habitat, the BLM, in coordination and consultation with the NDOW, may take direct or indirect management actions to control visitor use. If and when it becomes apparent that public use is significantly degrading the wilderness wildlife resources, limitations on visitor use may be imposed and enforced by the appropriate agency.

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VI. Annual Operations and Maintenance Schedule.

A. All Wildlife Projects and Activities Other Than Water Development Inspection, Maintenance, Repair, and Replacement

By January 15th of each year, the NDOW will submit to the appropriate BLM District Manager(s), an annual Operations and Maintenance Schedule of proposed fish and wildlife management activities, projects and developments planned within BLM Wilderness Areas for the subsequent twelve-month period beginning July 1st and ending on June 30th of the following calendar year. Activities, projects and developments must be submitted if they: (1) involve one or more of the prohibited uses identified in Section 4(c) of the Wilderness Act (i.e., commercial uses, permanent roads, temporary roads, use of motor vehicles, use of motorized equipment, use of motorboats, landing of aircraft, mechanical transportation, structures, installations); (2) may be potentially surface-disturbing (i.e., any new disruption of the soil or vegetation); (3) involve the use of pesticides or other chemical or toxic substances; (4) involve manipulation of fish and wildlife habitat; and/or (5) involve mechanized and/or motorized control measures for predators or problem fish or wildlife species.

Annual Operations and Maintenance Schedules must be site-specific, time-sensitive, and as definitive as reasonably possible. The Schedules will: (1) specify when proposed activities, projects and developments are planned, (2) describe the proposed activities, projects and developments in sufficient detail to allow for the assessment of the environmental consequences of such actions, (3) estimate the number of people involved, the amount of time for completion, the number of vehicles (if any) to be used, the equipment to be utilized, and (4) identify planned camping sites, material and equipment repositories, landing areas, and associated locations for support services and facilities. The BLM may request clarification of proposals and additional information.

The NDOW agrees to notify the BLM of any changes, additions or deletions to proposed activities, projects and developments. The notification will allow sufficient time for the BLM to complete necessary administrative requirements, including a public notification with 30-day public comment period, minimum requirement decision analysis, environmental review, Decision Record (DR) and Finding of No Significant Impact (FONSI). Once the District Manager makes a final decision, copies of the decision are mailed to all interested and affected parties. If the NDOW disagrees with a decision of the District Manager, the decision may be reviewed and modified by the BLM Nevada State Director. All decisions can be appealed to the Interior Board of Land Appeals.

The BLM recognizes that accomplishment of the proposed fish and wildlife management activities, projects, and developments depends on factors which the NDOW may not control or that are uncertain and subject to change. Among these are the weather, availability of volunteers and agents, funding, etc., which may not permit the NDOW to complete activities, projects and developments according to the annual Operations and Maintenance Schedule.

B. Wildlife Water Development Inspection, Maintenance, Repair, and Replacement

By the authority of BLM environmental assessment "DOI-BLM-NVL030-2012-0003-EA" and the Decision Record (DR) dated January 13, 2012, Nevada BLM District Managers have issued a five-year authorization to the NDOW for inspection, maintenance, repair and replacement of 35 big game and small game water developments within seven wilderness areas in the Ely and Southern Nevada Districts. The authorization becomes effective on the date this amendment is approved. The first year of the authorization has been sanctioned by the environmental assessment and DR previously cited.

Under these authorities, helicopter access will be permitted to the 20 big game water developments but not to the 15 small game water developments, unless the conditions under Section VII of this MOU, "Immediate Actions and Procedures," apply. Small game water developments will be accessed by foot or horseback only. If helicopter access is needed for a small game water development repair or replacement, and the conditions described in Section VII do not apply, the request will be treated as a new proposal, subject to full BLM administrative review (i.e., public notification with 30-day public comment period, minimum requirement decision analysis, environmental review, DR and FONSI).

For subsequent years (years 2-5), the NDOW will submit by January 15th of each year, to the appropriate BLM District Managers, an annual Operations and Maintenance Schedule for the succeeding twelve-month period beginning July 1st and ending June 30th of the following calendar year. The schedule will include a request for use of a helicopter for inspection, maintenance, repair, and replacement of big game water developments. The schedule will also call for the use of motorized and mechanized equipment (e.g. power drill, generator, hand cart) in order to effect maintenance, repair, and replacement of big game water developments. Further, the schedule must identify the anticipated dates for use of a helicopter, and name the expected water developments to be visited.

When received by the appropriate BLM District Managers, the BLM will conduct a determination of National Environmental Policy Act (NEPA) adequacy (DNA) and then, by April 15th of each year, issue an authorization

letter to NDOW citing BLM environmental assessment "DOI-BLM-NVL030-2012-0003-EA" and the DR dated January 13, 2012, as the mandate for authorizing the proposal. No further public notification with 30-day public comment period, minimum requirement decision analysis, environmental review, DR and FONSI will be necessary for each annual authorization.

If conditions remain relatively stable and do not change significantly, the five-year authorization will be renewed without further amendment to this MOU and without a full BLM administrative review (i.e., public notification with 30-day public comment period, minimum requirement decision analysis, environmental review, DR and FONSI). If conditions do not remain relatively stable and do change significantly, the BLM will conduct a full administrative review of the five-year authorization. If this review concludes the five-year authorization should not be renewed by the BLM District Managers, and NDOW disagrees with this decision, the decision may be reviewed and modified by the Nevada BLM State Director. All decisions can be appealed to the Interior Board of Land Appeals.

If inspection, maintenance, repair, and replacement activities extend beyond the boundary of the "footprint" of disturbance (i.e., the edge of disturbance created by previous construction or installation), a new authorization requiring the full range of BLM administrative review requirements (i.e., public notification with 30-day public comment period, minimum requirement decision analysis, environmental review, DR and FONSI) will be initiated. The same rule will apply for all additional proposals for construction of new wildlife water developments.

NDOW will prepare an annual report summarizing its big and small game water development activities. This report will be referred to as the "Annual Water Development Activities Report" and will be submitted to the District Managers by December 1st of each year for the previous State of Nevada fiscal year (i.e., July 1st through June 30th). The report will include the following information:

- the name of each water development inspected, maintained, repaired or replaced; the date(s) of the visit(s); and the name of the encompassing wilderness;
- the types of motorized and mechanized equipment utilized at each water development on each date;
- the number of landings and the number of sling-load trips conducted at each water development.

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This information is required by the BLM Washington Office for the BLM's National Wilderness Character Monitoring Program.

The terms and conditions contained in this MOU will apply to any new wilderness areas designated within the State of Nevada unless the language in the new designation legislation contradicts the terms and conditions contained in this MOU.

VII. Immediate Actions and Procedures.

Actions requiring immediate attention due to unanticipated natural or human-caused circumstances (e.g., flood, vandalism, sick animal), that directly and immediately jeopardize the survival of fish and wildlife under the NDOW's jurisdiction, may be permitted if the following procedure is adhered to: (1) The NDOW agrees to notify the proper BLM District Manager as soon as practicable after the problem is known; (2) The NDOW would be permitted to select and agrees to use the appropriate "minimum tool" level of motorized vehicle, mechanical transport and/or motorized equipment necessary and practical to rectify the situation; and, (3) The NDOW agrees to submit to the proper BLM District Manager, a written assessment of the action requiring immediate attention within two weeks after resolution of the situation.

If a wildlife water development is involved, the written assessment should include:

- the name of the wilderness area;
- the name of the water development;
- identification of the problem and the repairs performed;
- type of motorized and mechanized equipment utilized;
- number of persons involved;
- number of landings and the number of sling-load trips conducted;
- date(s) of the immediate action.

To the extent feasible, the NDOW will submit as part of their annual Operations and Maintenance Schedule, immediate action scenarios that may be possible or probable in connection with a given proposed activity, project or development. In doing so, the BLM will then be in a position to analyze potential impacts to wilderness resources in advance of occurrence.

VIII. Administration.

A. Nothing in this MOU will be construed as affecting the authorities of the BLM or the NDOW or as binding beyond their respective authorities, or to require the BLM or the NDOW to obligate or expend funds in excess of available funds.

B. Conflicts among the BLM and the NDOW concerning processes or

procedures under this MOU that cannot be resolved at the operational level will be referred to successively higher levels, as necessary, for resolution.

C. The BLM and the NDOW will review this MOU at least every five years to determine its adequacy, effectiveness and appropriateness.

D. The terms of this MOU may be renegotiated at any time at the initiative of the BLM or the NDOW, following at least 30 days' notice to the other agency.

E. The BLM or the NDOW may cancel this MOU at any time, following at least 30 days' notice to the other agency.

F. The BLM or NDOW may propose changes to this MOU during its term. Such changes will be in the form of an amendment and will become effective upon signature by both agencies.

G. This MOU will become effective upon signature of both agencies.

APPROVED:

Amy Lueders, Nevada State Director
Bureau of Land Management

11/29/12
Date

Kenneth E. Mayer, Director
Nevada Department of Wildlife

11/29/12
Date

IB-NV-2013-006
Attachment 1-13

APPENDIX F: LAKE MEAD NATIONAL RECREATION AREA ACOUSTICAL MONITORING 2007–2012

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Acoustic Monitoring 2007–2012

Lake Mead National Recreation Area

Executive Summary

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INTRODUCTION

A full Acoustic Monitoring Technical Report is available through that National Park Service Inventory and Monitoring Division. This executive summary serves as a general overview of the study and its findings. Only samples or representative sites are shown in this summary. For findings at each site, refer to the full Acoustic Monitoring Technical Report.

Lake Mead National Recreation Area (NRA) is located in both Nevada and Arizona. It includes both Lake Mead and Lake Mohave, created by Hoover Dam (1936) and Davis Dam (1951) respectively. Nearby population centers include Las Vegas, Henderson, and Boulder City, Nevada and Bullhead City and Kingman, Arizona. Between 1935 and 1964, the Lake Mead area was cooperatively managed by federal agencies including the National Park Service. The park was officially established in 1964.

Figure 1. Wildflowers at Lake Mead, NPS photo

The park encompasses a vast array of habitats within its 1.5 million acres. Lake Mead NRA offers a wealth of activities and a variety of places to go year-round. It is home to thousands of desert plants and animals, adapted to survive in an extreme place where rain is scarce and temperatures vary widely. In 2002, approximately 184,439 acres of Lake Mead NRA was designated as wilderness. Other areas are currently being considered for wilderness designation. Lake Mead NRA is often represented with the binomials LAME for LAke MEad or LAKE for LAKE Mead and the monitoring sites herein are named similarly.

An important part of the National Park Service (NPS) mission is to preserve and restore the natural resources of the parks, including the natural soundscapes associated with units of the national park system. National Park Service Management Policies 2006 state,

> Park natural soundscape resources encompass all the natural sounds that occur in parks, including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes. Natural sounds occur within and beyond the range of sounds that humans can perceive, and they can be transmitted through air, water, or solid materials. The National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks.

The collection of sound level data provides valuable information about a park's acoustic conditions for use in developing planning documents, management plans and soundscape management plans. In 2007, Lake Mead NRA began an acoustic monitoring program to analyze the long-term baseline acoustics in designated and proposed wilderness areas. Monitoring equipment was deployed for a minimum of 30 days at each location. From 2007 through 2012, 25 acoustic monitoring units were deployed within Lake Mead NRA and on surrounding lands administered by the Bureau of Land Management (BLM). Together, these stations cover a range of terrain from shoreline areas to upland hills and cover most regions of the park. Focus was given to areas which are in existing or proposed designated wilderness areas.

The purpose of this monitoring effort was to characterize existing sound levels, estimate natural ambient sound levels, and identify audible sound sources in support of future and pending management decisions. This report provides a summary of results of these measurements, representing all seasons over several years. Figure 2 shows a map of the area with the locations of the monitoring sites.

In efforts to collect baseline ambient data for a future Air Tour Management Plan, an acoustic monitoring unit was placed specifically at Indian Pass AR72 (LAME007). This acoustic monitoring unit will help managers determine possible noise impacts for the future. Predicting and understanding potential impacts is critical to determining future management actions. To meet this objective, monitoring occurred for an extended time period of just under one year. This monitoring location was intended to collected baseline acoustical data prior to the development of the proposed Ivanpah Airport.

