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United States Department of the Interior



BUREAU OF LAND MANAGEMENT
Las Vegas Field Office
4765 Vegas Drive
Las Vegas, Nevada 89108

**PROPOSED
GENERAL MANAGEMENT PLAN**
and
DRAFT ENVIRONMENTAL IMPACT STATEMENT
for
Red Rock Canyon National Conservation Area
(An Amendment to the Las Vegas Resource Management Plan)



JULY 1999

U.S. Department of the interior
Mission Statement

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 resource; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U. S. administration.

ABOUT THIS DOCUMENT

This document is divided into two parts -

Part 1 - The Proposed General Management Plan (GMP) and

Part 2 - The Draft Environmental Impact Statement (DEIS) on the Proposed GMP and Alternatives.

The Proposed GMP is Alternative 3 of the DEIS. Part 1 - The Proposed GMP includes topics related to administration and program direction not found in the DEIS such as Interpretation and Environmental Education, Cultural Resources, and Public Safety.

Numerous items giving management direction which are common to all alternatives or are dictated by law or policy are contained in the Standard Operating Procedures and/or Management Common to All Alternatives sections. The common items are grouped in these two sections. The total picture of the proposed management direction combines the Proposed GMP specifics with the Standard Operating Procedures and the Management Common to all alternatives.

A short form Final GMP and EIS may be printed. The short form would probably not include all the Alternatives and Appendices. Therefore, this document should be retained for future reference.



**UNITED STATES DEPARTMENT of the INTERIOR
BUREAU OF LAND MANAGEMENT**

**Las Vegas Field Office
4765 Vegas Drive
Las Vegas, Nevada 89108**

Dear Friend of Red Rock,

I am pleased to present the Red Rock Canyon National Conservation Area **Proposed General Management Plan (GMP) and Draft Environmental Impact Statement (DEIS)** for your review and comment. The formal comment period on the GMP is July 1, 1999 to Sept. 30 1999. During this time BLM will hold a series of open houses and field trips to describe the elements of the plan and discuss proposed actions and future management direction.

I would like to thank you for your interest in the long term health and management of Red Rock Canyon. I would especially like to thank those individuals and organizations who volunteered to be on our planning team. They endured many meetings and long hours helping to shape the issues and alternative actions presented in this Proposed GMP/DEIS.

In preparing this Proposed GMP, Congressional direction in the legislation creating the National Conservation Area gave us our primary objectives. In the first paragraph of the Act it states "...to conserve, protect, and enhance for the benefit and enjoyment of present and future generations the area in southern Nevada containing and surrounding the Red Rock Canyon and the unique and nationally important geologic, archaeological, ecological, cultural, scenic, scientific, wildlife, riparian, wilderness, endangered species, and recreation, there is established the Red Rock Canyon National Conservation Area." The Proposed GMP includes management direction for five specific subjects Congress required planning for - interpretation and public education, administrative and public facilities, cultural resources, wildlife and dispersed recreation activities.

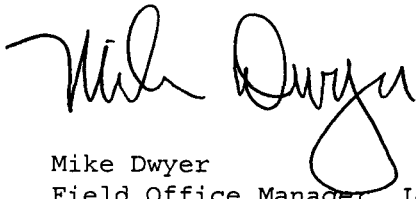
As with all land use planning efforts, the Proposed GMP requires priority setting for resource and space allocation. Not all activities can occur everywhere, some are mutually exclusive and trade offs must be evaluated. The overall direction we have taken is to put the long term health, and in some cases recovery, of the Red Rock ecosystem as our first priority. All other resource uses and activities must fit into this overall direction. Of course even this objective is subject to priority setting since it could be argued that the best ecosystem management would be no human use at all. This however would not meet the Congressional intent in creating the National Conservation Area (i.e. "benefit and enjoyment of present and future generations") or be practical since human use is well established.

Therefore, we are presenting in the Proposed GMP/DEIS what we believe is the best mix of management direction, visitor use and ecosystem management that will meet the intent of the NCA designation and protect the long term health and vitality of the ecosystem. This does mean that there will be some changes in both human use and resource allocation.

Thanks to the efforts of BLM staff, volunteers and researchers, we are able to present some of the most complete and extensive data on wildlife, plants and

riparian systems ever assembled for this type of planning effort. This data was not available to BLM in prior Red Rock planning efforts. As a result, some issues seem less critical now (i.e. some plant species once thought to be rare are now documented as commonly occurring) while other issues have become more critical (i.e. assessments of riparian areas has documented substantial on-going damage to riparian systems).

Thank you in advance for your participation in the review process and your comments. If any parts of the Proposed GMP/DEIS need clarification you can contact Gene Arnesen, GMP Team Leader at (702) 647-5068 (gene_arnesen@nv.blm.gov) or Dave Wolf, Conservation Area Manager at (702) 647-5074 (dave_wolf@nv.blm.gov).

A handwritten signature in black ink, appearing to read "Mike Dwyer". The signature is fluid and cursive, with the first name "Mike" written in a larger, more prominent script than the last name "Dwyer".

Mike Dwyer
Field Office Manager, Las Vegas

PART 1

PROPOSED GENERAL MANAGEMENT PLAN

RED ROCK CANYON NATIONAL CONSERVATION AREA

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INTRODUCTION

This Proposed General Management Plan (GMP) contains proposed management direction, decisions and actions for the Red Rock Canyon National Conservation Area (RRCNCA). The Proposed GMP has been developed as a result of an extensive planning process involving numerous individuals, organizations, interest groups, and local, State and Federal agencies. The GMP provides a broad framework, and in some cases specific decisions, which will guide the management and use of the RRCNCA. The Draft Environmental Impact Statement (DEIS) which accompanies this GMP includes a description of the Proposed GMP and alternatives considered in the planning process, an assessment of the impacts of implementing the Proposed GMP or any of the alternatives and a compilation of all the information known on the natural resources, facilities and recreational uses occurring within the RRCNCA.

Issuance of this Proposed GMP/Draft EIS initiates a period of review and comment by the public and local, State and Federal agencies. Following this review the State Director, BLM Nevada, will, taking into account comments and any new information provided by the public or other governmental agencies, select and approve a Final GMP. The Final GMP may be the Proposed GMP, one of the alternatives or a new set of decisions drawn from all the alternatives.

Adoption of the Final GMP will complete implementation of the planning requirement Congress included in the legislation designating RRCNCA.

The reader will find some duplication of maps and text between the Proposed GMP and the Draft EIS. This has been kept to a minimum but is necessary so that each document presents a complete picture of future management of RRCNCA. Technical data and/or lengthy descriptions for either document are included in the Appendix section of the DEIS.

BACKGROUND

For more than thirty years Las Vegas residents and visitors have valued the Red Rock Canyon area for its scenery and recreational opportunities. The Bureau of Land Management (BLM) recognized these values when it administratively designated 62,000 acres as the Red Rock Canyon Recreation Lands in 1968 and began providing visitor facilities. As the rapid growth of the Las Vegas area over the next twenty years increased both recreational use in Red Rock Canyon and the awareness of the potential impacts on sensitive natural resources, public support grew for a designation which would be more encompassing, eliminate any potential for future land disposal or minerals development within Red Rock Canyon and provide for better control of recreational users. In 1990 Congress designated 83,100 acres as Red Rock Canyon National Conservation Area. In 1994 and again in 1998 Congress modified and expanded the RRCNCA boundaries resulting in a current size estimated at 196,000 acres.

The initial land use plans for Red Rock Canyon, developed in the late 1960s and early 1970s, called for intensive recreational developments, roads and facilities. Fortunately most of these early plans were not implemented. The three major projects undertaken were construction of the first half of the Scenic Drive in 1972, construction of the second half of the Scenic Drive in 1978, and construction of the Visitor Center in 1982. The area surrounding the Scenic Drive was, and continues to be, the focal point for recreational use in Red Rock Canyon. Recreational amenities provided by BLM (signing, trails, restrooms) have been concentrated in this area.

Recognizing the need to update the old recreation oriented plans, Congress directed BLM to prepare a General Management Plan for RRCNCA. A planning process was initiated in 1991 and was nearly complete in 1994 when Congress first expanded RRCNCA. The expansion action required the planning process to be re-initiated to include the newly designated lands. However, rather than revert to management under the badly outdated 1976 Master Plan, the decision was made to designate the nearly completed plan as the Interim GMP for the original 83,100 acres in RRCNCA, re-initiate planning to include the entire RRCNCA, and when the planning effort was completed, replace the Interim GMP with the Final GMP. This Proposed GMP is the next to last step in completing the re-initiated planning process.

THE PLANNING PROCESS

Land Use Planning Considerations required by Congress

In the RRCNCA Establishment Act of 1990, Congress required the BLM to prepare a General Management Plan to "describe the appropriate uses and development of the conservation area consistent with the purposes of this Act." Congress further defined its requirements by directing that five specific areas have planning decisions developed.

- A) An interpretation plan for a continuing program of interpretation and public education about the resources and values of the conservation area,

A description of the plan for providing a continuing program of environmental interpretation and education is described in the section titled Interpretive Plan beginning on page 9. The Visitor Center and Scenic Drive pull offs will remain the focus for this program since this is where most visitors are contacted. Plans for the Visitor Center and Scenic Drive facilities are included in the section titled Administrative and Public Facilities.

- B) A proposal for administrative and public facilities to be developed, expanded, or improved for the conservation area including Red Rock Canyon visitors center, to accommodate visitors to the conservation area,

Proposals for administrative and public facilities, including buildings, roads, and trails, are included in the Administrative and Public Facilities section (page 19) and in the Recreation Opportunities section (page 47).

- C) A cultural resources management plan for the conservation area prepared in consultation with the Nevada State Historic Preservation Officer, with emphasis on the preservation of the resources in the conservation area and the interpretive, educational, and long-term scientific uses of these resources, giving priority to the enforcement of the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa et seq.) and the National Historic Preservation Act (16 U.S.C. 470 et seq.) Within the conservation area,

A management plan for cultural resources is presented on page **. This plan is essential the same as the cultural resources plan in the Interim GMP. The SHPO's office reviewed the Interim GMP and will be asked to review and comment on this Proposed GMP.

- D) A wildlife resource management plan for the conservation area prepared in consultation with appropriate departments of the State of Nevada and using previous studies of the area,

The management of wildlife resources is included in the broader planning for Biodiversity since wildlife is inseparable from the vegetative and riparian resources which combine to form the spring Mountain ecosystem. The Nevada Division of Wildlife has had a representative on the planning team since it was formed.

- E) A recreation management plan, including non-motorized dispersed recreation opportunities for the conservation area in consultation with appropriate departments of the State of Nevada.

Management guidance for recreation use can be found in the Recreation Opportunities and Administrative and Public Facilities sections. In addition to dispersed recreation opportunities, direction is given for commercial uses including tour operators, riding stables and rock climbing schools. The Nevada Division of State Parks has had a representative on the planning team since it was formed.

Rather than prepare separate plans for the above listed subject areas, the BLM has ensured that the Proposed GMP includes and makes recommendations for these items in concert with other issues and subject areas that need planning decisions. This Proposed GMP includes the proposed management direction and actions necessary to satisfy the Congressional requirements. Where planning decisions and proposed actions have the potential to impact the natural environment or recreational users of RRCNCA, they are analyzed and evaluated in the Draft EIS.

GMP Planning Process

As discussed previously, this Proposed GMP represents a second phase of planning for RRCNCA. An Interim GMP, completed in June 1995, provides direction for the lands designated as RRCNCA in 1990 and will be replaced with adoption of the Final GMP.

The planning process for this Proposed GMP began in September 1995 with a series of public meetings held to solicit issues and concerns which the public felt needed to be addressed in the planning process. These issues and concerns along with the five planning topics identified by Congress and concerns raised by BLM staff resulted in twelve issues (listed below). During the planning process BLM requested the assistance of individuals representing the groups and agencies concerned with the future of RRCNCA and a citizens planning team was formed. This group met on numerous occasions to discuss and refine the planning issues and to develop actions and/or alternatives which could be implemented to resolve or mitigate the issues. The Proposed GMP and alternatives were developed as a result of the planning team's discussions.

Planning Issues

Listed below are the twelve planning issues developed through the scoping and issue identification process. An expanded discussion of the issues can be found in the Draft EIS.

1. What measures should be taken to preserve biodiversity?
2. How should riparian areas be protected?
3. How should wild horses and burros be managed?
4. How should cultural and paleontological resources be managed?
5. What opportunity settings (Management Emphasis Areas) should be offered to visitors?
6. What recreation opportunities should be offered to visitors and how should they be managed?
7. How should road and trail systems be managed to provide for hiking, bicycling, horse riding, motor vehicle use, and other possible uses, while protecting the environment?
8. What camping opportunities and facilities should be provided?
9. How should technical rock climbing be managed?
10. To what extent should target shooting be allowed?
11. To what extent should commercial purposes be allowed?
12. How do we properly recognize and provide for Native American concerns?

Planning Considerations and Criteria

Planning Considerations

Legal requirements and directives give overall direction and guidance to the planning process.

* FEDERAL LAND POLICY AND MANAGEMENT AND NATIONAL ENVIRONMENTAL POLICY ACTS

The Federal Land Policy and Management Act (FLPMA) of 1976, as amended, and the National Environmental Policy Act (NEPA) of 1969, as amended: Development of the GMP is guided by the legal authority found in FLPMA and NEPA. In developing land use plans, FLPMA and NEPA require that the BLM use an interdisciplinary approach and provide opportunities for public involvement and interagency coordination. Both FLPMA and NEPA require the BLM to provide the public with information about the effects of implementing land use plans.

Since the passage of FLPMA, the BLM identified certain areas, now within RRCNCA, for wilderness review. These areas, called Wilderness Study Areas (WSAs), have been managed under the BLM Interim Management Policy and Guidelines for Lands Under wilderness Review (IMP) since they were identified. The objective of the IMP is to manage those lands so as to not impair their suitability for designation as wilderness. The WSAs within RRCNCA will continue to be managed under the IMP, and the GMP will only be carried out to the extent that it does not conflict with the IMP, until action is taken by Congress. If Congress decides not to designate the WSAs as wilderness, the lands would then be managed under the provisions of the GMP.

* RED ROCK CANYON NATIONAL CONSERVATION AREA ESTABLISHMENT ACT OF 1990

The Red Rock Canyon National Conservation Area Establishment Act of 1990, as amended, described the purpose of establishing RRCNCA and made certain provisions for its management, including:

- * The Secretary shall only allow such uses of the conservation area as he finds will further the purposes for which the conservation area is established.
- * The Secretary shall permit hunting within the conservation area in accordance with the laws of the State of Nevada provided that the Secretary, after consultation with the Nevada Department (Division) of Wildlife, may issue regulations designating zones where and establishing when hunting shall not be permitted for reasons of public safety, administration, or public use and enjoyment.
- * Except when needed for administrative or emergency purposes, the use of mechanized vehicles shall be allowed only on roads and trails specifically designated for such use.
- * The Secretary may limit visitation and use of the conservation area as the Secretary finds appropriate for the protection of the resources of the conservation area.
- * Any lands, waters, or interests therein within the boundaries of the conservation area which may be acquired by the United States shall be incorporated into the conservation area.
- * Subject to valid existing rights, all Federal lands within the conservation area are withdrawn from all forms of entry, appropriation, or disposal under the public land laws, from location, entry, and patent under the mining laws, and from operation under the mineral leasing and geothermal leasing laws.

Planning Criteria

BLM planning regulations (43 CFR 1610) require preparation of planning criteria to guide development of all resource management plans. Planning criteria ensure that plans are tailored to the identified issues and ensure that unnecessary data collection and analyzes are avoided. Planning criteria are based on applicable law, agency guidance, public comment, and coordination with other Federal, State, and local governments, and Native American tribal governments.

The planning criteria used in developing the Red Rock Canyon National Conservation Area General Management Plan are as follows:

- * The GMP will be completed in compliance with FLPMA and all other applicable laws. It will meet the requirements of the Act to protect and enhance for present and future generations the unique and nationally important geologic, archaeological, ecological, cultural, scenic, scientific, wildlife, riparian, wilderness, endangered species, and recreation resources of the public lands.
- * The RRCNCA Planning team will work cooperatively with the State of Nevada, tribal governments, local, State and Federal agencies, and all other interested groups, agencies and individuals.
- * The GMP will establish the guidance upon which the BLM will rely on in managing RRCNCA and will be considered an amendment and addition to the 1998 Las Vegas Resource Management Plan (RMP).
- * The planning process will include an Environmental Impact Statement that will comply with National Environmental Policy Act standards.
- * The plan will emphasize the protection and enhancement of biodiversity and the Spring Mountain ecosystem while at the same time providing the public with opportunities for compatible dispersed recreation.
- * Major public facilities and services will be concentrated in the areas already modified by development with most facilities located along the Scenic Drive or at the Visitor Center.
- * The GMP will recognize valid existing rights within RRCNCA.
- * The planning process will involve Native American tribal governments as part of the planning team and will provide strategies for the protection of recognized traditional uses.
- * The concerns of area residents will be recognized in the GMP.
- * The GMP will not address boundary adjustments. Congress has established the NCA boundaries.
- * The GMP will recognize the State's responsibility to manage wildlife. BLM, in accordance with the Act, will consult with the Nevada Division of Wildlife before closing any areas to hunting for the purposes of protecting public safety, administering RRCNCA, or public use and enjoyment.
- * Any private lands located within RRCNCA's administrative boundary which are acquired by the BLM will be immediately made a part of RRCNCA and managed consistent with the GMP.
- * Decisions made in the GMP will strive to be compatible with the existing plans and policies of adjacent local, State and Federal agencies as long as the decisions are in conformance with Congressional direction on the management of RRCNCA.