STUDY AREA

Many sites within Lake Mead NRA were monitored throughout varying seasons over several years. They were selected with focus on acoustic monitoring near the designated and proposed wilderness areas of the Lake Mead NRA region or in relation to a proposed Air Tour Management Plan. Figure 2 shows a map of the area with monitoring site locations.

Monitoring sites were established at 15 locations throughout the NRA and adjacent BLM lands.

Sites were selected to:
a) be representative of the overall area or
b) to determine a baseline for potential or existing wilderness areas or
c) to monitor a specific resource impact – such as overflights at site LAME007.

Several of the initial monitoring sites are described here and demonstrate representative sites throughout the study area.

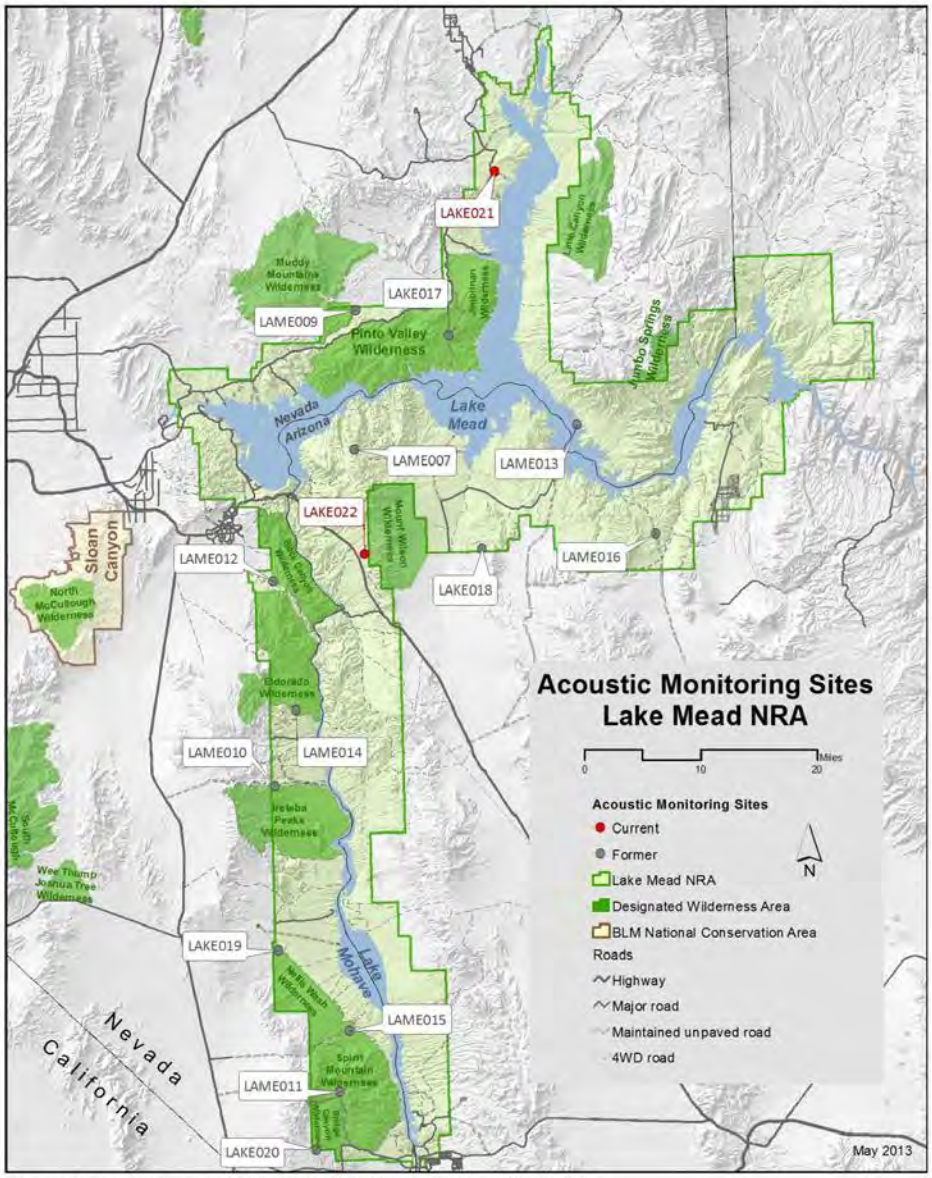

Figure 2. Acoustic monitoring site locations in Lake Mead NRA.

Examples of site location and equipment set up.

LAME009 is one of the original monitoring sites selected in 2007. It was established at Callville Wash (Figure 3), located near both the Muddy Mountains and Pinto Valley Wilderness areas. These wilderness areas are comprised of rugged hills, scenic valleys, and red sandstone outcroppings which merge with the green desert vegetation and the grays, browns, and yellows of the desert floor. This unique place is habitat for the rare Las Vegas bearpaw poppy plant.

Figure 3. LAME009 Callville Wash site (near Muddy Mountains and Pinto Valley Wilderness Areas).

LAME010 (Figure 4) is located within Ireteba Wilderness Area near AR42B West Powerline Wash Road. Within this wilderness is a portion of the Eldorado Mountains, gently rolling hills and wandering washes extending to Lake Mohave. Rugged mountains, secluded valleys, and flat alluvial fans provide opportunities for seclusion and isolation in a setting of scenic splendor. Sparse desert vegetation at LAME010 includes teddy-bear cholla forests and barrel cactus. This area is home to the threatened desert tortoise and Townsend's western big-eared bats, which are just some of the unique species surviving in this part of the Mojave Desert.

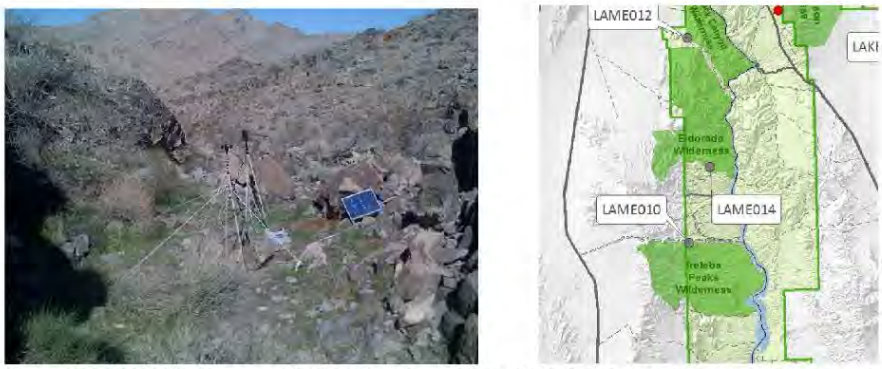

Figure 4. LAME010 site near AR42B West Powerline Wash Road (Ireteba Peaks Wilderness Area).

METHODS

Automated Monitoring

Larson Davis 831 sound level meters (SLM) were employed over several long term (generally 30 days) monitoring periods at Lake Mead NRA. The Larson Davis SLM is a hardware-based, real-time analyzer which constantly records one second sound pressure level (SPL) and 1/3 octave band data, and exports these data to a portable storage device (thumb drive). These Larson Davis-based sites met American National Standards Institute (ANSI) Type 1 standards.

Each Larson Davis sampling station consisted of:

- Microphone with environmental shroud
- Preamplifier
- Solar panel and batteries
- MP3 recorder
- Anemometer
- Meteorological data logger

Each acoustic sampling station collected:

- SPL data in the form of A-weighted decibel readings (dBA) every second
- Continuous digital audio recordings
- One third octave band data every second ranging from 12.5 Hz – 20,000 Hz
- Meteorological data

On-Site Listening

On-site listening is the practice of placing an observer near the acoustic monitoring station with handheld Personal Digital Assistants (PDAs). The observer listens for a designated period of time (in this case, one hour), and identifies all sound sources and their durations. On-site listening takes full advantage of human binaural hearing capabilities, and most closely matches the experience of park visitors. Logistic constraints prevent comprehensive sampling by this technique, but selective samples of on-site listening provide a basis for relating the results of off-site listening (see below) to the probable auditory perception of events by park visitors and wildlife. On-site listening sessions are also an excellent screening tool for parks initiating acoustic environment studies. They produce an extensive inventory of sound sources, require little equipment or training, and can help educate park staff and volunteers.

Thus, periods of on-site listening were conducted in order to discern the type, timing, and duration of sound-level data collected at Lake Mead NRA. In accordance with NPS Natural Sounds Program protocol, these sessions generally began at the top of an hour and lasted for one hour. Staff recorded the beginning and ending times of all audible sound sources using custom-designed PDA software. These on-site listening sessions provided the basis for the calculation of metrics including the period of time between noise events (average noise free interval [NFI]), percent time each sound source was audible, and maximum, minimum, and mean length (in seconds) of sound source events.

Off-Site Listening

For each day of monitoring data, Lake Mead NRA staff visually analyzed a subset of SPL samples (minimum of eight days) in order to identify durations of audible sound sources. Audio samples were employed to confirm identification. See Appendix B for further information on visual analysis. Hourly time audible statistics are then inserted into a formula which produces natural ambient sound level

estimates (see Calculation of Metrics below). The total percent time extrinsic sounds were audible was then used to calculate the natural ambient sound level. Bose Quiet Comfort Noise Canceling headphones were used for off-site audio playback to minimize limitations imposed by the office acoustic environment.

Calculation of Metrics

The current status of the acoustic environment can be characterized by a number of measurements including sound levels across the 1/3 octave band spectrum (from 12.5 Hz to 20,000 Hz), overall sound levels, and percent time audible durations for various sound sources. Two fundamental descriptors of the acoustic environment are existing and natural ambient sound levels. Measured in A-weighted decibel levels (dBA), the existing ambient or median sound level (L_{50}) isa statistical descriptor describing the sound level exceeded 50% of a specific time period. It is the uncensored composite of all sounds at a site, both human-caused and natural.

In order to understand the implications of the acoustical data fully, it is important to describe the distribution of sound levels in relation to potential functional effects. Table 1 presents park sound sources and common sound sources with their corresponding dBA. The dBA is a logarithmic measure of sound energy that approximates human hearing sensitivity (Harris, 1998, p. 1.16).

Table 1. Interpreting sound levels

Park Sound Sources	Common Sound Sources	dBA
Volcano crater (Haleakala NP)	Human breathing at 3m	10
Leaves rustling (Canyonlands NP)	Whispering	20
Crickets at 5m (Zion NP)	Residential area at night	40
Conversation at 5m (Whitman Mission NHS)	Busy restaurant	60
Snowcoach at 30m (Yellowstone NP)	Curbside of busy street	80
Thunder (Arches NP)	Jackhammer at 2m	100
Military jet, 100m above ground level (Yukon-Charley Rivers NP)	Train horn at 1m	120

Note: An increase of 10dBA represents a tenfold multiplication of energy

NPS staff calculates L_{10} and L_{90}, which describe the sound levels exceeded 10% and 90% of the time, respectively. While L_{90} describes the sound level exceeded 90% of the time, only the quietest 10 percent of the sample can be found below this point

The natural ambient (L_{nat}) is an estimate of what the ambient level for a site would be if all extrinsic or anthropogenic sources were removed. Unlike the existing ambient, the natural ambient is comprised of spectra drawn from a subset of the original data.

The differences between L_{50} and L_{nat} values allow NPS staff to answer the following questions:

- What are the listening opportunities in the absence of human development and activities?
- How are these listening opportunities compromised by increased sound levels due to noise?

To calculate L_{nat}, the NPS protocol includes the following:

- Calculate the percentage of all samples containing extrinsic sounds for each hour of the day (P_H) by either listening to samples, or analyzing daily spectrograms, for eight days.

P_H is used to complete this formula for every hour:

$$X = \frac{1-P_H}{2} + P_H$$

Hourly x_H values are entered into a database of all octave band information.

Example: if extrinsic sounds are audible 50% of the time (P_H=0.5), then x_H is 0.75.
L_{nat} is computed as the sound level that is exceeded 100*x_H percent of the time.
(In practice, L_{nat} is calculated by sorting the relevant sound level measurements and using x_H to extract the appropriate order statistic).

This procedure approximates the sound levels that would have been measured in the absence of extrinsic noise. The procedure is guaranteed to produce an estimate that is equal to or below the existing ambient sound levels, and the results of this calculation have produced consistent results at most backcountry sites.

RESULTS

Exceedence Levels

In order to determine the effect extrinsic noise audibility has on the acoustic environment, it is useful to examine the median hourly exceedence metrics. Shown below are a few samples of figures that demonstrate the existing ambient sound levels (L_{10}, L_{50}, L_{90}) and calculated natural ambient levels (L_{nat}). The existing ambient (or median, L_{50}) level for each hour is marked by the upper limit of the black boxes while natural ambient levels (L_{nat}) are marked by the lower limit of the black boxes.

The height of the black box is a measure of the contribution of anthropogenic noise to the existing ambient sound levels at this site. The size of these boxes is directly related to the percent time that human caused sounds are audible. When boxes do not appear, the natural and existing ambient levels were either very close to each other, or equal for that hour. These figures also show exceedence metrics L_{10} and L_{90}, which essentially mark the average maximum and minimum levels over the monitoring periods.

Results are provided for sites LAME007, LAME009 and LAME010 for Summer and Winter seasons. Note the hours during which the natural ambient is low or high as well as the hours when L_{50} is increased to its peak.

When examining natural quiet, the quietest hours at LAME007 (Summer) occurred at 0500 and 0600. During this time the median value for the natural ambient sound level fell as low as 15.4 dBA. By 1200 hours, the natural ambient levels increased to a peak median value of 23.8 dBA. From off-site listening, it is determined that this is primarily from light winds. The existing ambient or median sound level of both human and natural causes (L_{50}) is also represented in Figure 6 . The L_{50} fell as low as 19.7 dBA at 0500. Also noteworthy, the L_{50} raised significantly at 0700 as scenic helicopter overflights began their daily tours. The L_{50} increased to a peak median value of 36.5 dBA at 1000.

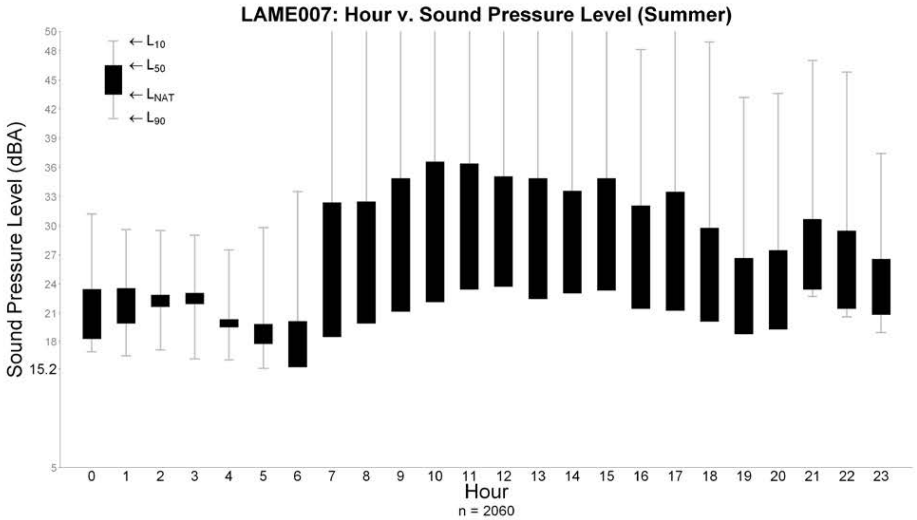

Figure 5. Hourly exceedence levels at LAME007 Summer (Indian Pass).

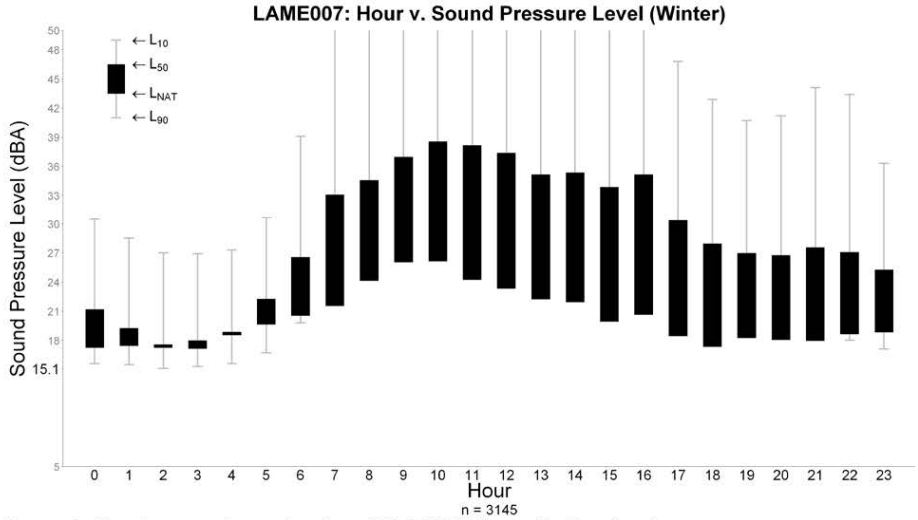

Figure 6. Hourly exceedence levels at LAME007 Winter (Indian Pass).

The quietest hours at LAME009 occurred at 0100 and 0500 hours. During these hours the median dBA for the natural ambient was 15.3. By 1500 hours, the natural ambient levels increased slightly to a median dBA of 25.4.

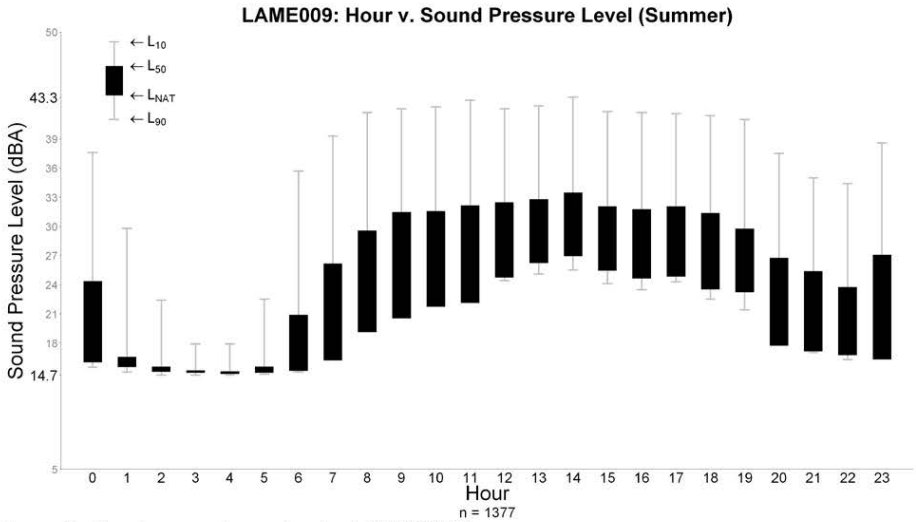

Figure 7. Hourly exceedence levels at LAME009 Summer.

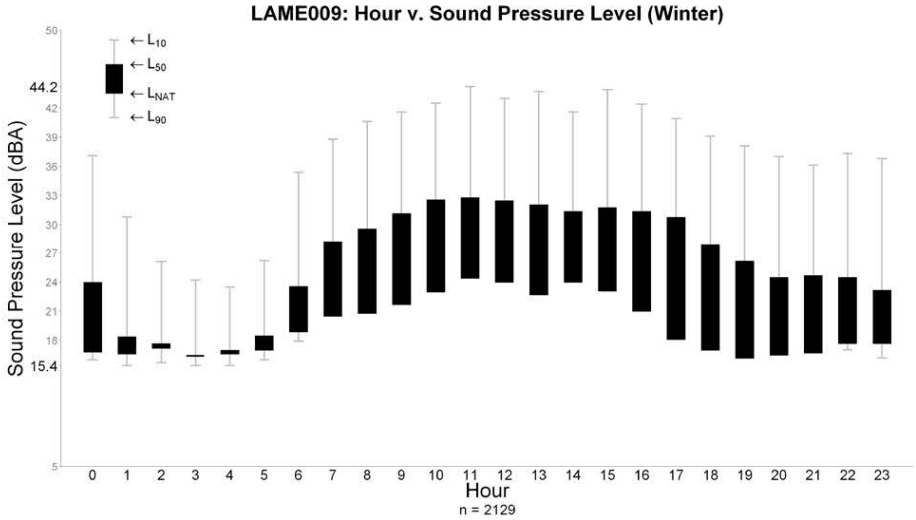

Figure 8. Hourly exceedence levels at LAME009 Winter (Callville Wash).

The quietest hours at LAME010 were 0000 and 0300 hours. During these hours the median dBA for the natural ambient was 14.7. By 1500 hours, the ambient levels increased slightly to a median dBA of 17.2. Noteworthy, LAME010 has less human contributions from visitors or aircraft than LAME009 or LAME011.

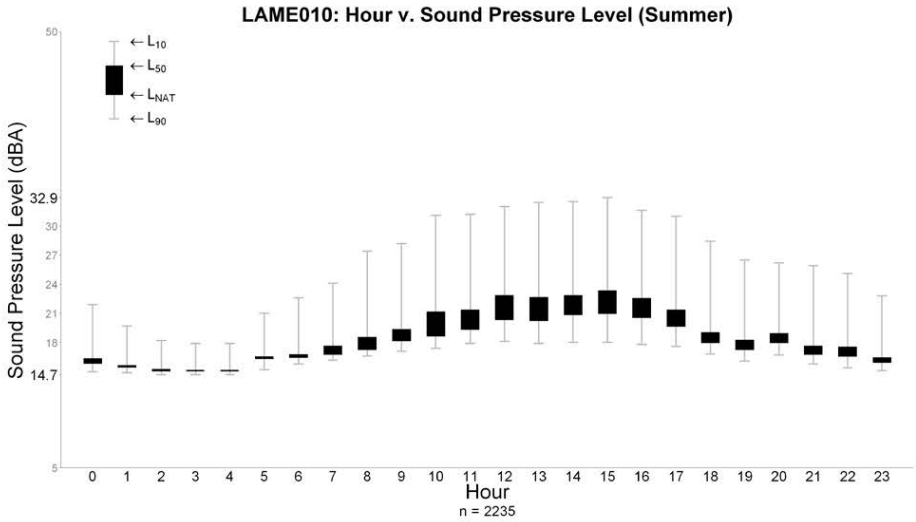

Figure 9. Hourly exceedence levels at LAME010 Summer (AR42B).

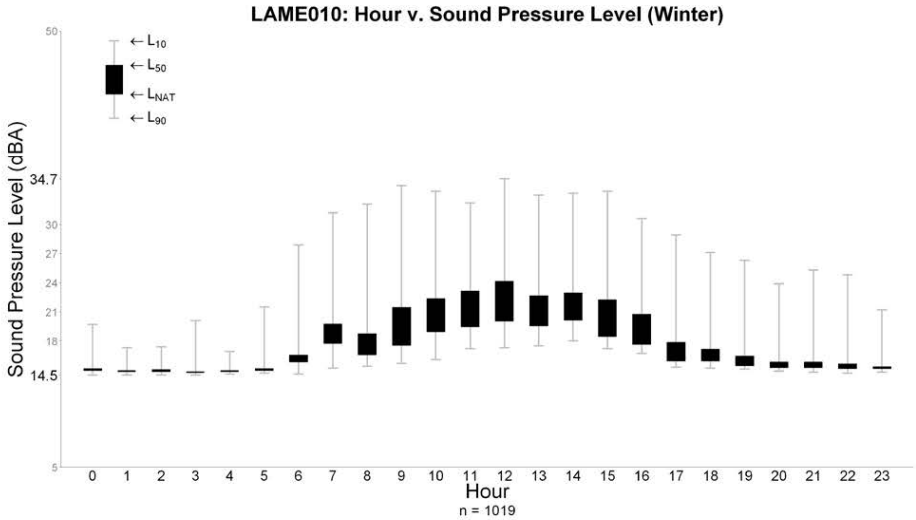

Figure 10. Hourly exceedence levels at LAME010 Winter (AR42B).