Relationship to the 1976 Master Plan, 1995 Interim GMP and Subsequent Decisions

The Red Rock Canyon Master Plan was in effect for 19 years 1976 to 1995 when the Interim GMP was adopted. When the Master Plan was written, the area had a BLM administrative designation as the Red Rock Canyon Recreation Lands (RRCRL). In 1990, Congress passed legislation changing the status to a National Conservation Area (NCA). The RRCRL mission statement and the NCA legislation both stress conservation of the area's resources and values as a principal goal.

Many of the decisions made in the 1976 Master Plan are still valid, should be implemented and are included in the Proposed GMP. However, some decisions now seem inappropriate due to changing conditions and uses. Listed below are key Master Plan decisions and how they are proposed to be included in, modified by or deleted from the Proposed GMP. This is not a list of all actions included in the new plan, just those included in both plans.

Camping

The Master Plan included three camping areas, including one on then private lands and one on State lands. None of these campground decisions were implemented, but a campground was established at the Highway 159-Oak Creek junction. The Interim GMP proposed closing the Oak Creek Campground and constructing a replacement camping area southeast of Blue Diamond. The subsequent site specific analysis of campground location alternatives found a site 1 ½ miles east of Calico Basin to be more favorable. The new, 13 Mile Campground, opened in March 1999 and the Oak Creek Campground has been closed.

Roads

Red Rock Summit Road - The Master Plan decision was to close this road. That has not occurred. In 1979 Clark County submitted their claim of RS 2477 (Revised Statute) status for this road. Due to this RS 2477 status, BLM does not have the authority to close this road. The Interim GMP proposed that this road be maintained as a one-way travel (west) four-wheel drive back country trail. Should the County drop its claim or an inter-agency agreement be reached, the road would be closed to motor vehicles, from Willow Springs to the Summit. Coordination with Clark County and the U.S. Forest Service will ensure coordinated management of this road.

Oak Creek - The (south) Oak Creek Road was designated as the access route to a camping area in the Master Plan. At that time, this road was a well maintained gravel road. Since then, the road has turned into a rough unmaintained 40' wide scar and the campground has been eliminated. As a result, this road has been closed and recovery can begin. A 3/4 mile section of the (north) Oak Creek Road off the Scenic Drive has been re-opened to provide alternative access.

Viewpoints and Parking Areas

The Master Plan included 12 viewing/parking areas along the Scenic Drive, of which only half have been constructed. A few additional sites were being considered for construction, but due to public concern, the possibility of constructing additional sites was deferred for further analysis, along with other options, to be considered in the Proposed GMP.

Trails and Bike Paths

The basic trail system adopted in the Master Plan has been completed and incorporated into the Proposed GMP. Changes and additions have been made to reflect changing and new uses, particularly mountain bikes.

The Master Plan's proposed separate bike path paralleling the Scenic Drive has not been included in the Interim or Proposed GMP, because both bikes and vehicles can be accommodated safely on most of the existing road and the environmental impacts and space constraints of constructing what would essentially be a second road adjacent to and paralleling the Scenic Drive.

THE PROPOSED GMP

MANAGEMENT EMPHASIS AREAS

Management Emphasis Areas (MEAs) provide a framework for indicating the management intent for a particular geographic area and for evaluating the appropriateness of future actions and proposals. Because all future needs and proposals cannot now be predicted and a plan which did not allow for the consideration of new proposals would be so inflexible as to be quickly useless, the intent of using MEA "zones" is to provide both an indication of desired present and future condition and to provide a structure for the analysis of future proposed actions and/or improvements. Using a modification of the Recreation Opportunity Spectrum (ROS) method of planning, RRCNCA has been divided into five MEA zones. Each MEA zone has a set of guidelines which both describe its current setting and provide a standard for future management. Any actions or improvements must be consistent with what is normally expected in that particular setting so the visitor is provided a positive experience. For planning purposes the following settings and characteristics have been used.

Management Emphasis Area Zone Descriptions

1. Developed

- Substantial modification of natural environment
- Intensified motorized use and parking available
- Human interaction level moderate to high
- On site controls obvious and facilities widely available
- Law enforcement moderately visible

2. Roaded Developed

- Recreation activities rely on and are consistent with the natural environment
- May include paved roads and buildings, but the design should blend with the natural environment
- Human interaction level moderate to high in more developed portions and low to moderate elsewhere
- On site controls, facilities and law enforcement noticeable
- Includes the Scenic Drive and Visitor Center

3. Roaded Natural

- Developments limited to improved access and those consistent with the natural environment
- The recreational experience is based on the natural setting
- May include roads, trails and camping areas (new improvements for resource protection only)
- Human interaction level would be low to moderate, more often on the low side
- On site controls present, but subtle
- Includes areas with existing dirt roads, many of which would remain open to use

4. Non-motorized

- Area(s) may not necessarily be remote and access may be easy, but human interaction level would be low
- Opportunities provided could include trails for mountain bikers, horse riders and hikers
- Existing roads closed and converted to trails, motorized use is prohibited
- Off site controls preferred
- Facilities are avoided, but may be provided for resource protection or user safety

5. Primitive

- Remote areas not on primary travel routes or easily accessed
- Access is by hiking and horseback; no mechanized vehicles (including mountain bikes) would be allowed
- Human interaction would be rare to low and evidence of other users would be minimal
- No on site controls or facilities provided except those required for resource protection

MANAGEMENT EMPHASIS AREA DESIGNATIONS

The NCA has been divided into the following Management Emphasis Areas (MEAs) as a planning tool for establishing desired conditions for proposed and future actions.

DEVELOPED

Includes the following areas:

Oliver Ranch

ROADED DEVELOPED

Includes the following areas:

Scenic Drive, Visitor Center and surrounding area

ROADED NATURAL

Includes the following areas:

- * Little Red Rocks and south to Brownstone Basin, and east of La Madre Mt. WSA boundary
- * North of SR 159 and east of Calico Basin
- * South of Spring Mtn. Ranch, north of SR 160, east of Pine Creek WSA boundary and south and west of SR 159, excluding the "developed zone"
- * South of SR 160, excluding the steeper slopes to the east and west
- * North of SR 160 and west of Pine Creek WSA
- * Rocky Gap Road
- * All lands north of La Madre Mt. including Kyle, Lucky Strike and Lee Canyons

NON-MOTORIZED

Includes the following areas:

- * North of Calico Basin and south of Brownstone Basin
- * East of Highway 159 except for shooting range, cave area, and the 13 Mile Campground
- * South of Scenic Drive area, north of Spring Mountain Ranch and east of Pine Creek WSA
- * East and west sides of Cottonwood Valley area south of SR 160

PRIMITIVE

Includes the following areas:

Wilderness Study Areas (WSAs)

INTERPRETIVE PLAN

"The management plan shall include an implementation plan for a continuing program of interpretation and public education about the resources and values of the conservation area." (P.L. 101-621 Sec. 5(a)(2)(A).

"Interpretation is a communication process designed to reveal meanings and relationships of our cultural and natural heritage, to visitors, through first hand involvement with an object, artifact, landscape or site." - Interpretation Canada

Purpose & Significance:

The unique geologic features, plants and animals of Red Rock Canyon represent some of the best examples of the Mojave Desert ecosystem. In 1967, the area was designated as Red Rock Canyon Recreation Lands to be managed by the Bureau of Land Management for the enjoyment of the public. In 1990, special legislation supported by the Nevada congressional delegation, changed the status of recreation lands to a National Conservation Area (NCA), the seventh to be designated nationally.

Red Rock Canyon currently comprises over 196,000 acres of diverse and rugged terrain in southern Nevada.

As stated in its enabling legislation, *"In order to conserve, protect and enhance for the benefit and enjoyment of present and future generations the area in southern Nevada containing and surrounding the Red Rock Canyon and the unique and nationally important geologic, archeological, ecological, cultural, scenic, scientific, wildlife, riparian, wilderness, endangered species and recreation resources of the public lands therein contained, there is established the Red Rock Canyon National Conservation Area."*

Themes:

- Red Rock Canyon is an area of the Mojave Desert with outstanding biotic diversity.
- Unique and dynamic geologic forces have helped create the most significant scenic features of the park.
- Human beings have utilized the resources of Red Rock for at least 2,000 years and continue to do so.
- The diversity of the area encourages a wide variety of recreational uses.

Goals:

- Enhance and diversify visitor experience to Red Rock Canyon through interpretive and educational programs, exhibits, and activities.
- Promote protection and preservation of the resource.
- Expand natural resource education programs in the Clark County School District.
- Strengthen ties with and support from continuing volunteer and other agency partnerships.
- Promote the Bureau's identity and management goals to the public.

Visitor Experience Statement:

Through interpretive/educational programs, exhibits, activities and other recreational uses, the visitor to Red Rock Canyon NCA will gain greater knowledge and appreciation of the Mojave Desert and its unique and fragile ecosystems,

geologic dynamics, and recreational diversity. These programs and opportunities will further enhance the visitor experience and create an understanding of the importance of preservation and a sensible land-use ethic which will help protect desert environments for the enjoyment of future generations.

Visitor Profiles

Based on a "customer" survey completed in 1992 by the Outdoor Recreation and Wilderness Assessment Group (ORWAG), a research unit of the USDA Forest Service, the following information was compiled about the "average" visitor to Red Rock Canyon. Assessments were made through on site interviews at RRC and written surveys distributed by mail.

60% of park visitors are well-educated with some college education. Most are white Anglo, with majority in the 25-44 year age group. Half of Red Rock's visitors come from outside Nevada, and a little more than half are male.

Observation by staff indicates that many park visitors are casual tourists who come to Las Vegas primarily for its gaming/entertainment amenities and/or for business related activities, and drive out to Red Rock for a "desert" experience and to enjoy the scenic drive. Many local residents visit on a regular basis to enjoy the many recreational aspects of the area such as hiking, biking, and rock climbing. These people generally fall within the majority age-group mentioned above but can be much younger or much older.

The area also receives heavy use from local school classes who usually make advance reservations for ranger-led interpretive talks and walks.

Interpretive programs should be directed at the casual visitor as well as the experienced and dedicated desert aficionado, and for both the short term and the long term visitor. All interpretive statements should be simple and direct in message and presentation. The Visitor Center shall remain the focal point for information, natural resource education and interpretation. Programs in the forms of guided walks or self-guided walks can be presented at nearly every pull-off and trail. Priority for interpretive media should be given to those areas most heavily used or impacted by visitors. This focus allows for more of an interpretive profile by the Bureau, a greater effectiveness of the message to a greater number of people, and a greater identity with the park mission and goals. Topics covering cultural resources, geologic and ecosystem concepts, water conservation, and human impacts will be expressed in a variety of media to reach the casual visitor. Where appropriate, other languages besides English will be used to express information and interpretive concepts.

The greatest challenges facing interpretive programs and planning at Red Rock Canyon will consist of how to manage ever-increasing numbers of visitors with a limited number of facilities, natural resources and personnel available, and project funding. Some improvement in facilities can be expected through the fee demonstration program but limitations on expansion will continue to be dictated by the sensitivity and vulnerability of the resource. Some of these challenges can be met with a flexible plan allowing for changes in visitor use and interests that occur over time. The current use of volunteer and hosted worker assistance must continue and increase. Natural resource education projects such as the Junior Ranger and Children's Discovery Trail brochures, workshops, guided public activities, and volunteer resource protection projects would continue to assist Bureau staff with management of resources and visitor use.

Natural and Cultural History of Red Rock Canyon NCA

The majority of the 600 million year history of what is now Red Rock Canyon NCA was spent at the bottom of a deep ocean basin. A rich variety of marine life flourished in these waters and left behind deposits of shells and skeletons more than 9,000 feet thick which were eventually compressed into limestone and similar carbonate rocks that now comprise the La Madre and Spring Mountains. Beginning approximately 225 million years ago, crustal movements caused the seabed to slowly rise and evaporate. The arid land became covered by giant sand dunes more than a half mile deep in places. These shifting sands were buried by other sediments, and eventually cemented into sandstone by iron oxide with some calcium carbonates. This formation is known locally as Aztec Sandstone and makes up the Calico Hills and Escarpment of Red Rock Canyon NCA. The most significant geologic feature of Red Rock Canyon is the Keystone Thrust Fault. This fault and other smaller local faults created the dramatic landscape that attracts today's visitors.

The unique geologic features of Red Rock Canyon allowed for the abundant plant and wildlife development of NCA. An area that supports vegetation and has one of more dominant species is identified as a vegetation type. Red Rock Canyon has nine different plant communities that support a variety of flora and fauna species. This abundance of life and water attracted early man into the area. The resources of Red Rock Canyon were utilized by various indigenous groups of Native Americans as early as 5,500 years before present. Evidence of their occupation can be found in the many cultural resources consisting of pictographs, petroglyphs, agave roasting pits and handmade tools found in the NCA.

The first visitors of European ancestry that passed through Red Rock Canyon were explorers, traders, and trappers in the early 1800s. The Spanish Trail was active between 1824 and 1849, and the first permanent settlement was the Sandstone Ranch, presently known as Spring Mountain Ranch State Park, established in 1867.

Las Vegas citizens early on knew of the recreational importance of Red Rock Canyon. In 1967 they helped the Bureau of Land Management acquire special land status for Red Rock Canyon in the formation of Red Rock Canyon Recreation Lands. On November 16, 1990, Red Rock Canyon National Conservation Area was designated, creating an even larger area of resources and recreational opportunities for the nation.

Existing Interpretive Facilities and Media Condition

The current RRC Visitor Center is a 7,600 square foot facility offering information and interpretation about recreation opportunities, wildlife, wild horses and burros, vegetation, geology, cultural and natural resources and more. Most exhibits were constructed in the early 80s and consist of static displays with the exception of one video monitor, a non-functional "waterfall", and a portable wand tour which needs text revision. Many of the exhibits show wear and tear, are thematically inconsistent, and are in need of major rehab work or total replacement. Patterns of visitor movement are undefined and confusing.

The lobby currently houses the information desk, bookstore/gift shop, interpretive area entry and hand-held wand unit distribution box. With the current visitor load, this causes overcrowding problems and hinders circulation, as does the lack of appropriate signage.

The bookstore/gift shop is operated by the Red Rock Canyon Interpretive Association, a non-profit organizations whose mission "is to aid in the understanding of the values of the areas in and around Red Rock Canyon National Conservation Area " and in researching and sharing interpretive information about RRC and assisting the .BLM financially with endeavors related to interpretation.

Recently, an additional "Friends" room was constructed for multi-purpose use by educational groups, and for special functions and events.

With annual visitor center use approaching half a million people, the current building can no longer fully accommodate the needs of visitors and staff. Inadequate storage space is also a major problem. The original reception area was previously altered to create a makeshift office/library with storage space for video production equipment.

In the same location as the Visitor Center is the "Homer Morgan Pavilion" which offers a rest stop destination/location, with water and a rest room, for bicycle enthusiasts. It also includes benches and picnic table providing opportunities for day use picnicking and group gatherings.

A *Visitor Center Masterplan and Conceptual Design* report (July, 1996) addresses some of these concerns and considers alternatives for future expansion of these facilities.

Interpretive Development of Themes by Site Location

Visitor Center

The Visitor Center is the focal point for visitor orientation. Located at the entrance of the Scenic Drive adjacent to Charleston Boulevard, visitors can receive educational, informational and interpretive materials, partake in scheduled public activities, and view the overall Conservation Area. The interior exhibits will continue to be upgraded to support increased use and changing information. Major cooperative agreements with non-profit organizations providing interpretive services for both the Bureau and public at Red Rock Canyon will continue to center their activities at the Visitor Center.

Moenkopi Trail

The Moenkopi limestone formation is the best example of the ancient seabed which covered the NCA. Fossilized mud, marine life and sand dunes would be interpreted along this trail. The Moenkopi Trail with its adjacent access to the Visitor Center, can become an additional environmental education trail. Promoting the Moenkopi Trail for educational purposes would reduce the resource damage and use restrictions occurring on the Children's Discovery Trail.

Calico I, II and III

The geology of the Calico Hills presents a variety of topics. This petrified Aztec sandstone formation is a fine example of cross-bedding, mineral leaching, faulting, and erosional actions. Interpretive signs explaining different geological processes should be located both at Calico I and II.

Sandstone Quarry

Interpretation at Sandstone Quarry would focus on cultural resources and wash ecosystems. The early mining history would be the major historic theme with prehistoric Native American use a sub-theme. The geologic processes that affect a wash environment would also be explained by self-guided tours or interpretive signs.