Discussion

As is evident from the above figures, human-caused sounds raised the natural ambient levels more during the daytime hours and into the night. During the early morning hours at most sites, the existing and natural ambient levels were very near the noise floor of the recording equipment (the lowest limit of recording equipment), indicating that these sites were at times remarkably quiet.

From examining the figure of exceedence levels, utilizing the on-site and off-site listening analysis, and comparing the data to maps and visual assessments, the Callville site (LAME009, Figure 8) seems to have inherently higher existing ambient levels due to the site's proximity to McCarran Airport in Las Vegas, NV. When the hourly L_{10} and L_{90} lines differ greatly from each other, this implies that there is large variation in the ambient levels for that hour. This happens often in the midday and evening hours on the graph for LAME009. Such variation is likely due to wind and aircraft over-flights. The peak hours of human contributions can be inferred from this graph by comparing the size of the black or gray boxes. Generally, the larger the box, the larger the contribution of human-caused sound during that hour will be. The size of the boxes is directly related to the percent time audible.

Percent Exceedence Metrics

In determining the current conditions of an acoustic environment, the NPS examines how often sound pressure levels exceed certain decibel values that relate to interference with human health and speech. The NPS uses these values for making comparisons, but should not be construed as thresholds of impact. When assessing current conditions at a site, it is important to document the distribution of sound levels in relation to potential functional effects. Table 2 summarizes various sound level values that relate to human health and speech, as documented in scientific literature. These sound pressure metrics are often useful in planning documents as a measure of where the majority of sound energy is located. They are also useful in measuring the effects of sound on wildlife. Human responses can serve as a proxy for potential impacts to other vertebrates because we have more sensitive hearing at low frequencies than most species.

Table 2. Explanation of sound pressure levels.

Sound Level (dBA)	Relevance
35	Blood pressure and heart rate increase in sleeping humans[1]
45	WHO's recommendation for max noise levels inside bedrooms[2]
52	Speech interference for interpretive programs[3]
60	Speech interruption for normal conversations[3]

1. (Haralabidis et al., 2008)
2. (Berglund, Lindvall, and Schwela, 1999)
3. (U.S. Environmental Protection Agency, 1974)

Table 3 reports the percent of time that measured levels were above these values at each of the representative monitoring sites. The first decibel value, 35 dBA, addresses the health effects of sleep interruption (Haralabidis et al. 2008). The second value addresses the World Health Organization's recommendations that noise levels inside bedrooms remain below 45 dBA (Berglund et al. 1999). The third value, 52 dBA, is based on the Environmental Protection Agency's (EPA 1974) speech interference threshold for speaking in a raised voice to an audience at 10 meters. This value addresses the effects of sound on interpretive presentations in parks. The final value, 60 dBA, provides a basis for estimating impacts on normal voice communications at 1 m (3 ft). Hikers and visitors viewing scenic vistas in the park would likely be conducting such conversations.

To demonstrate the measurements, we will use LAME009. The LAME009 acoustic monitoring station was located in the flight pathway of aircraft to the Las Vegas McCarran International Airport, thus sound pressure levels were slightly louder than the other sites.

The low percent exceedence metrics for all sound levels at most sites suggest that very loud sounds occur infrequently in these wilderness areas. The top value in each cell in Table 3 focuses on frequencies affected by transportation noise whereas the lower values use the conventional full frequency range. A-weighting measurements are often used to measure low-frequency transportation noise and as an indicator for the quality of acoustic environments in rooms. They are also used to determine the potential for speech interferences, sleep interruption, and physiological responses to noise. However, in wilderness areas, dBA measurements can be misleading because much of the sound energy comes from high frequency sounds that are naturally occurring like birds, frogs, and insects. Thus, when using dBA as a means of comparison, wilderness areas with a preponderance of birdsong could appear as loud as a noisy urban environment. Therefore, in order to obtain an accurate measure of natural ambient dBA levels, NPS has extracted another dBA measurement which focuses on the frequencies where motorized vehicles produce sound (20 Hz – 1250 Hz). This allows NPS to compare levels of sound in parks to transportation noise measurements.

Table 3. Percent time above metrics for night and day for sample sites.

	% Total above sound level: 0700 -1900				% Total above sound level: 1900 - 0700			
Site Name	35dBA	45dBA	52dBA	60dBA	35dBA	45dBA	52dBA	60dBA
LAME007	45.31	20.91	10.27	4.38	11.61	4.24	1.25	0.10
(Summer)	46.46	21.65	10.91	4.95	13.00	4.57	1.30	0.12
LAME007	47.23	23.00	12.08	5.16	12.87	4.14	1.39	0.14
(Winter)	48.13	23.15	12.11	5.26	13.74	4.21	1.39	0.14
LAME009	32.51	5.78	1.46	0.35	10.88	1.24	0.25	0.05
(Summer)	33.89	5.92	1.51	0.38	11.20	1.24	0.26	0.05
LAME009	30.32	6.19	2.27	0.69	11.35	1.49	0.21	0.00
(Winter)	30.93	6.24	2.29	0.73	11.49	1.48	0.20	0.00
LAME010	4.29	0.61	0.10	0.00	1.51	0.21	0.03	0.00
(Summer)	4.79	0.68	0.12	0.00	1.51	0.21	0.03	0.00
LAME010	5.28	0.83	0.14	0.00	1.72	0.17	0.05	0.00
(Winter)	8.33	1.14	0.20	0.01	1.87	0.17	0.05	0.00

Exceedence levels (L_x) are metrics used to describe acoustical data. They represent the dBA exceeded x percent of the time during the given measurement period (e.g. L_{90} is the dBA that has been exceeded 90% of the time). Table 4 reports the L_{90}, L_{nat}, L_{50}, and L_{10} values for the sites measured at Lake Mead NRA. The top value in each cell focuses on frequencies affected by transportation noise whereas the lower values use the conventional full frequency range.

Table 4. Natural ambient (Lnat) and exceedence levels for existing conditions for sample sites.

Site	Exceedence levels (dBA): 0700 to 1900				Exceedence levels (dBA): 1900 to 0700			
	L_{90}	L_{nat}	L_{50}	L_{10}	L_{90}	L_{nat}	L_{50}	L_{10}
LAME007 (Summer)	21.6	20.3	33.5	52.5	13.4	14.6	20.5	33.1
	23.0	21.8	33.8	53.0	17.9	19.4	25.3	35.4
LAME007 (Winter)	24.2	21.6	34.9	54.1	16.4	17.6	23.1	35.5
	25.3	22.3	35.1	54.2	17.1	18.4	24.6	35.8
LAME009 (Summer)	21.1	21.1	30.6	41.7	13.5	14.0	19.5	33.1
	22.9	22.8	31.3	41.9	15.4	15.9	21.5	33.2
LAME009 (Winter)	22.7	21.3	30.7	41.7	16.1	16.8	21.5	34.8
	23.1	21.6	31.0	41.9	16.2	17.0	22.4	34.9
LAME010 (Summer)	15.6	17.4	19.0	29.5	13.2	13.8	14.1	19.4
	17.3	19.0	20.8	30.6	15.4	16.4	16.9	23.0
LAME010 (Winter)	15.0	16.4	18.2	29.7	13.4	14.0	14.3	20.8
	16.3	18.0	21.4	32.2	14.7	15.2	15.5	23.8
	17.0	17.9	19.7	27.8	15.5	16.1	17.9	27.6

Frequency v. Sound Pressure Level

Figure 11 - Figure 16 plot the dB levels for 33 one-third octave band frequencies over the day and night periods at the monitoring sites. The grayed area represents sound levels outside of the typical range of human hearing. The typical frequency levels for transportation, conversation and songbirds are presented on the figure as examples for interpretation of the data. These ranges are estimates and are not vehicle-, species-, or habitat- specific.

The day and night dB levels for 33 one-third octave bands illustrate that song birds typically sing at a lower level dB but a higher frequency; while transportation sounds are typically at a lower frequency. An examination of one-third octave level variation in Figure 11 reveals that overflight activity contributes much of the higher dB values at the lower frequencies, especially during the daytime hours.

The day and night dB levels for 33 one-third octave bands illustrate that song birds typically sing at a lower level dB but a higher frequency; while transportation sounds are typically at a lower frequency. Research has indicated, in some instances, a masking of song birds by transportation.

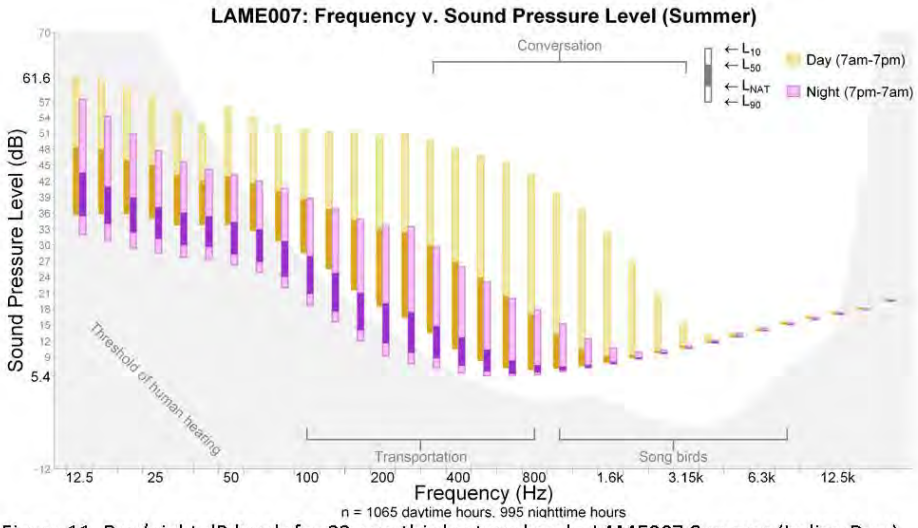

Figure 11. Day/night dB levels for 33 one-third octave bands, LAME007 Summer (Indian Pass).

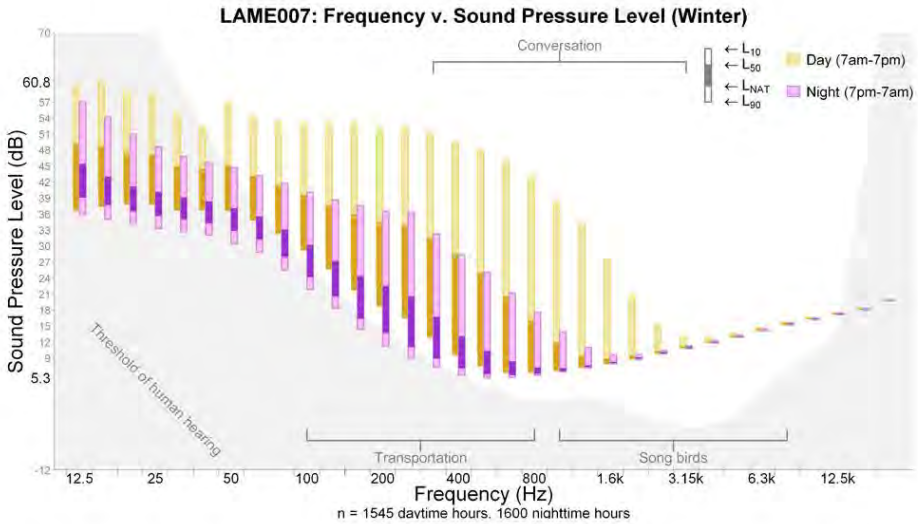

Figure 12. Day/night dB levels for 33 one-third octave bands, LAME007 Winter (Indian Pass).