White Rock

The entire ecosystem of Red Rock Canyon can be interpreted here. Sub-themes on geology, springs, flora, fauna and cultural resources can be explained at different White Rock sites. The expansive view from the White Rock pull-off is the best place in the NCA to talk about the famous Keystone Thrust. All the faulting and thrusting action that gives the unique escarpment its importance can be seen from this spot. Other geologic sub-themes could be included at White Rock Spring explaining how springs form at the base of sandstone outcrops. In addition, the cultural resources associated near spring development and the unique flora and fauna associated with riparian sites are also possible themes.

Willow Spring

The largest concentration of resources of historic and prehistoric use occurs here. Interpretive activities should be concentrated here as this is the most heavily visited picnic site in the NCA. Trails and signs will interpret the various periods of Native American occupation, and the early ranching and transportation developments in the canyon. The existing interpretive trail requires frequent maintenance due to heavy use. New signing needs to be installed. And bilingual signs, in Spanish, should be strongly considered.

Red Rock Summit Road (Rocky Gap/Old Potato Road)

The major theme here will be the importance of transportation through this pass for the Las Vegas and Pahrump Valleys. Historic Civilian Conservation Corps road work and the importance of early transportation of goods would be highlighted. Additional interpretation should acknowledge this road as the portal for hiking to the top of the escarpment, adjacent proposed wilderness areas and entrance into Spring Mountain National Recreation Area.

La Madre Spring

This is a great place to promote the "Watchable Wildlife" program. The spring brings in a variety of wildlife which can be viewed a short distance away from the small dam.

Lost Creek

The unique flora and its biotic relationship with water will be the main theme here. The concept of a riparian environment will be the main topic.

Children's Discovery Trail

Current use for school and youth groups will continue to be the major focus here. All major ecosystem themes are incorporated at this site and an additional on-site brochure for the public has been developed for the Children's Discovery Trail.

Ice Box Canyon

The theme of plant succession due to past and recent fires at the mouth of the canyon should be the major interpretive thrust here. A sign at the parking area would reach all visitors to Ice Box Canyon.

Pine Creek

Riparian habitat, rare plant species and the natural succession of plant communities should be the major topics of interpretation at this site. Interpretive signs at the parking lot would reach both the casual visitor and the climbing/hiking visitors to Pine Creek. Sub-themes on historic homesteading and Native American use of this area should be interpreted at the meadow site. The fire ecology trail off the main Pine Creek trail should be more clearly delineated.

First Creek

Interpretive the wild burros in Red Rock Canyon NCA near the trail entrance would serve a practical purposed in educating the public about burro behavior.

Oak Creek

Interpreting the different geologic strata should be the main theme at Oak Creek. The Chinle formation is best observed at Oak Creek and other wash and Moenkopi formations can be interpreted here.

Highway 160/Spanish Trail

The Spanish Trail opened the Las Vegas Valley to the east and the west. The importance of this trail to early Mexican commerce throughout the southwest and the later migrations of Mormon pioneers into southern California should be the main theme. Other interpretive activities can focus on the cultural resources, wild horse herds and the climbing, equestrian and mountain biking opportunities in the area.

Bootleg and Rainbow Springs

The southwestern end of Red Rock Canyon is a surprise of springs and cultural resources. Signing shall be installed as necessary to protect cultural resources, otherwise the area would be left undeveloped. No attempt would be made to provide on-site interpretation.

Bridge Mountain/Escarpment

Increased usage by hikers and backpackers atop the escarpment shows the need to install a trail system that interprets

the unique geology and fragile ecosystem found here. Low impact interpretation in the forms of signing and information acquired at the Visitor Center, plus the occasional guided activity should continue the solitude and wilderness experience most visitors desire when hiking to Bridge Mountain and surrounding peaks.

Scenic Drive

The Scenic Drive will continue to be the primary recreational activity for the majority of visitors to Red Rock Canyon. Vista pull offs along the 13-mile drive can be used to interpret every ecosystem found at the NCA, cultural resources, and impact of human use. Install a radio tour along the Scenic Drive would further increase the interpretive outreach media available. The biggest challenge for interpretation around the Scenic Drive is attracting the attention of visitors at given sites and communicating the desired message during their visit.

Brownstone Canyon

The prehistoric cultural resources of Brownstone Canyon would be the focal point of interpretation, with sub-themes on geology and wildlife. A cooperative agreement with local Native Americans and continuation of current volunteer activities would increase accuracy of site interpretation, enhance protection of special world-class features and increase guided activities. In order to protect resources within the basin, interpretation will be low key and limited.

The Cave

The "Cave" adjacent to west Charleston is the most accessible cave in Red Rock Canyon. Due to years of resource degradation at the site, concerns for local bat populations, and safety hazards inherent in cave sites, interpretation of this site should be limited to the abundant fossil resources of the Kaibab formation, rather than any emphasis on the cave itself whose significant formations have all but been destroyed.

Blue Diamond Hill

A cooperative agreement with the James Hardy Gypsum Plant would allow for interpretation of the geologic features that allow for mining in the area and the formation of the town of Blue Diamond. A brochure on the above material for a self guided tour along Highway 159 would interpret the importance of mining in southern Nevada.

Red Spring

The picnic area nestled at the foot of Red Spring would be a great location to interpret how water creates an oasis in the desert. The geologic and cultural resources found in the area can be tied together with a water theme. A site plan was developed for this area but never implemented. Area resources are currently very vulnerable to vandalism and other human-caused damage.

Red Rock Overlook (Dedication Site)

Interpretive signs explaining who the Bureau of Land Management is and the basic concepts of the Red Rock Canyon National Conservation Area should be added. Due to heavy use by local Hispanic groups, bi-lingual signing should

be considered. This area is a major short-term pull off for a variety of users.

Personal Services

Personal interpretive services at Red Rock Canyon National Conservation Area currently consist of guided walks, talks and hikes; formal and informal "patio" talks; outreach education programs; teacher workshops; special events; and staffing of the visitor center desk. As of January, 1999 BLM interpretive staff numbers five permanent employees and one ECO position.

In addition, interpretive programs and services are also provided by Red Rock Canyon Interpretive Association employees as well as members of the Friends of Red Rock Canyon. In 1998 RRCIA employees presented 187 formal programs and 144 informal talks, reaching an audience of 5,455 people, a 28% increase over the previous year.

Public support and demand for interpretive programs is high with increasing local use by educational and other groups, as well as enthusiastic participation from casual visitors as well. An aggressive program of teacher workshops and environmental education programs is in place, but there can be very little outreach into the community with the current limited resources.

Non Personal Services

Non-personal interpretive services at Red Rock Canyon currently consist of a number of media including publications, exhibits, video programs, wayside exhibits, and an audio "wand" tour. The visitor center is the primary location for many of these media including the "wand" tour which is currently available in four different languages. Most exhibits within the visitor center were designed and fabricated in the early 1980s and are in need of repair or replacement. Interpretive messages are dated and space is poorly utilized.

In the absence of an exhibit plan, displays and exhibits have been "piece-mealed" over the years with no coherent theme or message. Meanwhile, visitation to the facility has skyrocketed creating crowded and often uncomfortable conditions. In addition, due to the design of a raised floor, current handrails are unsafe for young children and should be considered a safety hazard. A total redesign of the current visitor center, with proper and professional planning, should be considered and in fact, with rapid growth in visitation, should be a top priority for any future interpretive planning.

Visitors have access to numerous free publications outlining various aspects of Red Rock Canyon. By and large, these publications are well-designed and accurate. With the expansion of the trail system, a hiking/trail guide needs to be developed as well as a color brochure of the park itself. An annual park newspaper, which would be distributed free, would be an excellent way to inform visitors of BLM resource management issues as well as advertising current interpretive programs.

Wayside exhibits are well distributed at trailheads and significant cultural sites and appear to be holding up well. But, again, an overall wayside exhibit plan needs to be addressed as different interpretive sites and themes are established.

Audio visual programs currently consist of several dated videos which are screened on a monitor in the visitor center. Consideration should be given to establishing a room or auditorium where a professionally developed illustrated slide

program, laser disc and/or video can be screened to the public at regular intervals. Interactive computer programs will also be an asset to the education of park visitors as well as establishment of a web site on the Internet.

Partnerships

At the present time, partnerships play a crucial and significant role in the interpretive program for Red Rock Canyon. Red Rock Canyon Interpretive Association and the Friends of Red Rock Canyon play a key role in supporting and sustaining interpretive activities on site through interpretive and education programs, and regularly scheduled staffing of the information desk. Furthermore, both organizations provide financial support for critically needed supplies and materials (refer to section on Cooperating Associations and Friends Groups).

Library and Collection Needs

At present, Red Rock Canyon maintains a small resource library at the park visitor center as well as a collection of video taped programs and lectures. Expansion and relocation of the library should be an integral part of any plan to redesign the current visitor center. Some "master" video and audio tapes need to be in a protected, climate-controlled environment to ensure that no deterioration occurs.

Slides are currently housed in an Abodia slide cabinet and are well organized and protected. Slide storage will need to expand as the collection expands.

Staffing Needs and Costs

In spite of continued support from our partner organizations, BLM still needs to be a viable and visible entity on site to provide credibility, expertise and agency identification to the visiting public. Some staff increases will be necessary to provide better coverage and expanded hours at the park visitor center. Staffing increases due to fee collections (temporary Rangers) allowed the Visitor Center operating hours to be expanded to 8 AM to 5 PM in early 1999.

Furthermore, in order to implement an effective outreach/education program within the community, dedicated staff must be available to develop and deliver these programs. An aggressive outreach program is an effective tool for resource protection and support, and is essential as the rapidly growing metropolis of Las Vegas moves closer and closer to the boundaries of the Conservation Area.

An addition of four permanent interpretive personnel (4 FTE) at full-performance level would allow Red Rock to achieve the goal of expanded visitor center hours, dedicated outreach programs, and additional on-site presentations while still maintaining full-time coverage inclusive of annual leave, sick leave, and other unscheduled emergencies. Projected cost for these additions would be about \$240,000 annually.

Summation

-Red Rock Canyon National Conservation Area protects and preserves some of the finest Mojave Desert scenery and habitat of any federally-managed area in the west. It's close proximity to one of the largest and rapidly-growing cities in the southwest makes education for preservation and protection an imperative action. Visitation will continue to grow

and will bring increased impacts to this fragile resource.

Facilities and services must keep pace with this anticipated growth, and must employ the most effective and “cutting edge” techniques to capture the interest and imagination of park visitors from all walks of life.

Understanding and support of this area by the visiting public will promote its protection and will promote the efforts of the Bureau of Land Management in its missions and goals. Effective interpretation and education is the best way to foster this support and, in turn, provide an awareness of the vulnerability of all of our desert lands. With its high-visibility in southern Nevada, the Red Rock Canyon National Conservation Area has the opportunity to make a real difference in the perception and protection of these public lands for future generations.

ADMINISTRATIVE AND PUBLIC FACILITIES

The management plan shall include a proposal for administrative and public facilities to be developed, expanded, or improved for the conservation area including the Red Rock Canyon visitor center, to accommodate visitors to the conservation area. (P.L. 101-621 Sec. 5 (a)(2)(B))

Overview

Summarized below are the significant projects proposed. All major projects are planned within the highly developed Roaded Developed MEA zone around the Scenic Drive and the Visitor Center. Following this section is a detailed discussion of the buildings, roads and trails in RRCNCA. The detailed discussion provides more detail and background on existing condition, maintenance needs and future opportunities.

Visitor Center Expansion

Construction of a 12,000 sq. ft. complex next to the Visitor Center to provide additional space for restrooms, offices, storage, and auditorium/theater and an environmental training and meeting center. The existing Visitor Center would remain the focal point for information and exhibits. Cost estimate \$ 6.6 million.

Sandstone-Visitor Center Road

This addition to the Scenic Drive would provide a shorter alternative exit from the Scenic Drive and would allow the Scenic Drive to remain open at all times. Presently, the Scenic Drive must be closed any time flash floods cross one of the three washes or ice is on the upper sections of road. This occurs several times per year. This road would facilitate implementation of a shuttle bus system serving the Calico Hills and Sandstone Quarry areas, the most heavily congested areas on the Scenic drive. Cost estimate (low/high) \$ 660,000/ \$1,000,000.

Sandstone-Willow Bike Trail

This hard surfaced trail, following the route of the closed Sandstone-Willow Road, would allow bike riders to avoid the steep, dangerous and difficult section of the Scenic Drive between Sandstone Quarry and Willow Spring. It is anticipated that this trail would attract the majority of recreational riders and significantly reduce the temptation to travel the wrong way on the Scenic drive to avoid the hills beyond Sandstone Quarry. Cost estimate (low/high) \$ 400,000/550,000.

Calico 3 Parking Area/Trailhead

This development, approved in the Interim GMP, is continued as valid existing management. The site is designed to reduce parking competition and congestion at Calico 2 by providing a larger capacity trailhead designed for long-term parking which is closer to the popular rock climbing locations. The selected site is not located on the ridgeline occupied by the Scenic Drive which would reduce the visual impact of the vehicles parked at Calico 2 and along the edge of the Scenic drive. Cost estimate \$ 120,000.

Buildings and Sites

Visitor Center

The RRC Visitor Center is a 7,600 square foot facility offering information and interpretation about recreation opportunities, wildlife, wild horses and burros, vegetation, geology, cultural resources and much more. The facility also offers a bookstore operated by "Red Rock Canyon Interpretive Association", a non-profit organization with the mission of researching and sharing interpretive information about RRCNCA and assisting the BLM with endeavors related to interpretation.

In the same location as the Visitor Center is the "Red Rock Canyon Bicycle Pavilion". The pavilion offers a rest stop/destination location, with water and a restroom, for bicycle enthusiasts. It includes benches and picnic tables providing opportunities for day use picnicking and group gatherings.

After fourteen years of use and increasing visitation, the Visitor Center is too small to handle current visitor loads, suffers from aging facilities and exhibits and does not provide adequate space for staff and volunteer needs. Space compromises and minor redesigns over the years have tried to meet needs, but they are just not enough to compensate for the needs created by increased staff, volunteers and the success of the RRCIA bookstore.

No provision was made for a bookstore in the original design and the current bookstore is a major part of the visitor services being offered. Storage space for materials and supplies is both inadequate and hard to access. Staff has to crawl through displays to get to some areas and the stage above the pit was sacrificed to provide storage for RRCIA's books and materials.

The exhibits still receive favorable comments from the public, but they are badly aged and out of date. Some of the principal problems are: none of the maps have been updated with the 1994 NCA boundary, the waterfall exhibit does not work, signs are cracked and peeling, and the recreation exhibit is dated and an inefficient use of space. Exhibit upgrading accomplished to date has been accomplished by the Interpretive Association, not BLM.

On a positive note several improvements have taken place. The office expansion has improved working conditions for BLM staff, volunteers and RRCIA; the information desk has been replaced and upgraded; the exhibit room audio system has been completely replaced and foreign language capacity added; and the "Friends Room", completed in December 1998, has met the need for a meeting/classroom area. In 1999 improvements including a new restroom facility, expanded parking and improved handicap access to the Visitor Center will be constructed.

Actions taken to date to implement the proposed action and alleviate some of the problems listed above are -

- 1) A long-range concept plan has been prepared by the BLM's National Applied Research and Sciences Center in Denver. A multi-disciplinary team of engineers, architects and space planners conducted a need's analysis by observing current uses of the visitor Center and interviewing staff, RRCIA, FORRC and other users. The concept plan recommends the addition of a three building complex adding 12,000 square feet of space to the building site. The buildings would be - 1) restrooms and offices, 2) auditorium and 3) meeting rooms and environmental education.

Action item: Pursue funding for design and construction of the concept plan in order to improve Visitor Center facilities and services.

2) Congress has allocated \$ 940,000 in Fiscal Years 1997, 1998 and 1999 for the remodeling and upgrading of the existing Visitor Center to allow it to meet immediate needs until the concept plan can be implemented. Construction has begun on a new restroom facility to be located in the Visitor Center parking lot. This will reduce pressure on the aging Visitor Center facilities. At the same time the Visitor Center entrance is being reconstructed to reduce the slope of the access ramp and move tour bus unloading further away from the entrance ramp.

Action item: Continue upgrades. Complete construction in 1999.

3) With the assistance of a \$ 25,000 grant from FORRC, a 600 square foot meeting room addition has been built on the west side of the Visitor Center. This room has replaced the old Joshua Room which is now part of the bookstore.

Action item: Finish room amenities (cabinets, audio-visual devices, displays boards) after experience using room provides direction of best location for these improvements.

4) RRCIA has moved its sales area into the remodeled space once occupied by the Joshua Room and "conference room". RRCIA funded the cost of remodeling. This remodeling has provided security for sales items and allows more flexible use of the Visitor Center after hours.

Action item: None required.

5) The wand system has been replaced by a new more flexible system. Visitors no longer have to stand within radio loops to hear messages and several foreign languages are available.

Action item: Continue to provide improved messages and increase the number of foreign languages available.

6) Construction of a new handicap parking area has been completed.

Action item: None

7) Construction of a new lower level overflow parking area has been completed.