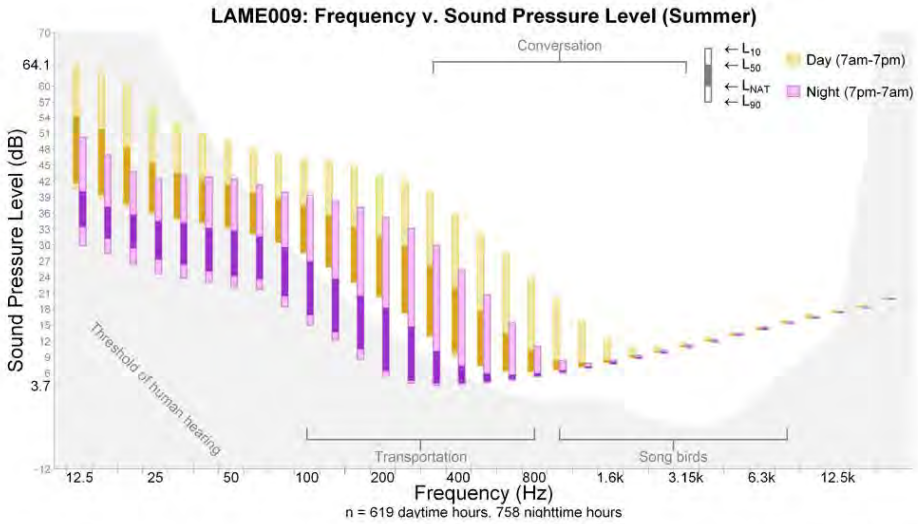

Figure 13. Day/night dB levels for 33 one-third octave bands, LAME009 Summer (Callville Wash).

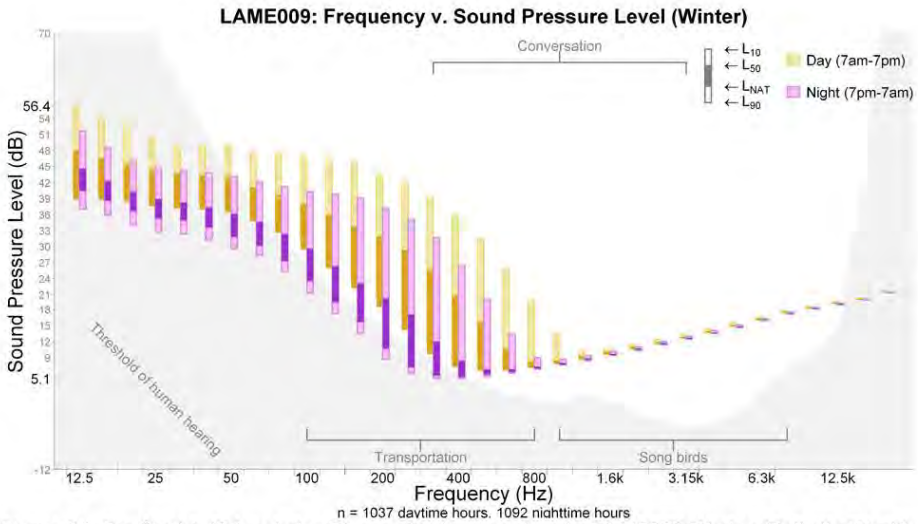

Figure 14. Day/night dB levels for 33 one-third octave bands, LAME009 Winter (Callville Wash).

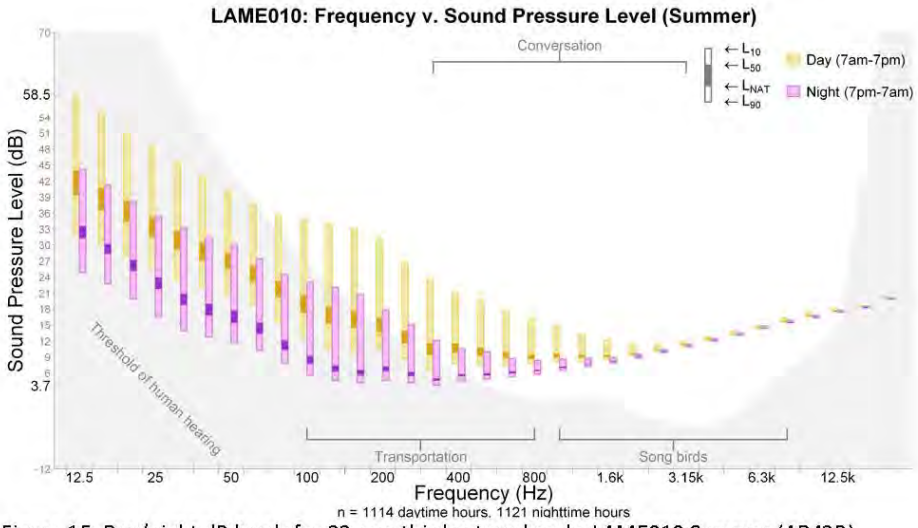

Figure 15. Day/night dB levels for 33 one-third octave bands, LAME010 Summer (AR42B).

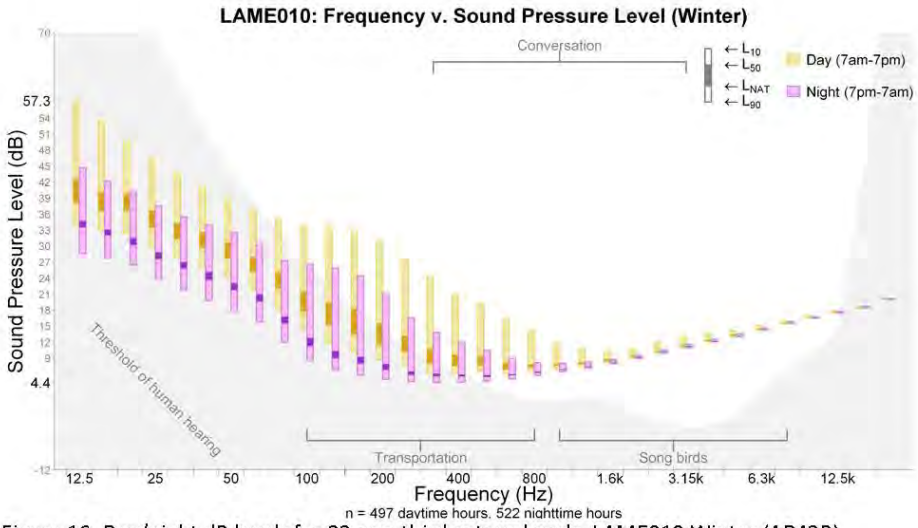

Figure 16. Day/night dB levels for 33 one-third octave bands, LAME010 Winter (AR42B).

Existing Ambient

Figure 17 - Figure 22 illustrate the variation in natural ambient dB across all frequencies by hour. Darker shades denote lower dB values while lighter shades denote higher dB values. The onset of loud low frequency sounds reflects increased aircraft activity as well as an increase in intrinsic sounds such as wind.

For example, Figure 17 for LAME007 (Summer) shows an increase in sound around 0630, which represents aircraft overflight activity that occurs throughout the day light hours.

Figure 17 - Figure 22 are very similar in shape, showing an increase in sound during the middle of the day for most sites. LAME009 (Figure 19 and Figure 20) has a larger orange contour than the other sites. This is an indication of the increased overflight activity at this site.

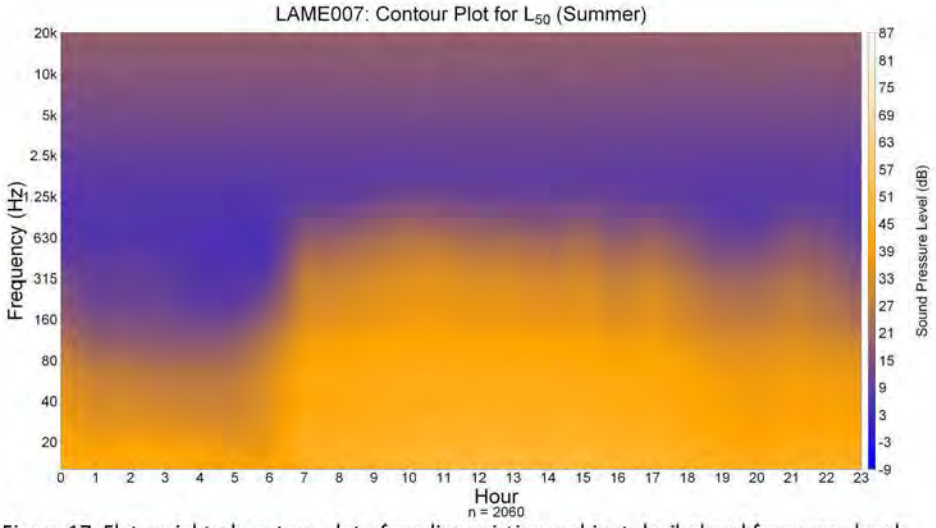

Figure 17. Flat-weighted contour plot of median existing ambient decibel and frequency levels, LAME007 Summer (Indian Pass).

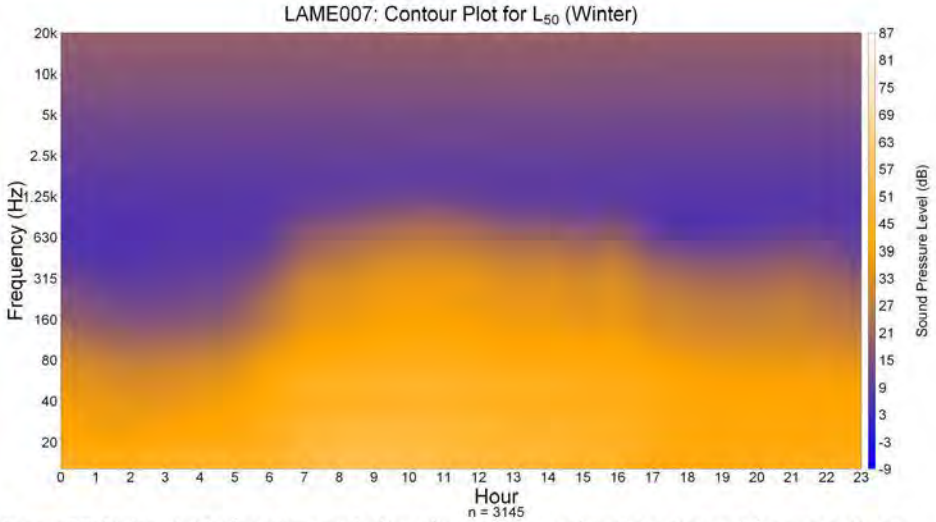

Figure 18. Flat-weighted contour plot of median existing ambient decibel and frequency levels, LAME007 Winter (Indian Pass).

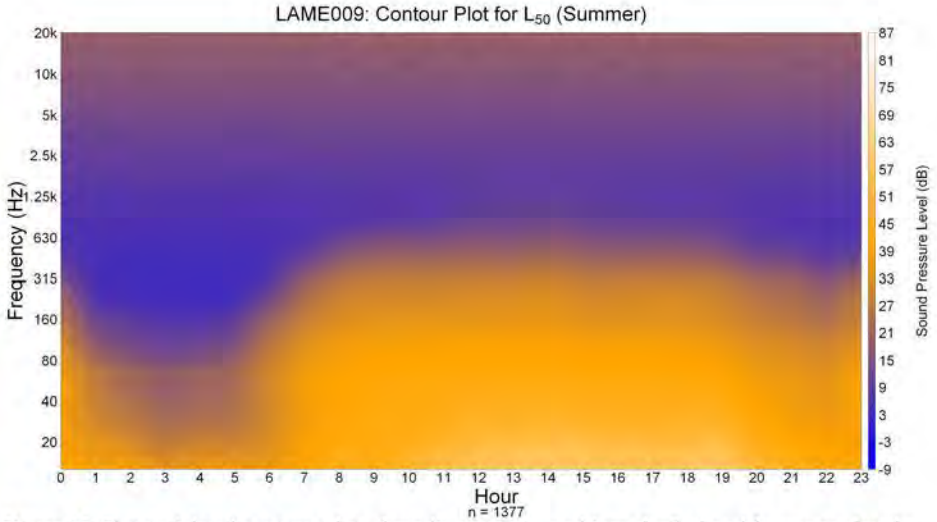

Figure 19. Flat-weighted contour plot of median existing ambient decibel and frequency levels, LAME009 Summer (Callville Wash).

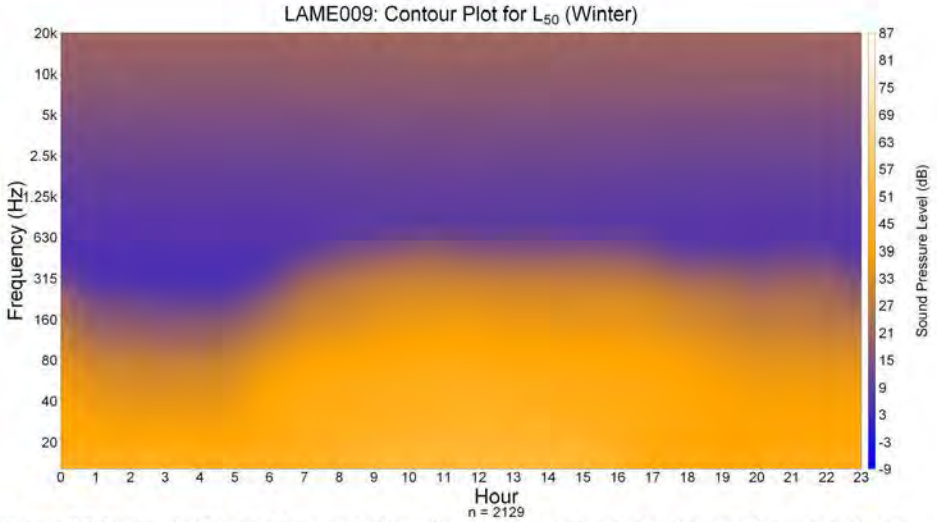

Figure 20. Flat-weighted contour plot of median existing ambient decibel and frequency levels, LAME009 Winter (Callville Wash).

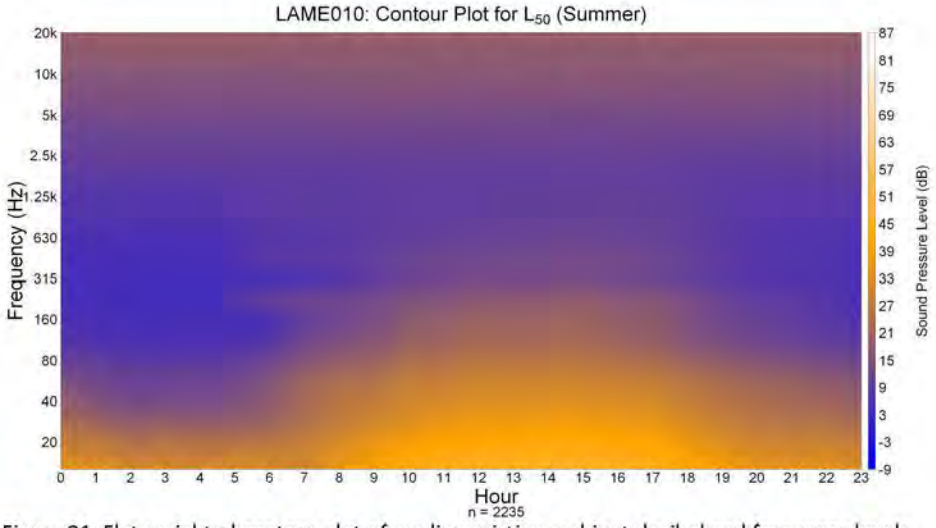

Figure 21. Flat-weighted contour plot of median existing ambient decibel and frequency levels, LAME010 Summer (AR42B).

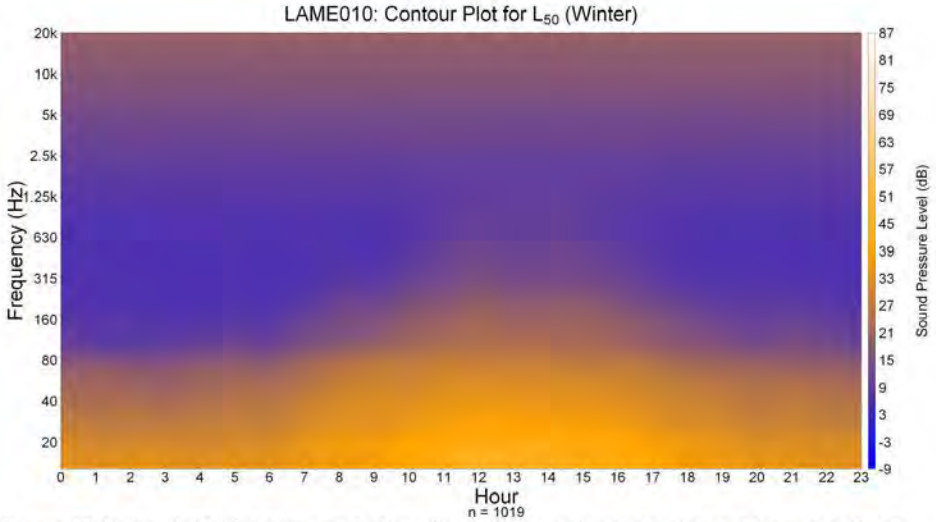

Figure 22. Flat-weighted contour plot of median existing ambient decibel and frequency levels, LAME010 Winter (AR42B).

Percent Time Audible

The overall percentage of samples in which extrinsic sounds were audible is demonstrated in Figure 23 - Figure 28. In addition to aircraft, road vehicles were also occasionally audible at these sites. In addition to the figures, percent time audibility is explained for a few of the sites below as compared to recorded sounds during on-site and off-site listening. Figure 23 and Figure 24 demonstrate the aircraft overflight pattern at LAME007. As scenic helicopter tours begin their routes and high altitude jets fly over this location there is a rise in activity around 0700. Aircraft audibility increase to over 90% during the mid-morning hours. In contrast, aircraft overflights were the quietest during the 0400 hour, with an audibility of only 8.6 percent. This figure also demonstrates that aircraft are by far the most dominant extrinsic sound source at this site, for all hours.

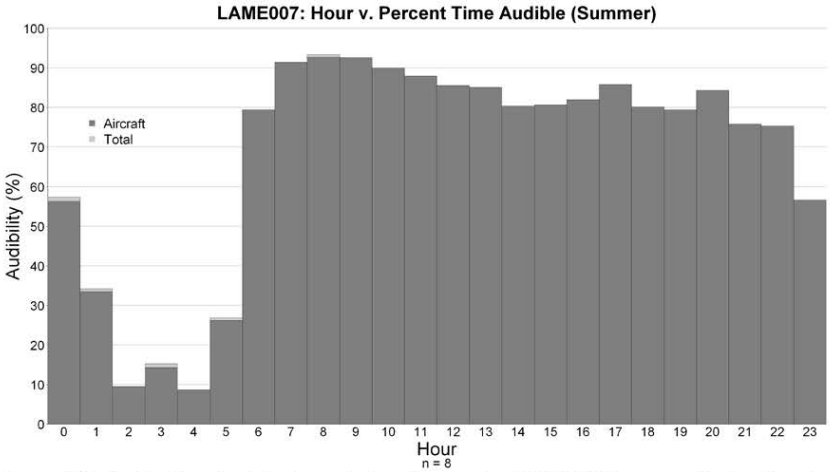

Figure 23. Audibility of extrinsic and aircraft sounds, LAME007 Summer (Indian Pass).

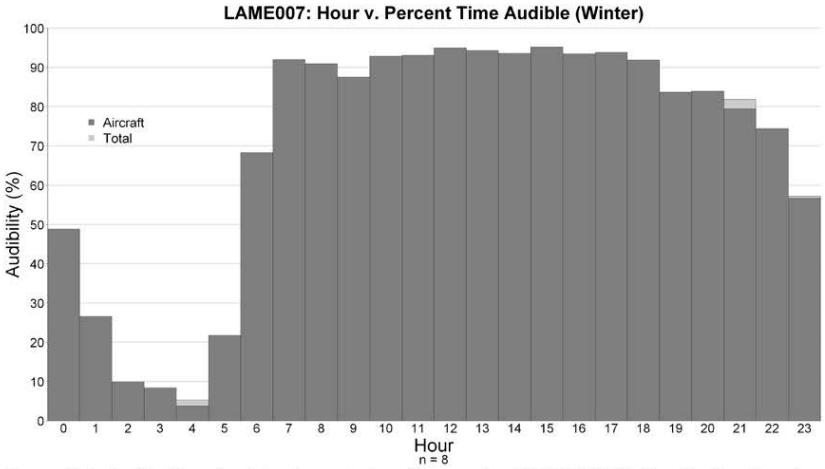

Figure 24. Audibility of extrinsic and aircraft sounds, LAME007 Winter (Indian Pass).

Figure 25 and Figure 26 demonstrate the aircraft overflight pattern at LAME009. The overall percent of samples in which extrinsic sounds were audible is highest at this site. There is a peak in the morning at 0800 hours. In addition to aircraft, road vehicles were also just barely audible at this site. Aircraft overflights were the quietest during the 0400 hour, when aircraft was audible only 8.5 percent of the time.

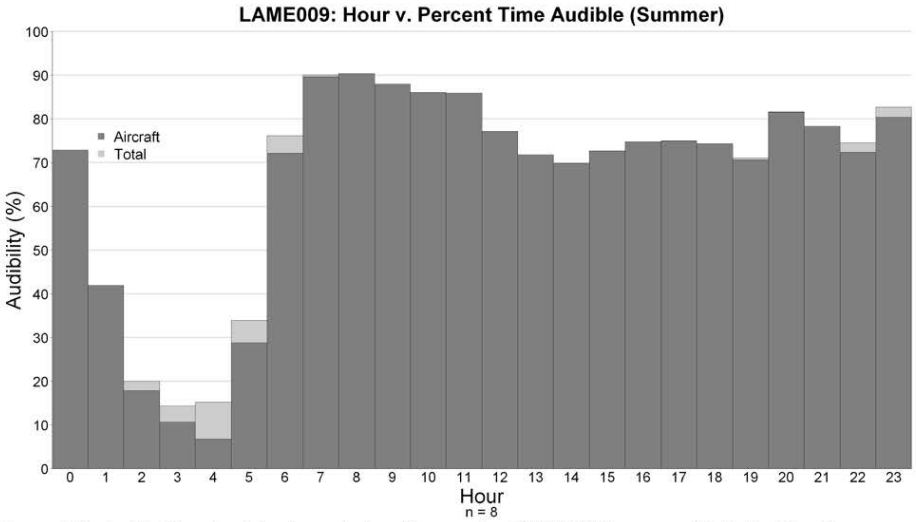

Figure 25. Audibility of extrinsic and aircraft sounds, LAME009 Summer (Callville Wash).

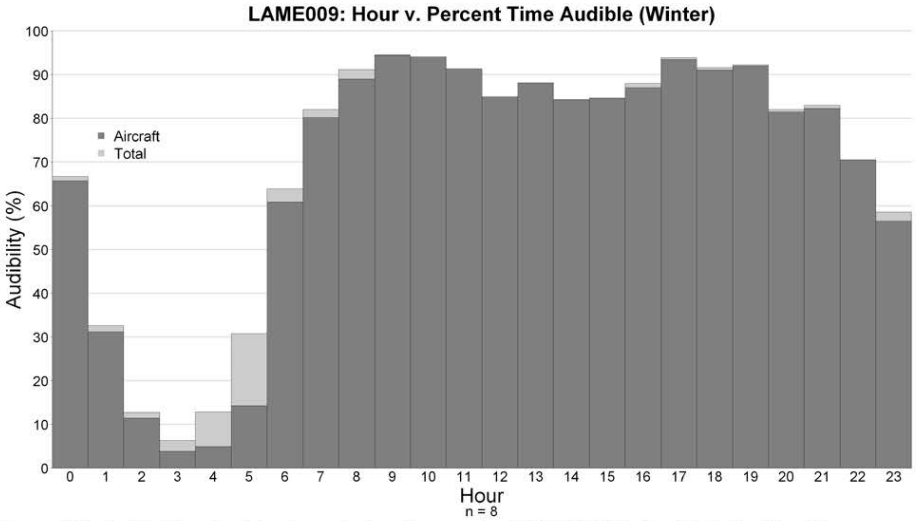

Figure 26. Audibility of extrinsic and aircraft sounds, LAME009 Winter (Callville Wash).