Action item: None

Oliver Ranch

In August 1993, BLM acquired the 300 acre Oliver Ranch through a land exchange. Current plans call for the ranch to be used for NCA administrative functions such as wild horse corrals, a fire station, employee and volunteer housing, and equipment storage. The ranch would also be developed as an environmental training and conference center after

upgrading some of the facilities to better meet user and safety needs. The original house is actually a small dwelling with a large attached enclosed porch, which makes an excellent meeting room(s). The ranch offers a unique opportunity for outdoor classroom activities.

The majority of the property is undeveloped and is either part of the Oak Creek wash system or fenced pasture. The fenced pasture contains several springs and riparian areas. This area will remain undeveloped and used as an outdoor laboratory when the environmental education program is fully implemented.

The ranch house is structurally sound, but needs a lot of time consuming cosmetic work (painting, caulking, floor leveling, window repairs). A heating unit needs to be added as the only current heat is a wood stove and small electric space heater.

There is also room for the construction of some bunkhouses and/or small apartments to be used by BLM staff and/or volunteers. College interns and volunteers (Student Conservation Association) could offer needed assistance to the NCA staff, but these programs require that housing be provided. Current housing allows BLM to have a Law Enforcement Ranger on-site within the NCA.

Red Spring Picnic Area

While sustaining heavy visitor use without significant resource damage, this area has some serious problems that need attention. Parking space is inadequate, the entrance is restricted, meadow and riparian areas sustain a lot of foot traffic, and the restrooms were placed in a way that does not allow access by physically challenged visitors. The road is a continual maintenance problem because of its steepness and the location of a seep at the top just as the road begins its descent.

Site repairs began in 1997 with the fencing of the wet meadow to reduce trampling and foot traffic. The vegetative response was immediate and evident with increased biomass and stem height evident. Several additional improvements were accomplished in 1998. Using entrance fee collections, a new toilet was placed in the lower picnic area. The riparian area just below the spring source was fenced to prevent human intrusion into habitat critical to the survival of the spring snail, a rare species which occurs in only a few springs in the NCA.

Future improvements planned are the repair and surfacing of the road, replacement of the older picnic tables and grills and construction of protective fencing around part of the meadow that is home to a population of Mariposa Lilly.

Oak Creek Campground

The Oak Creek Campground is in the process of being converted from a camping area to a day use trailhead. Camping has been moved to the new 13 Mile Campground.

Wheeler Camp Spring Natural Area

Approximately 20 acres around Wheeler Camp Spring were fenced through a cooperative project with the Red Rock Audubon Society. The project was initiated to protect wet meadows which were being damaged by off-road vehicle use

and to allow overused riparian areas to repair themselves. Increased vegetation growth is already evident. Eradication of tamarisk within the spring area has been initiated. As part of National Public Lands Day in 1996 two check dams were constructed to slow flash flooding and rebuild streambed soils. The dams have already shown significant impacts through the slowing of flows and the deposition of materials in the streambed. A third dam, constructed as an Eagle Scout project, was added in October 1998.

13 Mile Campground

In February 1999 the first section of the new 13 Mile Campground was opened. This area replaces the Oak Creek Campground. Sites in 13 Mile are larger and further apart. Each site has a parking stall, concrete picnic table pad and cooking grill. Eleven permanent restrooms were installed. The current size is 55 individual sites, 14 walk-in sites and 3 group sites. Future expansion will add 45 individual sites and 7 group sites.

Potential Future Facilities

Lake Las Vegas property, Calico Basin, Environmental Education Center

The BLM is currently working on an exchange with the Lake Las Vegas development for a 70 acre property they own in Calico Basin. Located on the property is a large building foundation, once planned for a residence, that has the potential to be the site of a magnificently sited environmental education center and meeting facility. A graded access road as well as power, phone and water are already installed at the building site.

Scenic Drive

A continuing problem along the Scenic Drive is parking. Not all of the parking areas and overlooks included in the original road design were constructed, and those that were built were seriously under designed. This has resulted in the public's creating parking areas and pulling off to take photos at desired locations. Most of these locations coincide with sites originally planned for a pull-off. Calico I developed this way, and the highest point overlook was developed on a hairpin curve at a point where many visitors stopped along the road to take photos. Future plans call for the modification of existing sites to accommodate use if possible and limit use if causing damage to resources. Several additional sites will be developed around the Scenic Drive to spread out use, provide alternative use areas and relief to overused sites.

Calico I Overlook and Trailhead

A very large percentage of visitors stop at this overlook because of its location and spectacular scenery. After reconstruction in 1993 to correct original construction deficiencies, this site is adequate on most days. However, when both climbing and flower viewing activities are going on in the spring, the parking area is too small. Additional parking opportunities are limited to the edge of the road (right) just beyond the bus parking area, which has been surfaced to accommodate 10-15 more cars. Long-term parking is encouraged to use these sites leaving the main parking area for the short use visitor.

The overlook area next to the parking lot has only been partially completed. The remaining gravel area needs to be surfaced and interpretive signing installed. The trail, which has developed down the ridge from the overlook, is heavily used, but is a hazard due to its slope and the natural gravel surface. A series of steps is needed to reduce the hazard on the lower half of this trail. Additional benches and seating is planned for the site.

Calico II Overlook and Trailhead

This site has a significant parking problem due to its close proximity to the Gallery, a favorite climbing site. On many spring and fall days, the parking area is full of all day climber vehicles by 10:00 AM. This leaves no space for short visit sightseers and hikers. There is no potential to physically increase the size of the site, because it was built on the crest of the ridge and the ground falls away quickly on both sides. In late 1998 the parking area was striped to designate specific parking stalls. A portion of the Scenic Drive was included in the parking area to see if this would provide any relief. No permanent curbing will be put in place until this arrangement is tested to make sure a bottleneck on the Scenic Drive has not been created. Using fee revenues, a new permanent restroom, replacing the rental toilet, was installed in late 1998.

Sandstone Quarry Parking Area and Trailhead

This site is heavily used by visitors on hikes up the wash and to the top of the Calico Hills. Parking has traditionally been inadequate with cars spilling out onto the Scenic Drive. In 1998 the gravel access roads and parking area were reconstructed and surfaced. The striping of specific parking spaces has brought a sense of order to the site and increased parking capacity by at least 50 %.

Highest Point Overlook

This site was planned in the original Scenic Drive design but not completed until 1994. It alleviates a safety problem which arose from visitors parking along the road curve at the highest point to take photos. The site is used constantly and has become a favorite for wedding parties. The site was paved in late 1998 to reduce dust emissions and increase site capacity with defined parking sites including bus slots. Four donated benches have been added to allow visitor to sit and enjoy the view.

White Rock Road and Trailhead

This site provides access to the Keystone Thrust, Grand Circle and Willow Spring/La Madre trails. The road requires constant maintenance due to the rocky soil and should be paved as soon as possible. This location could provide an alternative to the crowded areas like Sandstone Quarry, Lost Creek and Willow Spring if it had a better access road and good signing making it more attractive to users. Several trail loops can be accessed from this trailhead including loops to Sandstone Quarry and La Madre Spring/Willow Spring/Lost Creek.

A new restroom was installed in late 1998 and the road is scheduled for reconstruction and paving in 1999 if funding is available.

Lost Creek Trailhead

This site provides access to the Lost Creek, Children's Discovery, Willow Spring Interpretive and White Rock trails. It is heavily used by individuals and school groups and barely meets the needs for parking space and school bus access. Using fee revenues, a new restroom was installed in late 1998. Long-term planning includes expansion and paving of the parking area. This may be accomplished in 1999 if funding is available.

Willow Spring Picnic Area

This is the oldest developed site in the NCA. Originally constructed with covered tables and picnic grills, this site had deteriorated through vandalism and neglect to a point in 1992 where it was an embarrassment to BLM. By 1992, all picnic shelters were gone, most tables damaged and the toilet an odiferous embarrassment. Through the efforts of Park Ranger Dave Phillips and many volunteers, including Eagle Scouts, major improvements have been made in the last two years. New tables have been purchased, the spring water lines repaired and extensive landscaping installed. The venting system on the toilet has been reworked and a handicapped toilet was added in 1995. Future work includes rehabilitation of additional picnic sites and installation of replacement shelters.

Willow Spring provides, or did provide, habitat for the Spring snail, a small snail which exists in only a few springs in Red Rock Canyon. The last inventory failed to find any snails and there is concern that recreation use has eliminated them. To provide immediate mitigation and begin restoring the springbrook habitat, in 1997 the area immediately below the spring was fenced to eliminate human use and allow the riparian vegetation to re-establish itself. This fencing was extended further down the springbrook in 1998. Riparian vegetation has already responded to this protection and is re-establishing itself. If future inventories are unable to detect the snail after recovery is further advanced, consideration will be given to re-colonizing the area with snails from the Red Spring population.

La Madre Spring Trail and Dam

In 1995 the road to La Madre Spring was blocked at the junction with the Rocky Gap road. This was necessary due to congestion and resource damage associated with increasing vehicle use of the area. While in the past most users confined their vehicles to existing roads, there had been an increasing number of problems with vehicles pioneering new or expanded roads. There were two instances where vehicles simply drove by the impoundment dam and kept going up the drainage where there is no road. Both got stuck and had to be towed out. The dam is in good condition. Repairs by volunteers solved leakage problems at the old outlet pipe. Other than the consideration of providing a back-country restroom for this area in the future, no facilities or improvements are planned.

Ice Box Canyon Parking Area and Trailhead

With the parking expansion completed in 1993, this site is adequate. Through the use of fee revenues, paving of the dirt parking area and installation of a new restroom were accomplished in late 1998.

Red Rock Wash Overlook

This site is the most under utilized site on the Scenic Drive. There is no particular reason for visitors to pull off here because no facilities are evident (or provided). There really is not much to see in Red Rock Wash and most visitors have already stopped several times so it takes more than just a sign to get them to stop. The best use of this site may be as a picnic area as an alternative to Willow Spring. The addition of some tables with shade shelters would significantly increase the appeal of this site. A preliminary design has been developed. This site is also being considered for installation of a helipad for helicopter use. The METRO Search and Rescue unit uses this site as a base for high altitude training and for rescues in Pine Creek Canyon because the Pine Creek parking area is usually congested for safe helicopter operations.

Pine Creek Overlook and Trailhead

This site has probably received the most damage from users due to serious under-design in capacity. The parking area is at best 1/3 the size needed which has resulted in significant vegetation loss as vehicles are parked wherever space was available. Recent parking controls to prevent further damage have resulted in vehicles parked along the Scenic Drive. Expansion of this area was planned and approved in 1991 but never completed. This should be a priority project when funding becomes available.

Oak Creek Trailhead

This site replaced the old campground road access to Oak Creek. Use has increased as visitors learn of the easy access to Oak Creek. Using fee revenues, a new restroom was installed in late 1998. The access road should be paved to reduce dust emissions and maintenance when funding becomes available.

Red Rock Vista

Red Rock Vista, which is also referred to as the Dedication Site, was recently remodeled and expanded. It now

accommodates 75 vehicles and facilities include toilets, picnic tables, and a short hike to an overview area.

The location is not actually along the Scenic Drive, but on the north side of State Route 159, midway between the entrance and exit of the Scenic Drive.

OVERLOOKS & PARKING			
Name	Use	Capacity	Capacity on Scenic Drive
Calico I	Scenic view of Calico Hills/ Access to hiking, technical climbing, and rock scrambling	35 spaces designated	294 spaces
Calico II	Same as Calico I	Approximately 25 spaces	
Sandstone Quarry	Restrooms/ Access to hiking and scenic viewing in historical area	Approximately 30 spaces	
Escarpment View	Scenic view of valley floor, Calicos, and escarpment from highest point on Scenic Drive	Approximately 30 spaces	
White Rock	Hiking access	Approximately 24 spaces	
Willow Spring/Lost Cr	Restrooms/ Hiking and picnicking/ Cultural resource interests	Approximately 69 spaces	
Ice Box Canyon	Scenic view of escarpment/ Trailhead	Approximately 34 spaces	
Red Rock Wash	Viewing point for Red Rock Wash	7 spaces designated	
Pine Creek Canyon	Restrooms/ View of escarpment/ Trailhead	15 spaces - most designated	
North Oak Creek Canyon Access	Trailhead to access Oak Creek Canyon from north	Approximately 25 spaces	
Red Rock Vista	Scenic view of RRC north of Red Rock Vista/ Interpretation and dedication site of RRC	Approximately 75 spaces	
Red Spring	Picnicking/ Cultural resource interests	Approximately 39 spaces	

Roads

Scenic Drive

The 13 mile Scenic Drive was completed in two phases - 1972 and 1978. It was designated a one-way road upon completion of the second phase in 1978. The road surface is in good condition, but district maintenance staff has noted that the increased number of cracks in the 1972 section indicates the need to consider a resurfacing (or lift) in the next few years. Because vehicle use is primarily passenger cars, the road does not exhibit the typical rutting of two lane roads used by heavy trucks. Uncontrolled Desert willow and cliff rose growth along the edge of the road is causing minor damage in several locations due to root growth.

The increasing number of motor vehicles and bicycles on the Scenic Drive has created several safety concerns. There has been a significant increase in recreational bicyclists as compared to bicyclists working on racing skills or conditioning. Drivers get distracted by the scenery and may not notice bicyclists riding two and three abreast. Bike riders who overestimate their conditioning and turn around and ride back to the entrance against one-way traffic. The two lane width of the road offers some solution to the competition for space, but is probably not a long-term solution. A separate bike lane paralleling the Scenic Drive was included in the original Master Plan, but not constructed. There are differing opinions on whether this would solve or create problems if ever built. The Proposed GMP does recommend construction of a bike trail between Sandstone Quarry and Willow Spring (see Trails below).

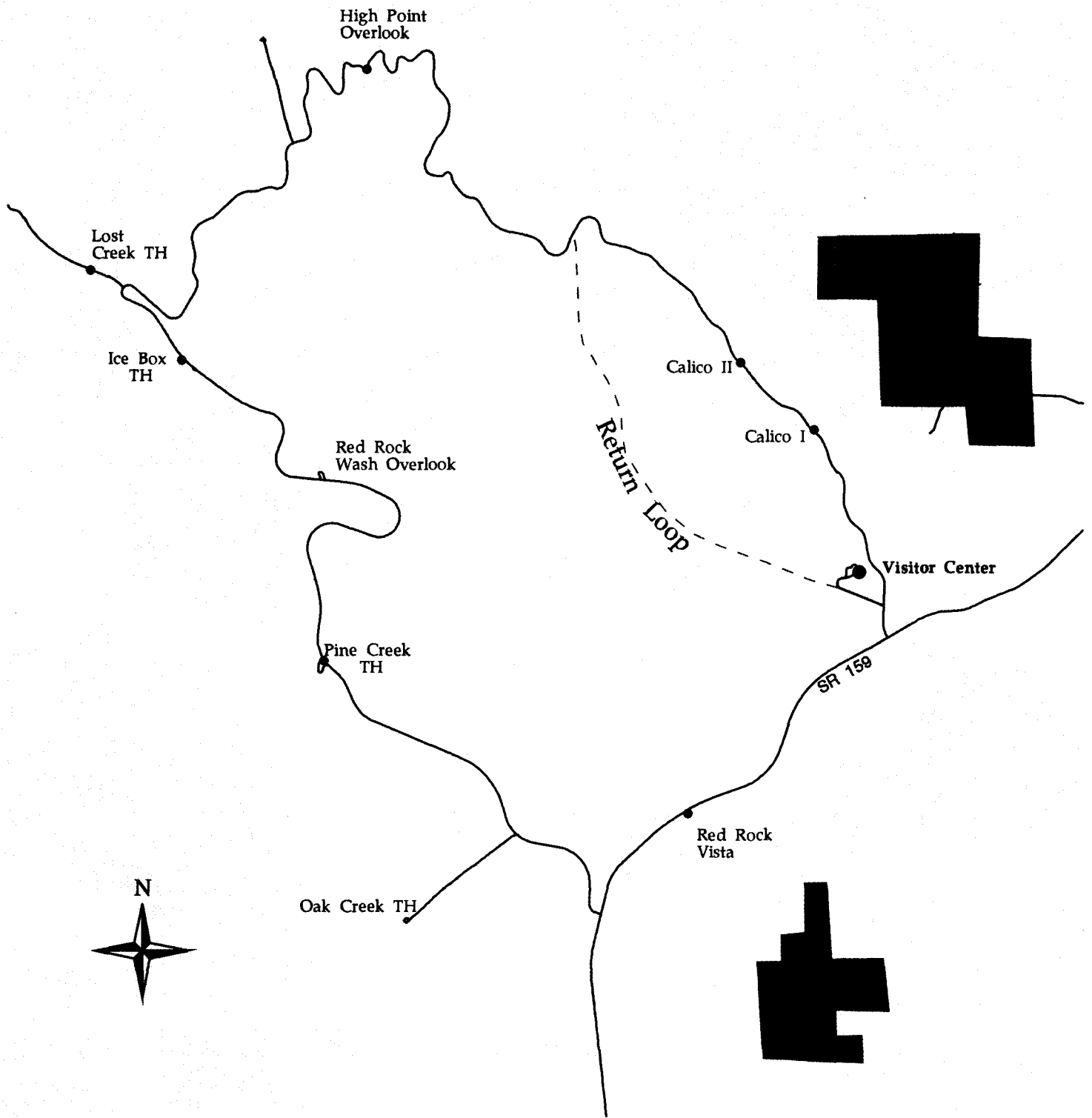
While reducing the total number of road miles in RRCNCA, the GMP proposes to construct one new section of paved road within the Scenic Drive between the Sandstone Quarry area and the Visitor Center. The route primarily follows tracks from an old road and a portion of the bladed (but now closed) original Willow Spring road. The primary purpose of this road is to ensure public access to at least a portion of the Scenic Drive at all times. Currently, if Sandstone, Red Rock or Pine Creek washes are flooding or there is ice on the upper portions of the Scenic Drive (and both these conditions occur several times every year) the entire Scenic Drive must be closed to all use until the problem is eliminated. With this new road the first three miles of the Scenic Drive will be open and access to the Calico Hills ensured at all times without regard to conditions further up the Scenic Drive.