Figure 27 and Figure 28 demonstrate the aircraft overflight pattern at LAME010. The overall percent of samples in which extrinsic sounds were audible is lowest at this site. There is a peak in the morning at 0800 hours. In addition to aircraft, road vehicles were on rare occasions just barely audible at this site. LAME010 is the quietest site in regards to human caused contributions. Aircraft overflights were the quietest during the 0400 hour when aircraft was audible only 3.3 percent of the time.

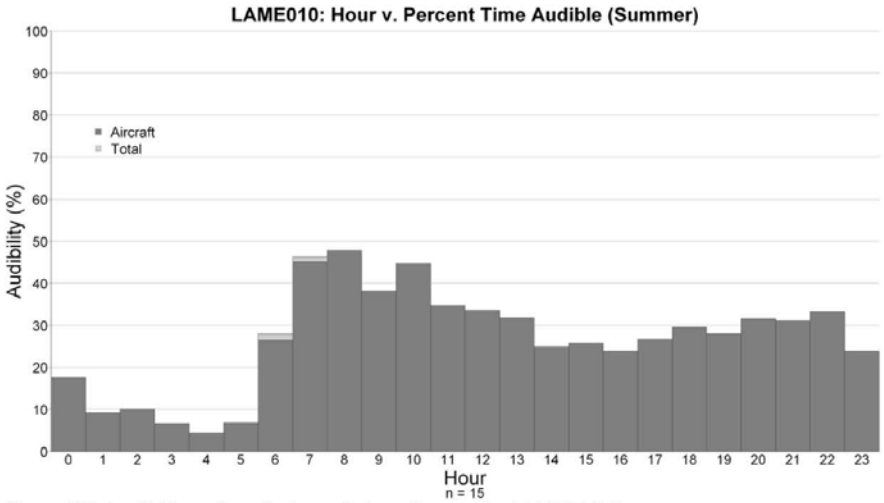

Figure 27. Audibility of extrinsic and aircraft sounds, LAME010 Summer.

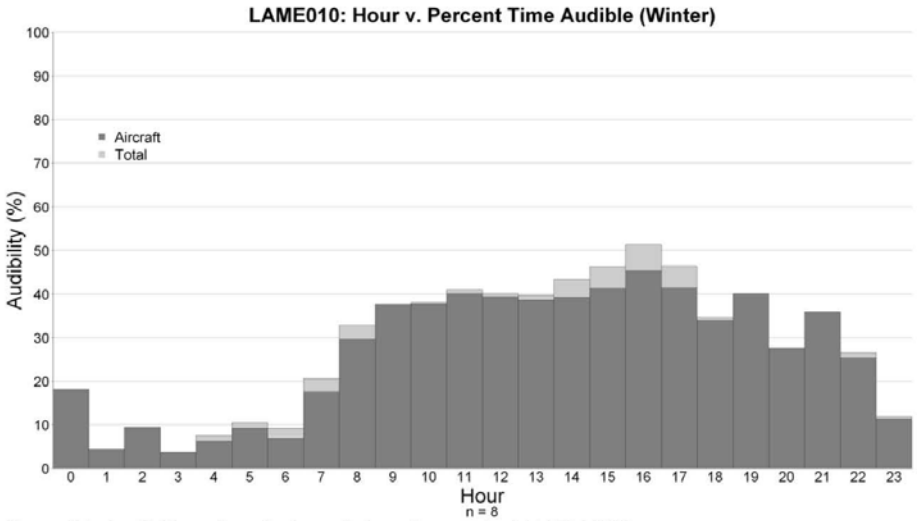

Figure 28. Audibility of extrinsic and aircraft sounds, LAME010 Winter.

On-site Listening

The tables below display results of on-site listening sessions. Each audible sound source is listed in the first column. Percent time audible, or PA, is the second column. The third column, max event length, reports the maximum event length among the sessions for each sound source in minutes and seconds (mm:ss). Likewise, the mean event column reports the mean length of the events in minutes and seconds (mm:ss). The last row in the table, noise free interval (NFI), is a metric which describes the length of time between extrinsic or human-caused events. These on-site listening tables are essentially a sound inventory of each site. They reveal the sounds one is likely to hear at or near each location.

At LAME007, the attended listening session was conducted on April 22, 2008, during removal of the monitoring equipment. Table 5 and Figure 29 report the results of on-site listening for LAME007. The audibility report is based on two hours of data between the hours of 1000-1100 and 1200-1300. The natural sound sources for this site consisted of wind, insects, and birds. The noise free interval occurred for a maximum length of 34 seconds. Figure 29 illustrates the data in Table 5 graphically.

Table 5. On-site Listening Report for Indian Pass AR72 (LAME007)

Sound Source	Percent Time Audible (PA)	Max Event Length, mm:ss	Mean Event Length, mm:ss	Count
All natural sources	94.1			
All non-natural sources	96.7			
All aircraft	96.7			
Aircraft, propeller	8.2	02:25	00:59	10
Helicopter	23.8	04:17	01:47	16
Jet	71.8	07:44	01:16	68
Bird	64.5	04:21	00:32	145
Insect	78.6	05:27	00:38	150
Wind	6.9	00:49	00:11	46
Noise free interval		00:34	00:06	41

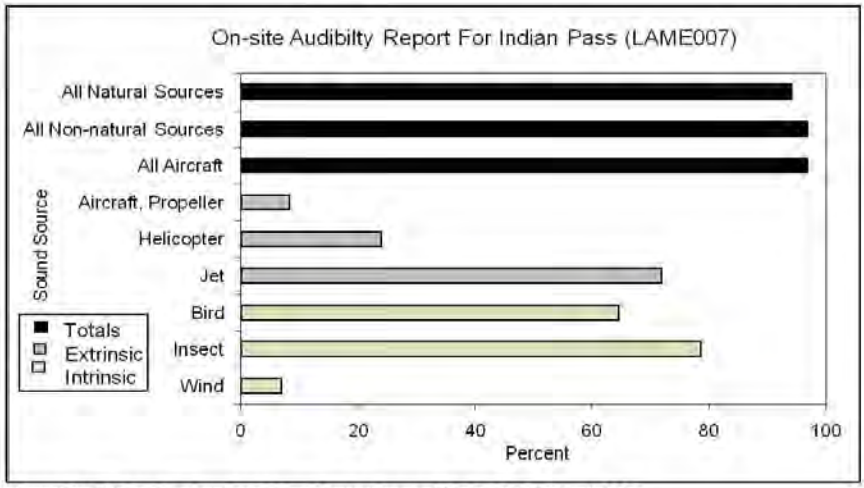

Figure 29. Percent time present during sampling period, LAME007.

The attended listening session was conducted on April 16, 2008, during removal of the acoustic monitoring equipment at LAME009 (Callville Wash). Table 6 and Figure 30 report the results of on-site listening for LAME009. The audibility report is based on 3 hours of data between the hours of 0930-1030, 1100-1200, and 1330-1430. The natural sound sources for this site consisted of wind, insects, and bird calls (Figure 30). The noise free interval occurred for a maximum length of 1 minute and 8 seconds.

Table 6. On-site Listening Report for Callville (LAME009).

Sound Source	Percent Time Audible (PTA)	Max Event Length (mm:ss)	Mean Event Length (mm:ss)	Count
All natural sources	99.9			
All non-natural sources	89.6			
All aircraft	89.6			
Jet	72.8	05:18	01:08	115
Helicopter	13.2	03:29	01:29	16
Aircraft, propeller	0.4	00:44	00:44	1
Aircraft, unknown	6.4	01:37	00:50	14
Wind	99.7	59:58	44:53	4
Bird	53.0	03:35	00:23	244
Insect	13.0	01:38	00:06	218
Natural, unknown	0.0	00:02	00:02	2
Noise free interval		01:08	00:10	110

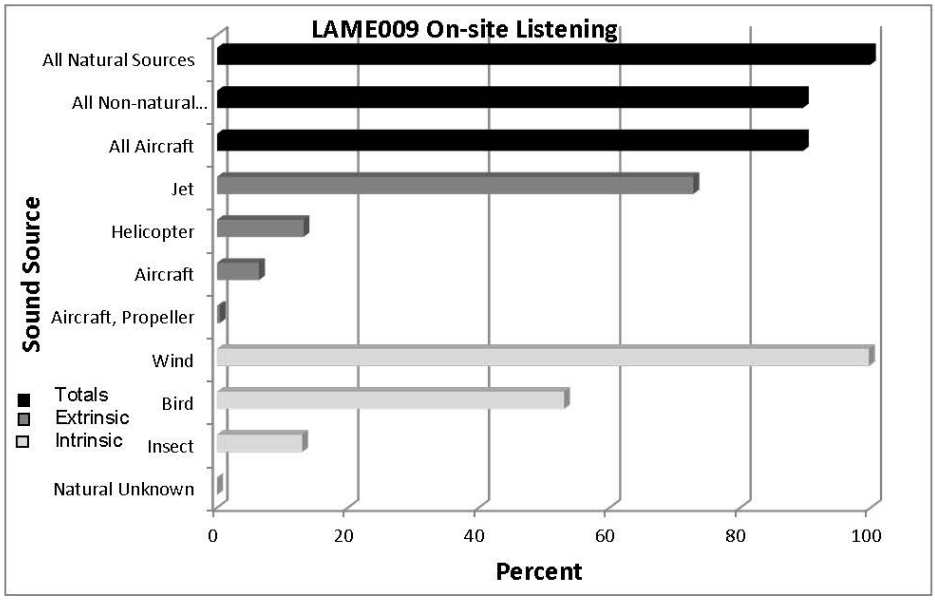

Figure 30. Percent time present during sampling period, LAME009 (Callville Wash).

The attended listening session at LAME010 was conducted on February 25, 2009. Table 7 and Figure 31 report the results of on-site listening for LAME010. The audibility report is based on 2 hours of data between the hours of 1100-1200 and 1230-1330. The natural sound sources for this site consisted of wind, insects, and bird calls (Figure 31). The noise free interval occurred for a maximum length of 10 minutes and 31 seconds.

Table 7. On-site Listening Report for AR42B West Powerline Wash Road (LAME010).

Sound Source	Percent Time Audible (PTA)	Max Event Length (mm:ss)	Mean Event Length (mm:ss)	Count
All natural sources	98.5			
All non-natural sources	47.6			
All aircraft	47.6			
Aircraft, unknown	8	03:36	00:44	13
Jet	19.8	02:42	00:48	30
Aircraft, propeller	19.9	06:06	02:23	10
Insect	47.2	01:21	00:14	245
Bird	74.8	03:33	00:40	133
Wind	77.8	20:21	01:20	70
Natural, unknown	0.3	00:09	00:04	5
Noise free interval		10:31	01:13	52

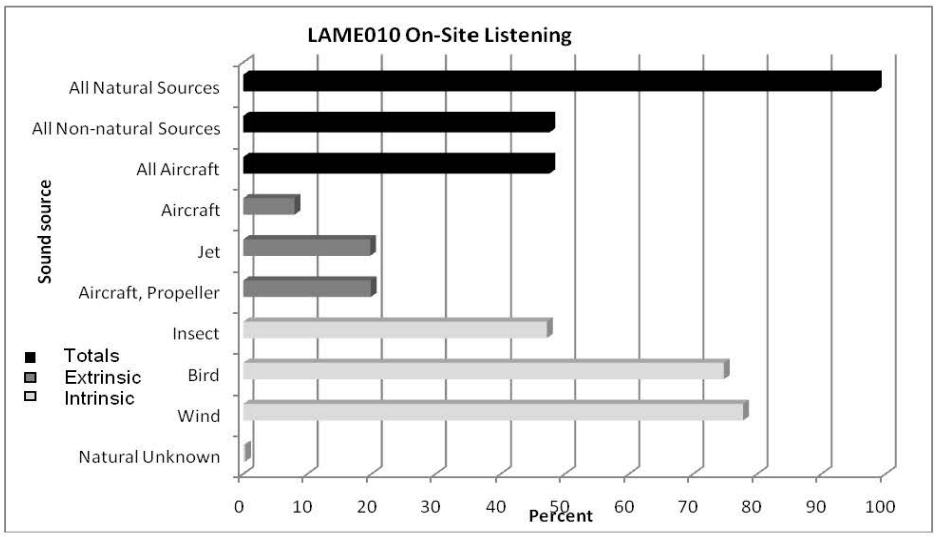

Figure 31. Percent time present during sampling period, LAME010 (AR42B West Powerline Wash Road).

CONCLUSION

This study was intended to provide current baseline sound level and overflight data throughout and nearby Lake Mead NRA. It was intended to inform and facilitate the formulation of an Air Tour Management Plan for the park (a Congressional mandate), wilderness planning, and overall park planning. Overall, park staff found the current conditions at the selected sites to be fairly quiet. Data show that the sites were most affected by extrinsic noise during daytime and evening hours. The dominant extrinsic noise source at all sites was high-altitude jets.

The acoustic monitoring systems also collected detailed records of ambient sound pressure levels. These data can be used to report existing ambient levels, and in conjunction with percent time audible statistics, can help estimate the natural ambient acoustical conditions. The existing ambient (L50) level is the median sound level. It is the composite of all sounds at a site, both human caused and natural. The natural ambient (Lnat) estimates what the acoustic environment would be without the contribution of anthropogenic sounds. Throughout the study area, natural and existing ambient levels were relatively quiet. In fact, in the early morning hours, sound pressure levels at LAME009 and LAME010 were very close to the noise floor of acoustic monitoring equipment, which is the lowest recording limit. Sound levels as low as these are extremely rare and highly sensitive to the influence of extrinsic sound events. While wind and location of monitoring equipment can affect the ambient sound pressure levels, the data presents a likely range of ambient levels for the sampling areas in the park, regardless of slight variations in ambient values.

Acoustic monitoring at Lake Mead NRA and surrounding BLM lands not only offers insight into the prevalence of extrinsic noise, but also allows managers to determine the presence of biological (or geologic) activity. Both on-site and off-site listening sessions produced a number of informative biological, meteorologic, and geologic sound recordings, such as bighorn sheep, bird calls, coyote howls, thunder storms, and rock falls.

Natural Ambient Sound Level and Audibility

Park staff was able to assess common noise sources at each site using off-site analysis (either visual or auditory). By a large margin, the most common noise source was aircraft (with audibility at or near 90% for some hours in some locations), followed by vehicles. The natural ambient levels at Lake Mead NRA were quietest during the early morning hours. As the day progressed into the night; birds, wind, and extrinsic sounds occurred.

The quietest nighttime L_{nat} levels occurred at LAME017 and LAME020, with a dBA of 14.5. The loudest daytime L_{nat} levels occurred at LAME016, with a dBA of 28.0, where local measured wind speed was the greatest. (See full Acoustic Monitoring Technical Report for more information about these sites). When L_{nat} levels were analyzed by frequency, each site displayed a similar pattern. The low frequencies were always the loudest, and the high frequencies were typically the quietest.

This trend was slightly different for LAME011 (See full Acoustic Monitoring Technical Report for more information about this site), where the late night and early morning hours ambient levels were increased from bird and insect sound sources.

From the sample sites in this executive summary, the lowest median L_{nat} dBA for LAME009 occurred at 0100 and 0500 hours and registered at 15.3 dBA. LAME010 had a slightly lower median L_{nat} dBA of

14.7 at 0000 and 0300 hours. In contrast, the highest median natural ambient dBA at LAME009 occurred at 1500 at 25.4. Also at 1500, LAME010 reached a median natural ambient high of 17.2 dBA.

Looking at nighttime ambient, using only frequencies affected by transportation noise, or dBT, (20 Hz - 1250 Hz), the data indicate a lower L_{nat} for each of the sites. The nighttime dBT at LAME009 was as low as 13.1 and LAME010 was at 9.5.

In addition to the percent time audible metrics, off-site analysis of acoustic (.wav) samples yielded a number of interesting wildlife sound recordings. In the process of listening to the selected days for each site, park staff located recordings of many different species of bird calls including the rock wren, mockingbird, phainopepla, and cactus wren. Other interesting intrinsic sounds heard include bighorn sheep passing by, coyote calls, rainstorms, and insects. Presumably, if continuous recordings had been analyzed instead of ten second samples every two minutes, these sounds might have been discovered more frequently.

Future Monitoring and Adaptive Management

Acoustic monitoring efforts in Lake Mead NRA yielded valuable results that allow park managers to better understand the existing acoustic environment of the park. Monitoring existing conditions and trends allows managers to take action to move towards desired future conditions. The acoustical data in this report provide the necessary information for the application of acoustic indicators and standards or the development of a management plan.

The wilderness areas listed in this report are relatively quiet in comparison to other portions of the park and even other parks in the nation. The sounds in and around Lake Mead NRA are an issue which deserves further consideration. The wilderness areas within Lake Mead NRA are impacted by extrinsic sounds of transportation, mainly high-altitude jets, helicopters, and vehicles. Limiting or mitigating the human caused contributions of sounds could improve the natural acoustic environment.

The data collected are an initial baseline for these wilderness areas. Future management at Lake Mead should focus on maintaining this baseline. It is recommended that Lake Mead NRA continue to make soundscape monitoring a priority. These areas should be monitored for trends every 2-5 years or more frequently if any significant impact is expected.

Biological monitoring with the use of continuous recording acoustic equipment offers many opportunities to extend surveys to places and intervals when it is inconvenient or impossible for observers to be present. Furthermore, many animals may react to the presence of an observer; a small piece of equipment presents a much smaller potential for disturbance.

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APPENDIX A. Glossary of Acoustic Terms

Acoustic Environment - The actual physical sound resources, regardless of audibility, at a particular location.

Amplitude - The instantaneous magnitude of an oscillating quantity such as sound pressure. The peak amplitude is the maximum value.

Audibility - The ability of animals with normal hearing, including humans, to hear a given sound. Audibility is affected by the hearing ability of the animal, the masking effects of other sound sources, and by the frequency content and amplitude of the sound.

dBA - A-weighted decibel. A-Weighted sum of sound energy across the range of human hearing. Humans do not hear well at very low or very high frequencies. Weighting adjusts for this.

dBT - Truncated measurements focus on general transportation noise (~100-800 hertz). These results allow park staff to confidently draw conclusions about human-caused sounds.

Decibel - A logarithmic measure of acoustic or electrical signals. The formula for computing decibels is: 10(Log10(sound level/reference sound level)). 0 dB represents the lowest sound level that can be perceived by a human with healthy hearing. Conversational speech is about 65 dB.

Diel - A 24-hour period usually consisting of a day and the adjoining night.

Extrinsic Sound - Any sound not forming an essential part of the park unit, or a sound originating from outside the park boundary.

Frequency - The number of times per second that the sine wave of sound repeats itself. It can be expressed in cycles per second, or Hertz (Hz). Frequency equals Speed of Sound/ Wavelength.

Hearing Range (frequency) - By convention, an average, healthy, young person is said to hear frequencies from approximately 20Hz to 20000 Hz.

Hertz - A measure of frequency, or the number of pressure variations per second. A person with normal hearing can hear between 20 Hz and 20,000 Hz.

Human-Caused Sound - Any sound that is attributable to a human source

Intrinsic sound - A sound which belongs to a park by its very nature, based on the park unit purposes, values, and establishing legislation. The term "intrinsic sounds" has replaced "natural sounds" in order to incorporate both cultural and historic sounds as part of the acoustic environment of a park.

Listening Horizon - The range or limit of one's hearing capabilities. Just as smog limits the visual horizon, so noise limits the acoustic horizon.

Leq - Energy Equivalent Sound Level. The level of a constant sound over a specific time period that has the same sound energy as the actual (unsteady) sound over the same period.

Lx - A metric used to describe acoustic data. It represents the level of sound exceeded x percent of the time during the given measurement period. Thus, L50 is the level exceeded 50% of the time (it is also referred to as existing ambient).

Lnat - An estimate of what the acoustic environment might sound like without the contribution of extrinsic (anthropogenic) sounds.

Masking - The process by which the threshold of audibility for a sound is raised by the presence of another sound.

Noise-Free Interval - The period of time between noise events (not silence).

Noise - Sound which is unwanted, either because of its effects on humans, its effect on fatigue or malfunction of physical equipment, or its interference with the perception or detection of other sounds (Source: McGraw Hill Dictionary of Scientific and Technical Terms).

Off-site Listening - The systematic identification of sound sources using digital recordings previously collected in the field.

On-site Listening - The systematic identification of sound sources at a specific monitoring site using a personal digital assistant (PDA). Custom PDA software records begin and end times of audible sound sources. These sessions often last for one hour.

Sound - Variations in local pressure that propagate through a medium (e.g. the atmosphere) in space and time.

Soundscape - Human perception of the acoustic environment.

Sound Pressure - The difference between instantaneous pressure and local barometric pressure. Measured in Pascals (Pa), Newtons per square meter, which is the metric equivalent of pounds per square inch.

Sound Pressure Level (SPL) - A calibrated measure of sound level, expressed in decibels, and referred to an atmospheric standard of 20 micro Pascals.

Time Audible - The amount of time that a sound source is audible to an animal with normal hearing.

APPENDIX B. Analyzing Audibility Visually

Sound pressure levels (SPL) from a 24 hour spectogram at an acoustic monitoring site at Lake Mead National Recreation Area are shown below. Twenty four hours of SPL data are displayed over 12 lines. Each line shows SPL values from low frequency to high frequency. Values are represented with a color scale, where dark purple is quiet and orange/white is loud (Figure 32).

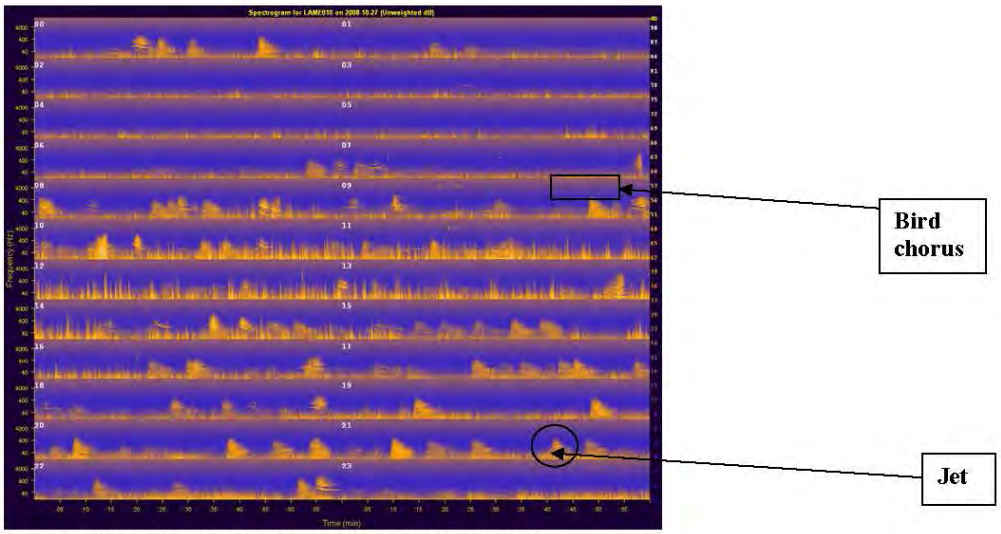

Figure 32. Example of a 24 hour spectrogram from LAME.

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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