Additional benefits of the proposed Sandstone/Visitor Center road are - 1) an outlet for visitors who wish to leave after visiting the Calico Hills thus reducing traffic on the remaining 10 miles; 2) an outlet for tired bicyclists who now option to ride the wrong way on the Scenic Drive rather than continue all the way around; and 3) an option to implement a quick turn-around shuttle bus operated from the entrance station in an attempt to reduce climber/hiker vehicles parked at Calico 1 and 2.

Other Major Roads

Major roads in addition to the Scenic Drive include State Highway 159 (Charleston Blvd. to Blue Diamond), State Highway 160 to Pahrump, the Rocky Gap Road over the escarpment to Lovell Canyon, the Cottonwood Valley Road to Goodsprings, the Kyle Canyon Road and the Lee Canyon Road. All of the above major roads are either State or County roads of some type with minimal BLM management involvement, maintenance or control. BLM does, and will continue to, provide limited maintenance on the Rocky Gap and Cottonwood Valley roads to control erosion, illegal off-road vehicle use and off-site impacts of recreation use.

Short Return Loop - Scenic Drive



Dirt and gravel roads and two track routes

Numerous dirt and gravel roads and two track routes exist within the NCA. Some of these are used regularly while some are used rarely. Many of the older dirt roads in the vicinity of the Scenic Drive and along Highway 159 were closed when the Scenic Drive was constructed as the primary travel route in the area. Others like the First Creek, Cave Canyon and Oak Creek roads were closed when the amount of vehicle use began impacting the natural resources at unacceptable levels. These roads have been converted to hiking, horseback and mountain bike trails. Several roads and two tracks were listed for closure in the Interim GMP and the process of implementing these closures is on-going. The GMP proposes the closure of additional roads and two tracks. Most of these are dead end spurs and two track routes with limited use and no definite purpose. An exception would be the routes to be closed in the Little Red Rock area. Most of the routes proposed for closure are two track routes which have developed through casual use since 1979. They are located within the La Madre Mt. wilderness Study Area (WSA) and since they did not exist prior to 1976 are a violation of the Bureau's provisions for managing WSAs. Use of these routes has damaged the wilderness values in the WSA.

Many of the dirt roads in the NCA have been claimed by Clark County as Revised Statute (R.S.) 2477 Rights-of-Way. RS 2477 was a Federal law (now replaced by the provisions of the Federal Land Policy and Management Act - FLPMA) which granted public highway rights of way based upon the act of construction by a public entity rather than through prior application as is the practice today. Most of these rights-of-way were not formally documented until after the passage of FLPMA in 1976 which required the States/Counties to submit a listing of RS 2477 right of way claims. Clark County submitted its list of RS 2477 roads in 1979. This issue clouds long term management of vehicle use in the NCA, because many of the now abandoned or closed roads are claimed as county roads on the 1979 list. Discussions have been held with county officials about relinquishment of RS 2477 claims, within RRCNCA, not needed for county purposes. Final resolution has not been reached.

MAJOR ROADS			
Name	Type	Length	Length Totals
State Highway 159	Paved	11.9 miles	40.4 miles
State Highway 160	Paved	4.3 miles	
Scenic Drive	Paved	13.0 miles	
Lee Canyon	Paved	5.6 miles	
Kyle Canyon	Paved	5.6 miles	
Lucky Strike Canyon	Dirt	8.8 miles	19.1 miles
Rocky Gap	Dirt	6.0 miles	
White Rock	Dirt	.6 miles	
North Oak Creek	Dirt	.7 miles	
Cottonwood Valley	Dirt	3.0 miles	

TRAILS

While the 1974 Master Plan laid out a system of trails, the system was never actually implemented. Instead, a number of individual trails to specific locations evolved primarily through casual visitor use without effort to link them together. This resulted in numerous user created paths, particularly in the Calico Hills, which were beginning to cause serious erosion and visual problems.

In 1994 an effort was initiated to integrate the individual trails into a network of connecting segments, to better defined users of individual trails and to make formal trail designations where use levels and impacts required more intense management. In 1994 Public Lands Appreciation Day (PLAD) was used to kick off the implementation of a unified trail system focusing on hiking trails in the immediate vicinity of the Scenic Drive where most trail use occurs. By Sept. 1995 (PLAD 1995) the major portion of the system had been completed. The core of the system is a loop trail, the Grand Circle, which leaves the Visitor Center and roughly parallels the Scenic Drive to Lost Creek and then returns to the Visitor Center via the old Willow Spring Road. This trail passes through Calico I & II overlooks, the Gallery, Sandstone Quarry and White Rock and provides connections with trails to the Moenkopi Loop trail, Calico Tanks, Keystone Thrust, La Madre Spring, Lost Creek and Willow Spring. A connector trail, south from Lost Creek, tying the core system with the Ice Box Canyon, Pine Creek and Oak Creek trails was completed in June of 1997. This connector terminates at the Oak Creek Trailhead. The GMP includes a proposal to extend this trail south to the First Creek Trail which would provide an additional loop trail opportunity using the Oak Creek, First Creek and connector trails.

The proposed GMP recognizes the impacts trail use can have, and in some cases has had, on natural resources in RRCNCA, in particular riparian habitat, and proposes measures to mitigate current and avoid future impacts. Indirect control measures such as re-routing existing trails away from sensitive areas, avoiding these areas with future trails and improving user awareness of trail impacts through the environmental education program will be favored over more direct methods such as regulatory signing and trail closure.

Use of an old road between Sandstone Quarry and Willow Spring as a bike trail, possibly paved, was reviewed and approved in 1993. The Proposed GMP recommends proceeding with the paving of this road/trail. This could provide a safer and less physically challenging route for the typical family bicyclist looking for a good ride, but not ready to challenge the Scenic Drive hills beyond Sandstone Quarry. This route would be expected to divert a significant number of riders from the section of the Scenic Drive with the most hills and dangerous curves. The incidences of riders who underestimate the difficulty of the Scenic Drive and turn around, riding back to the entrance the wrong way on the Scenic Drive, would be greatly diminished due to construction of this hard surfaced trail. The hill climb beyond Sandstone Quarry could be avoided.

Mountain bikes are permitted on designated trails and any of the paved or dirt roads in the NCA open to motorized vehicle use. Mountain bikes use is not allowed off designated roads and trails. A concentrated user education program will be directed at this highly mobile and fast growing user group.

The main trails designated for mountain bike use are those composing the Cottonwood Valley network. A plan for these trails was completed in May of 1996 and they were officially designated on National Trails Day 1998. The trails are signed and marked. The following table is an inventory of the trails composing the network, with information supplied by volunteer Suzanne Shelp.

TRAIL NAME	LENGTH (miles)	CHALLENGE LEVEL
Land Line Loop	8.1	intermediate
Loop du Jour	33.0	advanced
Cottonwood Valley Race Course	5.7	intermediate
Dead Horse Loop - 2 versions		
short version	14.0	intermediate
long version (w/Raven Spur)	18.0	intermediate
Original Horse Trail	17.6	intermediate
Badger Pass	14.8	intermediate
Late Night	7.1	intermediate
The New 33	32.9	advanced
The Mam Man	11.1	intermediate

The above trails fall into the intermediate and advanced levels because of length and technical aspects included. Riders at the beginner level should start with the dirt roads and gradually work into the intermediate trails as their skills improve.

The proposed GMP designates limited number of additional bike trails in the area between Kyle and Lucky Strike Canyons known as the Twilight Zone Trails.

Some of the trails in the Scenic Drive area are designated for hiking only due to the amount of use they receive and the congestion that would be created with mixed use.

The following is a table of RRC hiking trails. The "loop" trails are hikes that end where they begin without retracing portions of the trail. "RT" included with the trail length means round-trip distance, since the trail is traveled in both directions to complete the hike.

TRAIL NAME	DESCRIPTION	MILES		
Moenkopi Loop	Interpretive trail starting and ending at the Visitor Center	2		
Keystone Thrust	Geologic interest	4 RT		
White Rock to Willow Spring	Easy pleasant hike through desert vegetation	1.5		
White Rock Loop	Includes above trail and continues to Willow Springs, La Madre and on around back to White Rock trailhead, offering diverse and interesting scenery	6		
Willow Spring Loop	Interpretive trail featuring plants and cultural resources	1.5		
La Madre Spring	Closed rocky road leads to small dam	4 RT		
Top of Escarpment to Bridge Mountain	Scenic hike from Willow Spring to Red Rock Summit via Rocky Gap Road, and follow trail to Bridge Mountain	14 RT		
Lost Creek	Scenic hike featuring year round creek and seasonal waterfall	.7		
Ice Box Canyon	Scenic hike with some rock scrambling leading to seasonal waterfall	1.75 RT		
Grand Circle Trail	Loop trail which connects sites throughout the first half of the Scenic Drive	11		
Pine Creek Canyon	Diverse hike with desert vegetation, historic homestead site, meadow area, year round stream, Pine Creek Canyon	4-5 RT		
Arnight Trail	From N Oak Cr parking lot to Pine Cr Loop. Offers diversity and potential loop hikes	1.6 one way		
N Oak Creek Trail	Accesses Oak Creek Canyon from road and parking area off Scenic Drive	2-3 RT		
S Oak Creek Trail	Accesses Oak Creek Canyon from Oak Creek Campground	4-5 RT		
Base of Escarpment Trail	Offers unique and interesting scenery and is composed of the segments listed below, from Lost Cr to First Cr	7.5 one way		
segments	SMYC		Lost Cr to Ice Box	1.1 mi
	Dale		Ice Box to Pine Cr	2.2 mi
	Pine Cr		Portion between Dale & Arnight	.65 mi
	Arnight		Portion of Arnight Trail between Pine Cr & Juniper Canyon	.3 mi
	Knoll		Juniper Canyon to First Creek	3.25 mi

CULTURAL RESOURCES and NATIVE AMERICAN CONCERNS

The management plan shall include a cultural resources management plan for the conservation area prepared in consultation with the Nevada State Historic Preservation Officer, with emphasis on the preservation of the resources in the conservation area and the interpretive, educational, and long-term scientific uses of these resources giving priority to the enforcement of the Archaeologic Resources Protection Act of 1979 and the National Historic Preservation Act. (P.L. 101-621 Sec. 5(a)(2)(C))

The management and protection of cultural resources has a high priority. There were many comments received on the importance of protecting these resources. There is also a need to allow visitors the opportunity to experience, enjoy and learn from cultural resources. It is an area of interest for many of the visitors and the staff at the Visitor Center are asked about site locations on a daily basis.

Interpretation and education will play an important role in the management of cultural resources. For additional information, see the "Interpretive Plan" chapter of this document. Also, for more information on the legal aspects of dealing with this issue, see the "Standard Operating Procedures" section. The following are the determinations assimilated for this plan:

Management Objectives for Cultural Resources

Manage for Information Potential

Cultural resources are capable of contributing useful scientific, historic, or management information.

Cultural resources which would be managed for their information potential include most agave roasting pits, the Sandstone Quarry area and the mining district in the southwest corner of the NCA.

Protection of these resources through administrative or physical means would be provided until potential information has been collected and site management planning has been completed.

Manage for Public Values

Cultural resources possess identified socio-cultural, educational, recreational, or other public values.

Cultural resources which would be managed for these values include all rock art; the Willow Spring, Lost Creek and Red Spring areas; the Old Spanish Trail; and the Oliver Ranch.

These resources would be managed in a manner that gives adequate consideration to the value possessed, while affording the public the opportunity to experience and learn from them. Some areas may be restricted from use, due to sensitive or fragile resources, or to protect sites sacred to Native Americans.

Manage for Conservation

Cultural resources have overriding scientific or historic importance.

Cultural resources, which would be managed for conservation, include the rock art in Brownstone Canyon, which would remain closed to vehicle use to limit access to this site.

Management Direction

1. Continue the process of determining site eligibility for nomination to the National Register of Historic Places under criteria in 36 CFR 60.4, including, but not limited to, the Red Spring, Sandstone Quarry, Willow Spring and Lost Creek areas.
2. Install interpretive signing at Brownstone Canyon, Lost Creek, Pine Creek, Red Spring, Sandstone Quarry, Willow Spring and on Highway 160 near the Spanish Trail in Cottonwood Valley, explaining the historic and cultural resources.
3. Maintain the vehicle closure at the entrance to Brownstone Canyon. Consider placing a low level fence in front of the site along with an interpretive sign if this would be the minimum tool to protect the panel. Consider additional protective measures if fencing is not successful.
4. Install Archeological Resource Protection Act (ARPA) signs in the immediate vicinity of all rock art sites in RRCNCA. Signs should be placed so as not to draw attention to the sites.
5. Consult with Native American groups and individuals prior to implementing actions which may impact areas of significance to Native Americans. Develop a cooperative agreement with the Las Vegas Paiute Tribe to assist BLM with the preparation of informational and interpretive signs, and brochures.
6. Cultural resources managed for information potential may be studied upon BLM and SHPO approval of a plan of study presented by an accredited institution. The proponent would be required to provide a report of the information gained for use by the NCA interpretive staff.
7. Locate trails and human activities away from cultural and paleontological sites so that physical damage does not occur.
8. Inventory the known historic and prehistoric sites acquired in the 1994 additions to RRCNCA. Submit 36 CFR 60.4 National Register of Historic Places nominations for eligible sites.
9. Coordinate with Native American interests on educational, interpretive and other related program activities.
10. Enhance partnerships using volunteers to conduct photo monitoring and patrolling of sites to monitor recreational use.
11. Maintain existing interpretive exhibits at the Visitor Center, Willow Spring/Lost Creek, Sandstone Quarry, White Rock, Rocky Gap, La Madre Spring and the Red Spring Project Plan.

12. Provide BLM sponsored guided activities at cultural sites where management deems safe for the resources.

Native American Concerns

Solicit Native American comments on proposed actions which may have an impact on cultural resources or Native American values. Provide partnership opportunities for Native Americans to express their interest at RRCNCA.

Work closely with the USDA Forest Service, Spring Mountain National Recreation Area, to develop coordinated management direction regarding Native American relations.

Locate trails and human activities to avoid impacting cultural sites.

Enhance existing Visitor Center cultural exhibits by incorporating local Native American beliefs and knowledge.

Allow for Native American use of sensitive resources when involved with traditional ceremonial purposes.

Invite Native Americans to present cultural/educational activities for volunteers and the general public at RRCNCA.

BIODIVERSITY

wildlife, biodiversity, ecosystem management and wild horses and burros

The management plan shall include a wildlife resource management plan for the conservation area prepared in consultation with appropriate departments of the State of Nevada and using previous studies of the area. (P.L. 101-621 Sec. 5(a)(2)(D))

Biodiversity Preservation

Conduct an ongoing program of population monitoring for T&E species, Candidate species (Blue Diamond cholla) and other Special Status Species (Angelica scabrida; Calochortus striatus; Astragalus mohavensis var. hemigyrous, (peregrine and springsnail). (DEIS, App. 1, Special Status Species)

Re-introduce springsnails (Pyrgulopsis deaconi and P. turbatrrix) into restored Willow Spring riparian habitat. (DEIS, App. 2, Priority Management Areas)

Areas where raptors, in particular Peregrine falcons, are suspected to be nesting would be monitored to confirm nesting status. If nesting is confirmed, recreational uses, primarily rock climbing on canyon cliffs, would be monitored and evaluated to determine if use restrictions are needed to avoid nest disturbance during incubation and fledging of young.

The Blue Diamond cholla habitat on Blue Diamond Hill would be protected through the implementation of a Conservation Agreement between BLM, the U.S. Fish and Wildlife Service and James Hardie Gypsum mine. Recreational use of Blue Diamond Hill would be discouraged by not locating any public facilities, roads or trails in the area. A continuing inventory would be initiated to further refine cholla habitat and discover any additional plant populations. BLM would continue to support a land exchange with James Hardie Gypsum in which BLM would acquire most of the known cholla habitat in exchange for BLM lands within the mine area.

BLM would continue to encourage and support researchers inventorying caves and abandoned mines for bat colonies and potential roost sites. Bat gates would be installed where appropriate starting with a gate in Wounded Knee Cave to protect a known Townsend's Big-eared bat colony. Controlled public use would still be allowed.

Remove and rehabilitate unauthorized trails within Pine Creek WSA. There are a number of unauthorized trails, some constructed for mountain bike use, in the western edge of the WSA in the Lovell Canyon and Red Rock Summit areas.

Monitor cumulative recreation use impact on Bridge Mountain (biodiversity hotspot; global population of Ionactis caelestris). (DEIS, App. 2, Priority Management Areas)

Emphasize conservation management for the North Fork Pine Creek Canyon Natural Area (biodiversity hotspot) with emphasis on:

- Sensitive species, including Spring Range endemics (Astragalus remotus; Angelica scabrida)
- 9 species of fern or fern allies, including Polystichum scopulinum (rare in Nevada)
- 2 spikemosses, both rare in NV (Spring Range only) - Selaginella leucobryoides; S. utahensis (only RRCNCA population)

Implement management actions to preserve and ensure habitat suitability for native wildlife species; minimize habitat fragmentation from roads; work as a partner in implementing the Clark County Multi Species Habitat Conservation Plan. (DEIS, App. 1, Part C., Special Status Species)

Ecosystem Management

Identify core habitat for the Bighorn sheep herd north of SR 160 and monitor for recreation impacts in coordination with the Nevada Division of Wildlife (NDOW). Cooperate with NDOW and the Howard Hughes Company to provide alternate water sources to mitigate losses from urban expansion or recreational use. Implement visitor use restrictions as needed. Utilize Bighorn as an umbrella species to monitor and evaluate habitat and the potential for fragmentation due to human use in the upper elevations of the Spring Range within the NCA.

Modify or re-construct Bird, Tunnel and Grapevine springs to ensure that the diversion of waters into storage tanks does not deny water to wildlife and begin to restore the riparian area. Ensure that wildlife drinkers at these springs are receiving water. Coordinate with NDOW to improve upland game bird habitat conditions.

Continue to limit the allocation and diversion of water for purposes other than wildlife and riparian purposes to 25 % of historic low flow measurements (IGMP 1995).

Implement prescribed natural fire program to restore fire ecology to montane chaparral communities in the escarpment canyons.

Establish a minimum response fire suppression policy for pinyon-juniper uplands to promote mosaic habitats, in coordination with the U.S. Forest Service, Spring Mountain National Recreation Area.

Implement strategies to minimize habitat type conversion fires stemming from invasive exotic annual grasses.

Implement aggressive fire suppression policy for all fires in low elevation communities (Blackbrush).

Establish "Limits of Acceptable Change" and monitor dispersed recreational use impacts focused on, but not limited to, riparian areas and other high density visitor use locales.

Wild Horse and Burros

Red Rock Herd Management Area (HMA)

The Red Rock HMA lies on BLM lands both inside and outside of RRCNCA and on U.S. Forest Service managed lands in the Spring Mountain National Recreation Area (SMNRA). There has been considerable confusion as to the location and extent of the HMA since it has the name Red Rock. The HMA and RRCNCA, while they overlap, are not the same areas. The HMA covers substantially more area than just the NCA.

The boundary of the Red Rock Herd Management Area (HMA) would be amended in the Proposed GMP. The area north of Cave Canyon on the east side of State Route 159 and the area north of Spring Mountain Ranch State Park

would be removed from the HMA. Wild horses and burros would be removed from the areas deleted from the HMA and placed in the Adopt-A-Horse program.

Wild horses and burros would be managed on the east side of State Route 159 and south of Spring Mountain Ranch. As a short term measure to allow for improved ecological condition of the vegetative and riparian resources in the area between State Route 160 north to Spring Mountain Ranch State Park, all wild horse and burros would be removed from this area until the area's ecological condition has improved, and a clear indication given through a structured program of monitoring, that progress is being made in reaching the desired plant community objectives. The criteria or trigger point that would signal that progress in meeting desired plant community objectives and allow for the consideration of re-introducing wild horses in the area between State Route 160 and Spring Mountain Ranch, would be two years of trend data which finds that 80 % of trend plots have a basal cover of 3 % or more perennial grasses. The long-term objective is 5 %. (The 80 % target is used in recognition that some sites may never be able to meet the 5 % objective.)

The Wild Horse and Burro Act requires that wild horses and burros "be considered in the area where they are presently found, as an integral part of the natural system of public lands." BLM guidance further requires that wild horses and burros be managed to preserve a thriving ecological balance. There has been, and is, on-going confusion as to exactly where wild horses and burros existed on public lands in the Las Vegas area at the time of passage of the Act versus where domestic horses under grazing permit existed. Additionally, the documented, and significant, damage to, or loss of, springs, riparian areas and vegetative resources due to wild horse and burro use, or improvements constructed to facilitate wild horse and burro use, is a clear indication that a thriving ecological balance is not being maintained.

The following factors figured prominently in developing the Proposed GMP and are described in more detail in Chapter 3 of the DEIS:

1. Reduced range quality and habitat fragmentation due to fencing and development (see Map *);

The NCA portion of the HMA, which in 1971 was relatively undeveloped and open to access, is now subdivided into numerous small pieces due to the fencing of State Highways and County roads to improve public safety and/or limit off-road vehicle use. Only the area (south) between State Route 160 and Goodsprings remains free of barriers to wild horse (and burro) movement. The Calico Basin burro band spends the majority of their time on lands outside of the HMA (as mapped in the 1998 Las Vegas Resource Management Plan) east of Calico Basin and Gateway Canyon and has been seen as far southeast as the subdivisions near Sahara Blvd. and Fort Apache (although they can no longer get there due to new development).

2. Natural water sources are unreliable and do not produce sufficient water to maintain a viable population;

In the area used by wild horses (Spring Mt. Ranch south), six springs are used. Two springs, Bird and Tunnel, are south of State Route 160 while four, Shovel, Lone Grapevine, Mud #1 and Mud #2 are north of State Route 160. Four springs, Tunnel (Wilson Tank), Shovel and Mud #1 & 2, all go dry periodically and are unreliable. Water has been hauled to Tunnel Spring in 1991/92 and 1998 and to Mud #1 in 1998. Lone Grapevine Spring north of State Route 160 and Bird Spring in the very southeastern corner of the NCA are the only two springs in the area used by wild horses on the eastern side of RRCNCA that have reliable flows.

Estimated total water availability (based on lowest recorded flows) is; south of SR 160 0.1 gpm (Bird .1 gpm, Tunnel 0.0 gpm (dry); north of SR 160 2.4 gpm (Shovel 1.0 gpm, Lone Grapevine .4 gpm, LM 0.0 gpm (dry), Mud #1 .2 gpm and Mud #2 0.0 gpm(dry), Wheeler Camp .8 gpm); and USFS springs which total .7 gpm, for total production of 3.2 gpm (DEIS App. 11, Spring Discharge Measurements). Based on an estimated need of 20 gallons/day/animal for horses (the USFS Spring Mt. Plan used 10 gal./day but BLM feels this is too low for the hot desert environment of RRCNCA), this production (4,608 gallons/day), allocated 25 % for wild horses and burros, can support 58 animals. Local office horse specialists have stated that a population of 50 animals is required to maintain a viable herd. Based on current BLM population estimates of 71 horses, horse use at 1,420 gallons/day (or almost 31 % of the minimum recorded flows) exceeds the 25 % allocation (1,152 gallons). Only the fact that not all springs experience low flow at the same time, and periodic water hauls, have prevent a major crisis. Horses have died in the past during drought events.

The entire flows (100 %) from Tunnel and Bird springs, and most of the flow from Mud #1, are diverted into storage tanks or watering troughs with no riparian area remaining. This exceeds the 25 % allocation, or any other alternative less than 100 % which has been suggested. In order to meet riparian restoration goals, these developments would need to be re-constructed to reduce water diversions and begin restoring the riparian area.

In the areas used by burros, seven water sources provide primary waters; Ash, Calico and Red Springs in Calico Basin, Pine Creek, Oak Creek, Wheeler Camp Spring, and, when burros break through the fence, Mormon Green Spring at Oliver Ranch. Artificial waters used include the old CCC dams in Brownstone Canyon, the tortoise habitat at the Visitor Center and water sources on the James Hardie mine site. Calico Spring is outside the boundary of the HMA (Las Vegas RMP, HMA reference map).

3. Wild horse use has caused significant and substantial damage to springs and riparian areas.

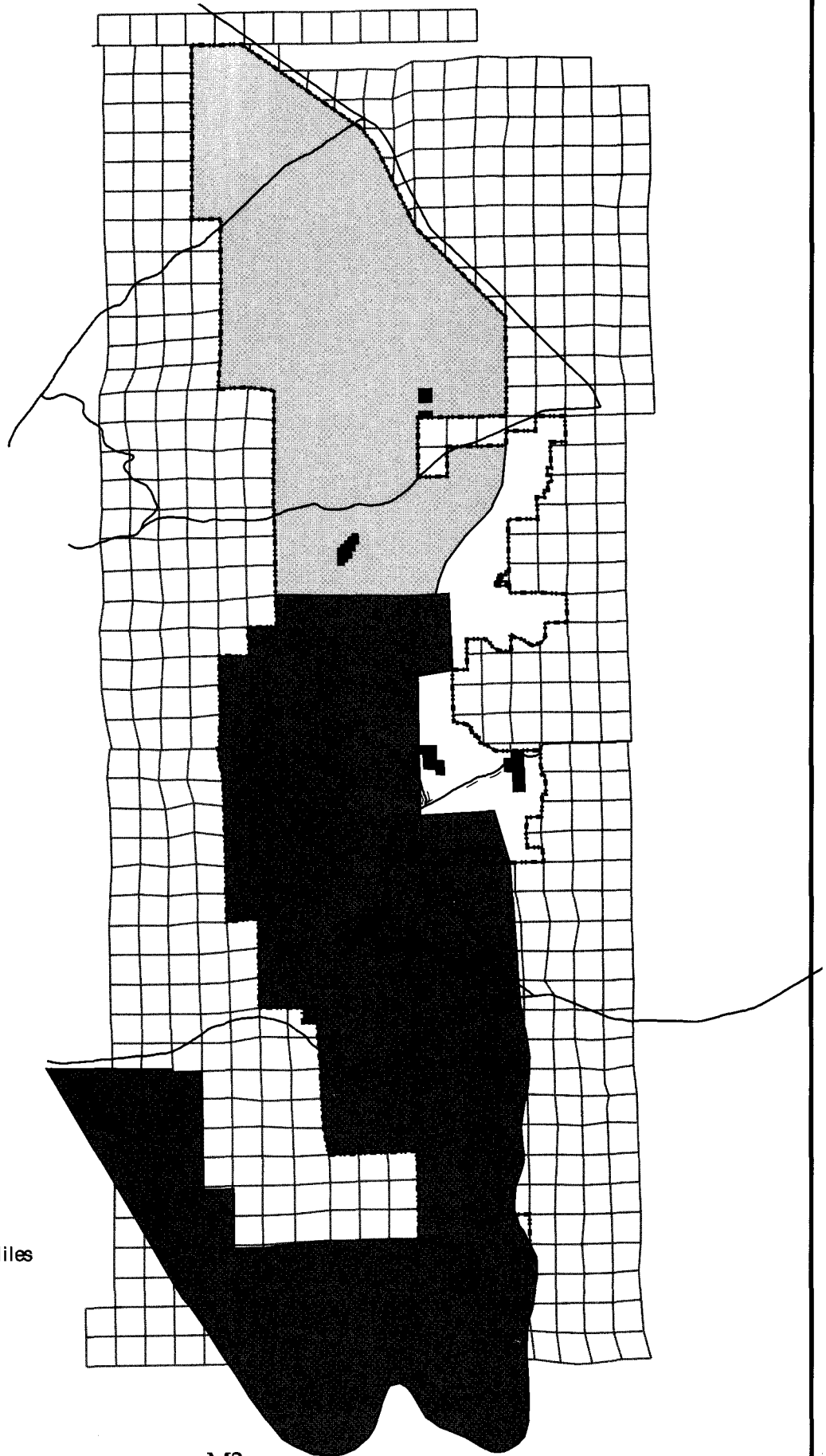
Field monitoring in 1996 and 1997 showed substantial damage to the riparian areas at Lone Grapevine and Shovel Springs. The riparian vegetation around the spring sources was completely disturbed and soil stability damaged by hoof action. Both springs and their riparian areas were fenced in September of 1997. Lone Grapevine has shown significant recovery while Shovel Spring is responding less quickly due to greater damage and loss of vegetation. (App. 15, Part C., Disturbed Habitat Areas, Wild Horse and Burro Impacts). Elimination of vegetative and soil disturbance by horses would allow the eventual removal of spring source fencing restoring the natural unaltered condition of RRCNCA springs as there are no other actions causing surface disturbance. Bird and Tunnel Spring do not show direct damage from horses since they were completely fenced many years ago and all their waters are collected in storage tanks and watering troughs.

4. Ecological condition (vegetation) is less than desirable

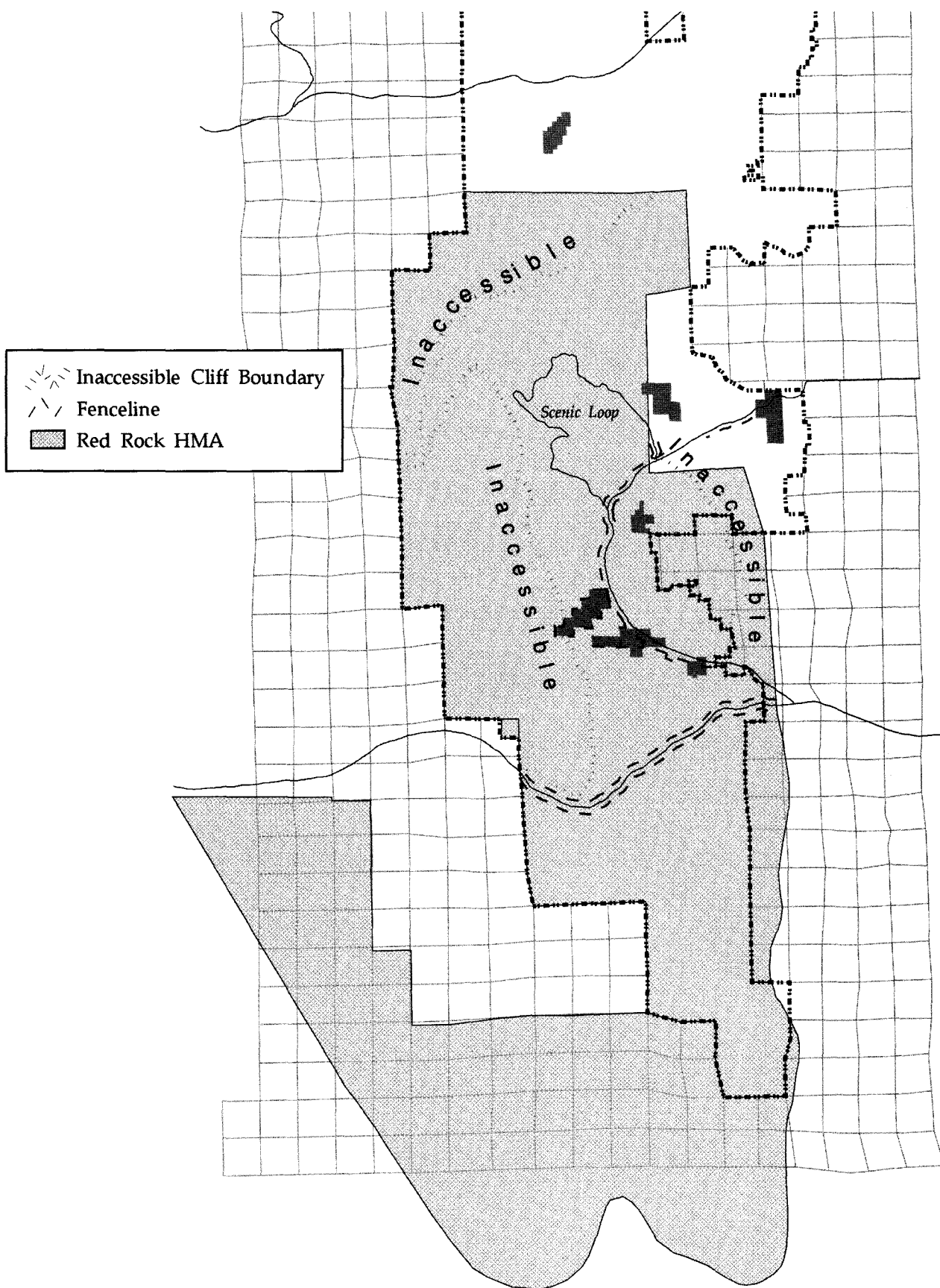
Soil and vegetative studies, particularly in the area north of State Route 160, have found that the native perennial grass component, which should comprise 5-10 % of the vegetative cover, has been substantially reduced, and in some areas cannot be found. While this condition is probably a result of past domestic livestock grazing, the current grazing by wild horses and burros is sufficient to prevent the grass species from re-establishing themselves due to selective grazing of young plants.

Herd Management Areas (HMAs) in Red Rock Canyon NCA

\\ Fenceline
HMAs in RRCNCA
■ Red Rock HMA
■ Wheeler Pass HMA
(Wheeler Pass HMA extends to the west beyond NCA boundary)



Fragmentation of Red Rock HMA



Wheeler Pass Herd Management Area

Because the majority of the Wheeler Pass HMA is now managed by the U.S. Forest Service SMNRA (SMNRA plan calls this the Spring Mt. Territory), that agency has the lead role in management of the HMA. In the SMNRA management plan, the decision was made to remove horses from Forest Service lands in Kyle, Lee and Upper Deer Creek canyons and establish a 0 AML. This leaves an isolated island of RRCNCA lands in the lower ends of these canyons. Allowing horse to remain in this area would render the SMNRA plan moot since there is no barrier to prevent horses from moving into the areas closed to horse use. This area also is too small to support more than a few animals leaving a non-viable population. Therefore, this area would be designated for removal of all horses.

The SMNRA plan set an AML of 26 horses and 0 burros for the Cold Creek area of the Wheeler Pass HMA (Cold Creek portion of USFS Spring Mt. Territory). Some of these animals will undoubtedly utilize the northern end of RRCNCA.

Visitor Education/Environmental Awareness:

Modify existing educational brochures and visitor information to deter recreational impacts in biologically sensitive areas (North Fork Pine Creek Canyon; Bridge Mountain; La Madre Spring).

Devise signing/visitor outreach program to publicize Red Rock's significant biological quality and value:

- Landscape ecosystem integrity, high biodiversity, endemism (rarity of both species and communities);
- Threats to biological and ecosystem integrity.

Biodiversity and Recreation/Trails/Access Issues:

Reroute existing Bridge Mountain trail/route to remedy erosion problems and avoid key biodiversity hotspots on Bridge Mountain. (DEIS, App. 2, Priority Management Areas)

Riparian Restoration

Camouflage and close trail spurs and braids (Oak Creek; First Creek; Pine Creek; Lost Creek; Red Spring; Bootleg; Rainbow; Mormon Green #1; Wheeler Camp Spring; Mud Spring #1).

Adopt a policy of discouraging recreation use in riparian habitats:

- Evaluate and rehabilitate present high use areas and minimize future promotion; deflect use to non-riparian areas.

Eradicate non-native species with emphasis on tamarisk removal. (DEIS, App. 15, Part A., Disturbed Habitat Areas)

Insure proper functioning condition of riparian areas. Restore surface flow for riparian vegetation (100%- Willow; 75% Lone Grapevine and Grapevine. (DEIS, App 10, Inventory of Springs)

Restore spring brook flows and riparian areas in Red Spring and Willow Spring to ensure adequate habitat for springsnails (pyrgulopsis deaconi and P. turbatrix). Maintain protective fencing around key habitat areas until the threat(s) which required the fencing has been eliminated.

Implement protective measures at degraded spring sites sufficient to allow natural revegetation to occur (Shovel; Mud #1; Lone Willow; Schumacher). Utilize fencing only as a last resort.

Design all future trails to minimize impacts to riparian areas.

Air Quality:

Pave, or treat with soil stabilizers, all high use dirt roads and parking areas to reduce creation of suspended particulate matter (PM 10) in conformance with local government's efforts to improve air quality within the Las Vegas Valley Non-attainment Area. Primary focus will be on areas around the Scenic Drive, the campground and the Red Spring Picnic Area.

Vegetation:

Continue to inventory NCA lands to more accurately determine the location and population density of plants listed as threatened, endangered or sensitive by Federal or State agencies. (DEIS, App. 1, Special Status Species)

Establish as ecological and desired plant community objectives the goals of a 20 % canopy cover (minimum), a basal cover of 5 % (minimum) perennial native grasses, and perennial grass species composition (by dry weight measurement) of 5-10 % in accordance with the potential natural community and site improvement potential as detailed in the soil characterization reports prepared by the Natural Resource Conservation Service.

RECREATION MANAGEMENT

The management plan shall include a recreation management plan, including nonmotorized dispersed recreation opportunities for the conservation area in consultation with appropriate departments of the State of Nevada. (P.L. 101-621 Sec. 5(a)(2)(E))

RECREATION OPPORTUNITIES - camping, rock climbing, target shooting, trails and roads issues

Camping

All camping, whether dispersed or in the designated campground, is limited to a 14 day maximum stay. (Current policy)

Expand the public education program of "Leave No Trace" recreation ethics and land stewardship.

The 13 Mile Campground will be the only campground designated in RRCNCA and the following actions taken:

- continue closure of the Black Velvet area to camping;
- close the 10-mile Canyon alternate group use site to camping;
- discontinue use of the "Spanish Trail" overflow camp area across from the James-Hardie Gypsum Plant.

Camping along Rocky Gap Road or on the Escarpment will be authorized by permit only.

From La Madre Mountain to the Forest Service/BLM boundary, 3 miles south of SR 160, camping will be managed as follows: (see following "Camping" map)

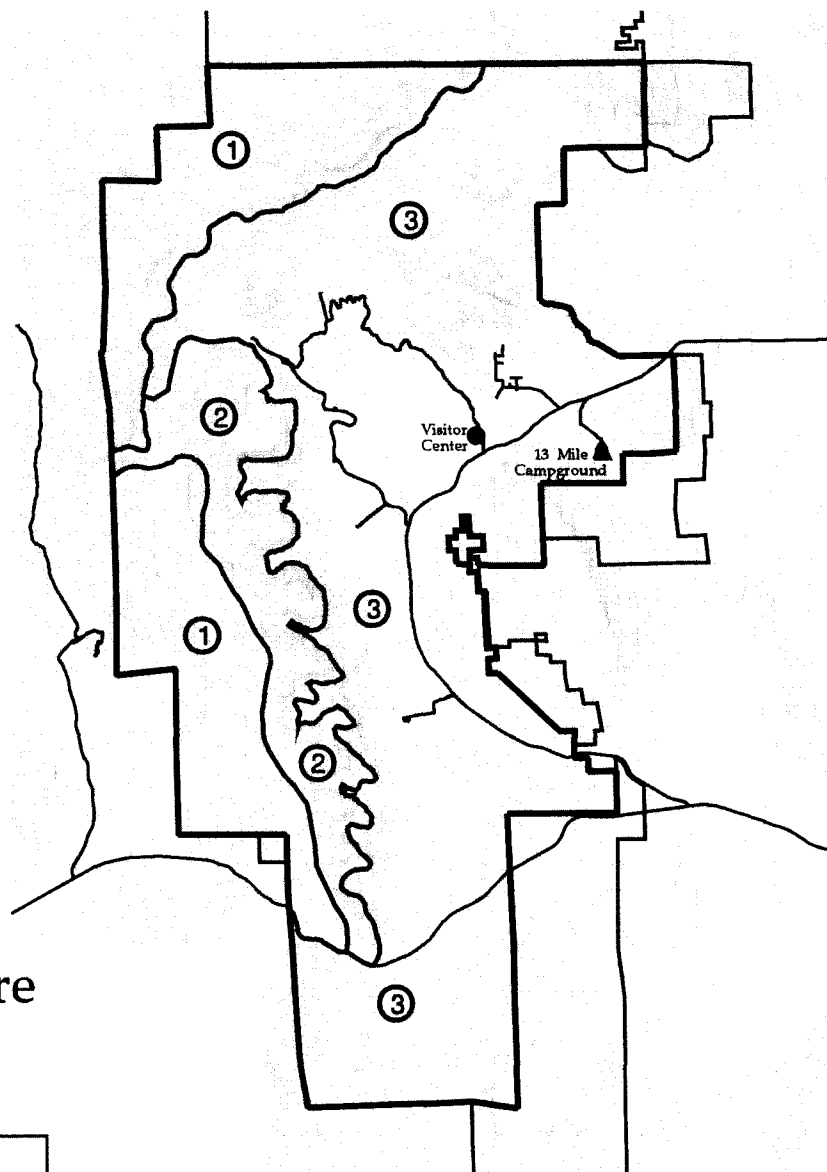
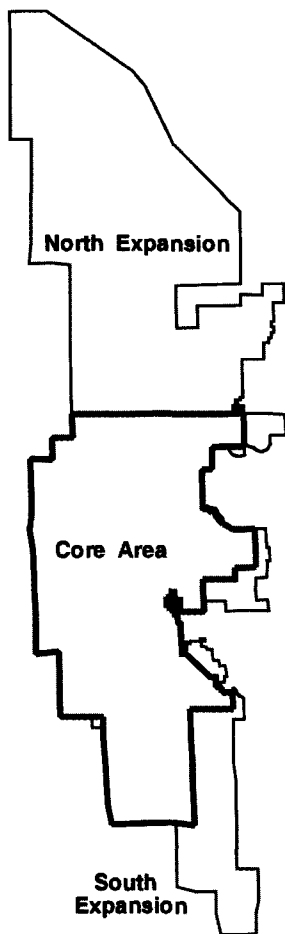
- camping northwest of the 6,500 ft elevation contour on La Madre Mountain does not require a permit;
- camping west of the Spring Mountains escarpment crest does not require a permit;
- within the Pine Creek WSA, camping between the escarpment crest and eastward to the canyon floor (4,400 ft. contour) requires a camping permit;
- no other camping is allowed in this area except in the designated campground or unless specifically agreed upon in writing by an authorized BLM representative;

Dispersed camping would be allowed north of La Madre Mountain on existing disturbed areas. If monitoring shows that additional impacts occur as a result, camping would be limited to specific designated sites.

East of the Bird Spring Range camping would be limited to disturbed areas within 200 feet of designated roads.

No camping within 1/4 mile of springs and riparian areas.

Camping at the base of the escarpment would not be allowed. The intention of "bivouac" is an overnight stay on the rock wall, above the base, on a multi-day climb. (Current policy.)



Camping in Core RRCNCA

This map does not refer to the NCA expansion areas which are covered in the alternatives.

The boundary along La Madre Mountain follows a contour of 6500 ft.

The boundary along the base of the escarpment follows a contour of 4400 ft, which basically separates the escarpment and the canyon floor.

The boundary following the Spring Mountain Range along the top of the escarpment follows the crest of the range.

Overnight parking along the Scenic Drive requires a permit regardless of camping location.

Any camping within 1/4 mile of the Rocky Gap Road requires a permit.



- ① OPEN - NO PERMIT NEEDED
- ② PERMIT ONLY
- ③ CLOSED TO CAMPING

Rock Climbing:

Liaison Council

Manage rock climbing in partnership with the climbing "Liaison Council" (LC) composed of representatives from the local community, permittees and sports shop interested in representing the climbing community in information exchange and issue resolution with the NCA staff.

Coordination efforts between the LC and the BLM would include:

- proposals for bolt replacement on wilderness climbing routes;
- working together to organize resource protection projects, such as designated approach routes to avoid trail braiding, or removing chalk, ropes and slings from climbing surfaces;
- joint efforts to inform non-local climbers of RRCNCA policies and regulations and keep local climbers updated on any new and relevant information;
- maintaining communications, keeping each other up to date on pertinent information and constituent concerns;
- possible changes to climbing management in the NCA in the future.

Climbing Restrictions

All of the following climbing restrictions represent the current management situation (Interim GMP in 1995).

The BLM is engaged in long-term monitoring of various RRCNCA plants and animals. If raptor nest sites are found, climbing restrictions may be imposed during critical nesting periods. Should any T&E species become an issue, appropriate mitigation actions will be taken.

Alteration of the rock surfaces by gluing, chipping or chiseling, is not allowed.

Cultural resources restrictions include the following:

- no climbing allowed within 50 feet of rock art.
- known cultural sites, such as in Sandstone, Willow Spring and Red Spring, will be signed to alert climbers about restrictions.

No permanent fixed ropes or cables for climbing or belaying purposes are allowed.

Bolting is not allowed in the following locations:

- Sandstone Quarry area within 1/4 mile from each side of the parking area

The Sandstone Quarry area has an abundance of cultural resources and is considered a historic area because of the quarry and related artifacts. To avoid detracting from the visual experience of scenic viewers and because of the abundance of cultural resources, no new bolting will take place in the vicinity as stated above.

- Within the Wilderness Study Areas (WSAs)

The placement of new bolts will not be allowed in WSAs (or in future designated wilderness). The Pine Creek and La Madre Mt. WSAs are recommended for Wilderness designation. Should the (eventual) Congressionally designated boundaries be different from those proposed, NCA policy and management will adjust accordingly.

- Replacement of existing bolts in the afore mentioned locations is allowed for safety purposes but should be presented to the Liaison Council for review and concurrence.

BLM strongly encourages the use of the following equipment:

- the "Bison Ball", "X-Factor" or the like, as opposed to an open chalk bag;
- tinted bolts and hangers which blend with the rock face;
- drab colored web gear, when used for a rappel anchor.

Commercial Climbing

The following policies are designed to provide adequate access to commercial services for visitors while avoiding overcrowding and maintaining continued access for commercial outfitters and guides.

1. The number of commercial (outfitter and guide) rock climbing permits, authorizing full time year-round use, will be limited to no more than six at any one time. In addition, ten "guest permits" will be available to allow limited use to commercial operations who wish to offer Red Rock Canyon as an option to clients. The guest permits will be limited to two visits, of up to five days per visit, in a calendar year (one ten day visit is permissible). There is no guaranteed renewal of guest permits. If the situation arises where there is more interest than permits available, some form of lottery may be implemented. (This continues the current situation.)
2. In order to ensure adequate access to commercial outfitter and guide services, a minimum use standard would be implemented. **Regular full time permits not utilizing a minimum of 100 visitor days per year for two consecutive calendar years would be canceled.** This standard would be implemented the first full year following completion of this plan so the standard would have to be met in the years 2000 and 2001 for a permit to remain active. (for additional permit information, see section on "permits" in this document)
3. Commercial group size in any one area is limited to 10 students plus instructors. (Current situation)
4. No more than two different commercial groups may use the Sandstone area, the Gallery, Kraft Rock, Calico I, Willow Spring/Lost Creek or Pine Creek at any one time. The two groups may not be operating under the same permit. (Current situation)

Scenic Drive Access

Early Access Permits - Early access to the Scenic Drive may be attained by registering a day ahead with the Visitor Center. The desired climbing route must be one that justifies the additional time. No more than two parties will be granted early access for any one day. (This continues current management direction.)

Late Exit and Overnight Parking Permits - Parking on the Scenic Drive (at Willow Spring, Ice Box, Pine Creek, or Oak Creek or other designated sites), after closing hours, may be authorized by an after hours permit, which can be obtained at the Visitor Center. To avoid waiting for the Visitor Center to open, permits should be filled out prior to the day of the climb. Late Exit permits are only issued for long one-day climbs where even with an early morning start, it is likely that return to the trailhead will occur after the Scenic Drive's posted closing hours. Late Exit permits will not be issued to climbing parties who simply begin their trip late in the day. Overnight permits will only be issued for certain routes that have been determined to be multi-day climbs requiring an on-wall bivouac. (This continues current management direction.)

Target Shooting

The NCA would be closed to target shooting. This continues the existing situation. The encroachment of urban neighborhoods and the increasing recreational use in RRCNCA, even in areas not normally thought of as recreation use areas, has created a safety issue concerning unregulated target shooting. A regulated shooting area could improve safety but this type of facility is not considered appropriate within a conservation area.

Trails:

General direction

Monitor use of the existing designated trails in the Scenic Drive vicinity south to First Creek. Implement limited use designations if necessary to mitigate impacts of overuse or incompatible uses.

Provide an access trail in Calico Basin to Kraft Rocks and Gateway Canyon starting at a new trailhead to be located on the remaining portion of the old dirt airstrip. There have been continuing complaints from Calico Basin residents concerning hikers and climbers who must pass through the subdivision to access Kraft Rocks and Gateway Canyon. While most of the roads in the subdivision are dedicated County roads, there is no place to park. Vehicles are often parked in front yards and residents are disturbed at all hours. Complicating the situation further has been the County's vacation, at property owners request, of several road sections in the subdivision. This new trailhead will eliminate the majority of vehicles which now pass through the subdivision. Prior meetings with Calico Basin residents have not resulted in a consensus solution to residents concerns so this action is being proposed. This action does not include use of any private lands, eliminates use of roads within the subdivision and the trail is located so that it passes by the fewest private parcels possible.

Construct the final portion of the Escarpment Base Trail (between First Creek and Oak Creek) and designate for hiking and equestrian use.

Designate the First Creek Trail and Brownstone access (beyond the gate) for hiking and equestrian use only (no mountain bike use).

Hiking trail use

Designate the following trails for hiking use only:

- the Arnight Trail from the North Oak Creek trailhead to Pine Creek;
- the La Madre Trail Spring (spur) Trail north of the intersection with the White Rock Loop Trail;
- the first half of the Grand Circle Trail; Visitor Center to the White Rock Road
- Pine Creek, Ice Box and Lost Creek trails
- The Dale Trail (Pine Creek to Ice Box) and the SMYC Trail (from Ice Box to Lost Creek) portions of the Escarpment Base Trail

Mountain bike trail use

Mountain bikes would be allowed on designated trails only.

Mountain bikes would not be allowed on any trails between Spring Mountain Ranch State Park and La Madre Mountain including all trails around the Scenic Drive.

Designate for mountain bike use the Blue Diamond to Jean trail (portion within RRCNCA) that has been used annually for a group ride event.

Designate the "Twilight Zone" mountain bike trails north of the Kyle Canyon road.

Modify existing and proposed trails to avoid springs and riparian areas.

Portions of the trail network designated in the Cottonwood Valley Mountain Bike and Equestrian EA would be realigned to accommodate the new underpass access points on State Route 160.

Bike paths - Road bike use

Construct a hard surfaced bike trail from Sandstone Quarry to Willow Spring following the route of the old Sandstone/Willow Spring Road. This route was approved for mountain bike use but it little used due to loose gravelly soils. This route would provide an alternative to the steep hilly sections of the Scenic Drive between Sandstone Quarry and the Willow Spring Road Junction. Advantages of this route are 1) a reduction in the number of wrong-way bike riders who attempt the Scenic Drive hills above Sandstone Quarry but turn around when they become fatigued, 2) increased visitor safety due to reduced bike/vehicle interaction and conflict in the tight narrow turns on the upper part of the Scenic Drive and 3) increased rider safety by providing a route which avoids the dangerous long steep downhill section of the Scenic Drive past the White Rock turnoff.

Participate in regional trail planning efforts with the Nevada Dept. Of Transportation, Regional Transportation Commission, Clark County, CAT bus system and the Howard Hughes Company. Focus on increasing safety for bicycle riders by providing wider road shoulders or even separate bike lanes along State highways and County roads.

Equestrian trail use

Restrict equestrian use to designated trails between La Madre Mountain south to Cottonwood Pass 3 miles south of SR 160 designating the following routes and trails to include equestrian use:

- * White Rock loop and Keystone Thrust trails - provide a water trough near the intersection of Rocky Gap Road and the La Madre trailhead;
- * the Oak Creek trails;
- * the old road from Willow to the Visitor Center;
- * the old road beginning at the Scenic Drive/Oak Creek Road junction and following the ridge just south of Pine Creek;

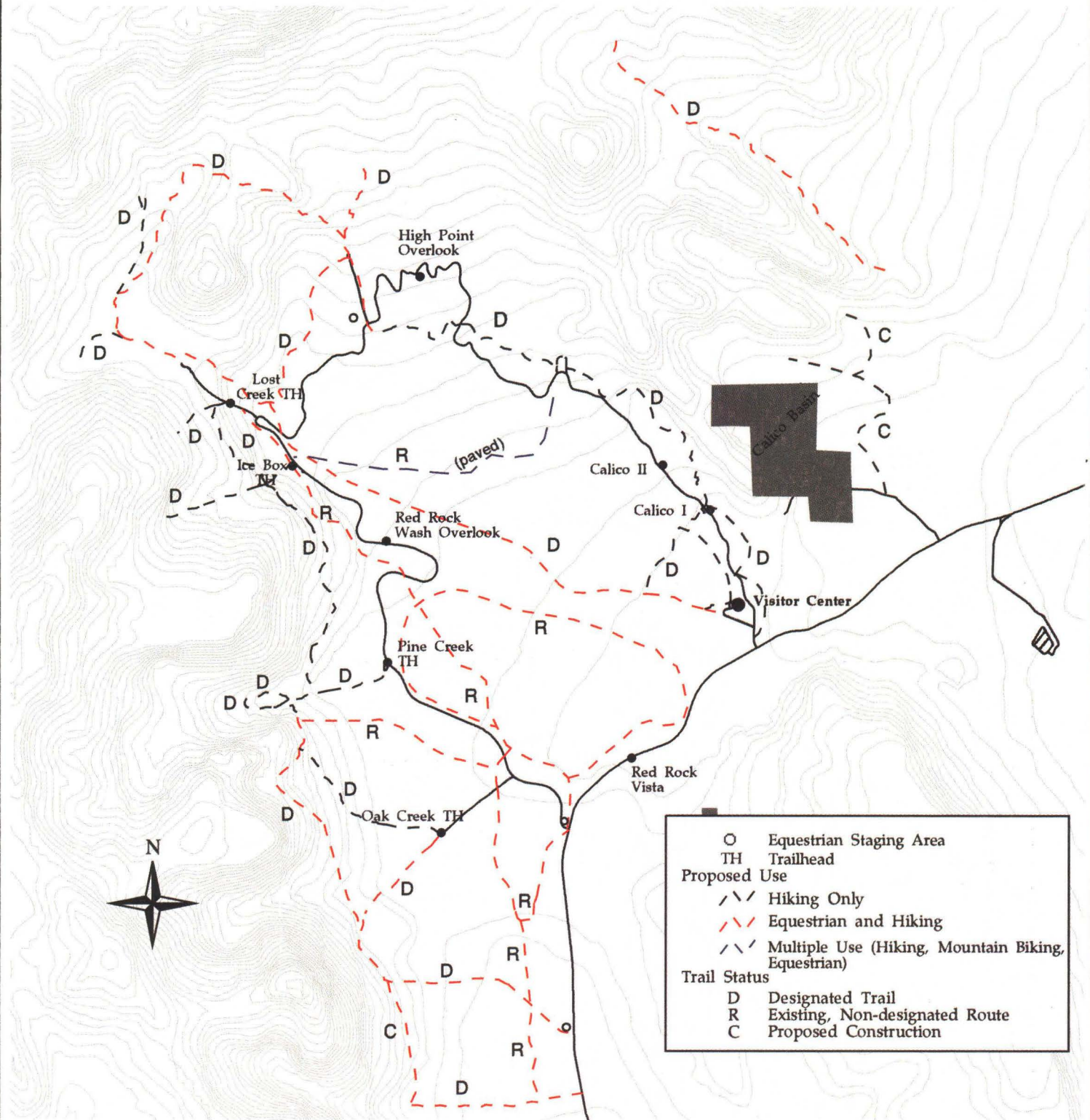
- * the Escarpment Base Trail between Pine Creek and Oak Creek;
- * the Blue Diamond to Jean route (portion within NCA) which has been used for an annual equestrian ride event;
- * the existing equestrian route from First Creek to Lost Creek, out away from the base of the escarpment;
- * the loop trail route directly north of Red Rock Vista;
- * the existing trails from the Scenic Drive exit lot to adjacent trails;
- * the Cottonwood Valley Trail System.

Designate horse trailhead/staging areas at the Scenic Drive exit lot and the Oak Creek Campground location (when the campground is relocated).

Construct a separate paralleling Red Valley trail for equestrian use (no mountain bikes) to separate horses and mountain bikes in this narrow corridor.

Designate the remainder of RRCNCA as an open riding area with no requirement to stay on specific trails.

Trails in Scenic Drive Vicinity Alternative 3

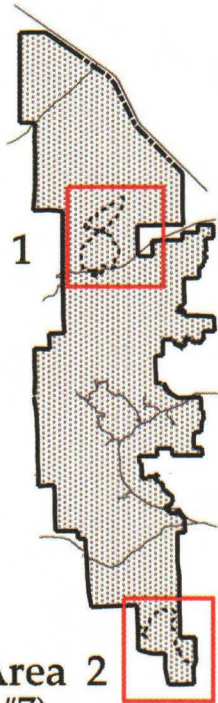


○	Equestrian Staging Area
TH	Trailhead
Proposed Use	
- - -	Hiking Only
- - - (red)	Equestrian and Hiking
- · - ·	Multiple Use (Hiking, Mountain Biking, Equestrian)
Trail Status	
D	Designated Trail
R	Existing, Non-designated Route
C	Proposed Construction

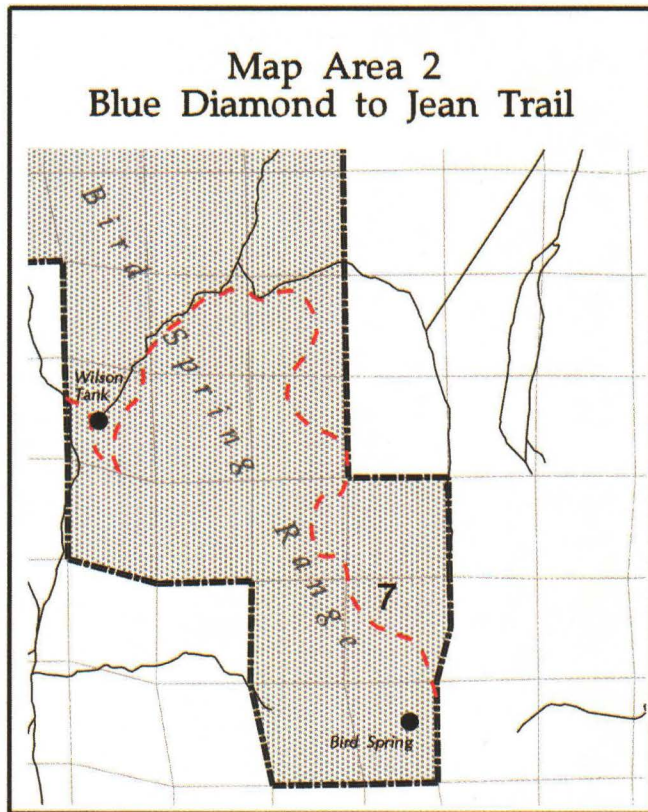


Blue Diamond to Jean and Twilight Zone Trails

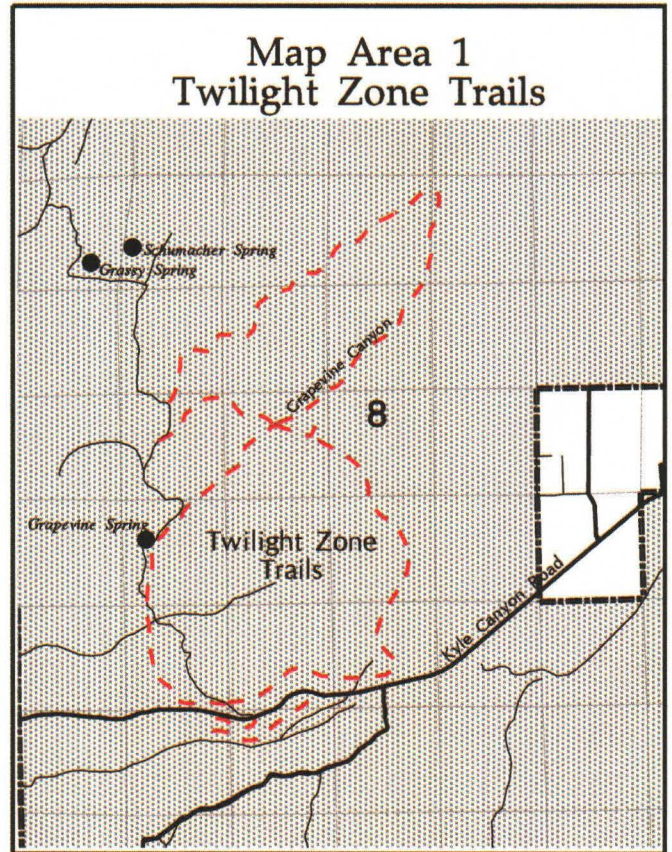
Map Area 1
(Trail #8)



Map Area 2
(Trail #7)



Map Area 1
Twilight Zone Trails



Roads

The following maps indicate which dirt roads are to be closed and which will be left open. Short minor routes not indicated on the maps are to be closed and used only for administrative purposes or restored to a natural state.

The access road to the Cottontail area will remain open to the site boundary but closed beyond to provide additional protection to this valuable cultural site.

Dirt roads which would remain open in NCA core area (North and west of the Bird Spring Range and south of La Madre Mountain) include the following:

- Little Red Rock access (may be converted to trail use if road across private lands (Summerlin) is closed)
- Brownstone Canyon access road, from Summerlin boundary west to gate
- Rocky Gap road
- White Rock road (planned for paving)
- Oak Creek access road from Scenic Drive (planned for paving)
- Access road to Rainbow Spring (1/4 mile shy of actual spring location)
- Wildhorse Loop roads and access to Black Velvet area
- Cottonwood Valley road (to Goodsprings)
- Access roads related to private inholdings
- Access road to 13-mile Campground (closed beyond)

Other dirt roads in the core area will be gated for administrative use only or closed and allowed to revert to a natural state.

The roads labeled 14, 15, 16 and 17 (see following map) fall within the La Madre Mountains Wilderness Study Area (WSA). Until Congress decides the wilderness designation issue, the study area must maintain the character that made it eligible for wilderness consideration.

Roads 14 and 15 were used prior to WSA designation and thus use of the roads may continue at this time. However, both roads will be closed if they eventually fall within designated wilderness, since neither road is cherry stemmed (altering wilderness boundary around roads to allow them to stay open).

Roads 16 and 17 will be closed until Congress decides the wilderness issue, since they were not in use prior to the WSA designation. If they eventually fall within designated wilderness, they will remain closed. If 17 falls outside of eventual wilderness designation, it may be opened for public use.

Paved Roads

Construct a 2.65 mile return road from Sandstone Quarry to the Visitor Center.

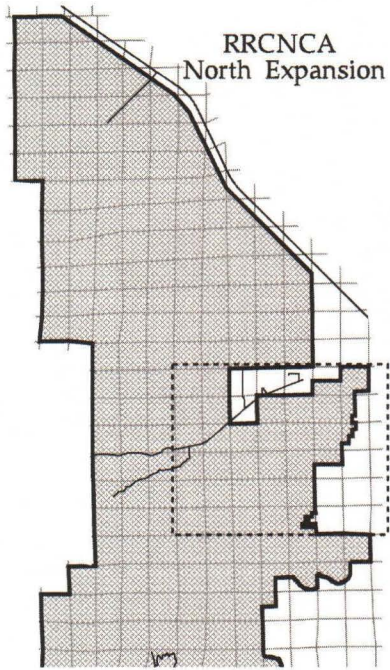
Because the Scenic Drive is a one-way road, when any of the washes (Sandstone, Red Rock or Pine Creek) are affected by a flash flood or winter ice is on the high points of the road, the entire Scenic Drive must be closed to use. This happens several times every year. The return road would allow at least a portion of the Scenic Drive, unaffected by floods or ice, to remain open at all times allowing use in the Calico Hills and Sandstone Quarry areas.

This would also provide a shortened loop for climbers and hikers recreating in the Calico Hills, over-ambitious bike riders who discover the entire Scenic Drive is more than they bargained for, and road walkers and runners who occasionally prefer a shorter alternative. All of the above have been known to return against one-way traffic to avoid traveling the entire Scenic Drive. Many of those in motor vehicles who do drive the remaining portion of the Scenic Drive, do so at excessive speeds, causing unsafe conditions and detracting from the experience of others wishing to observe the scenery.



Construct Calico III parking area between Calico II and Sandstone Quarry

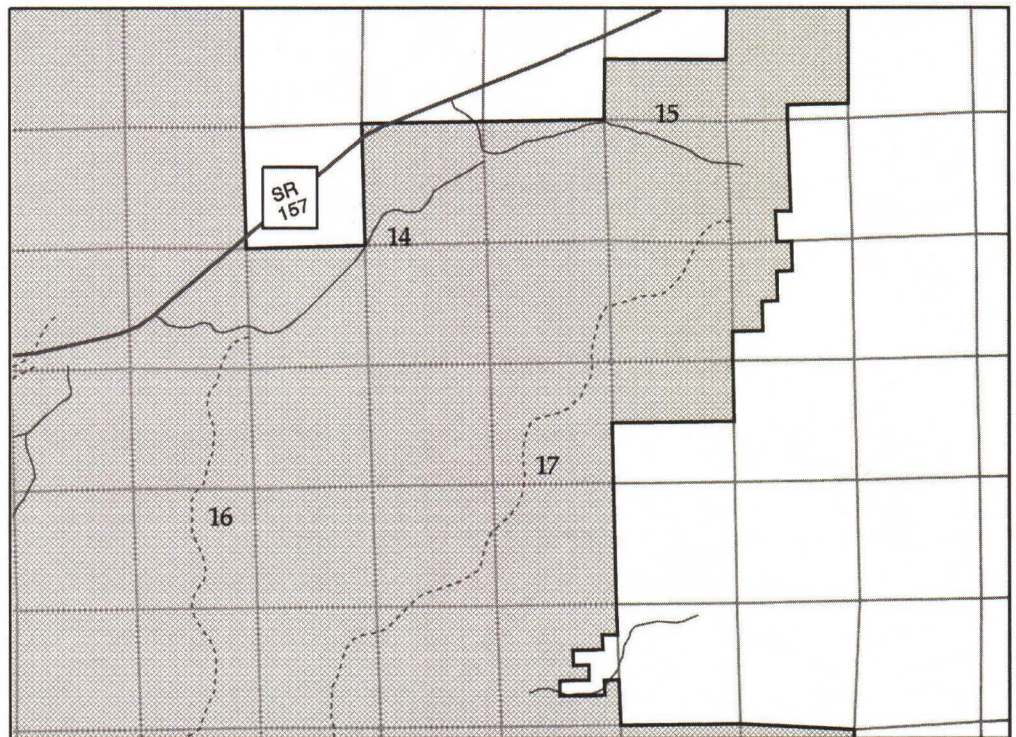
Calico III will accommodate long term parking, while Calico I and Calico II will limit parking duration to better serve short-term visitors.

Management Common to All Alternatives

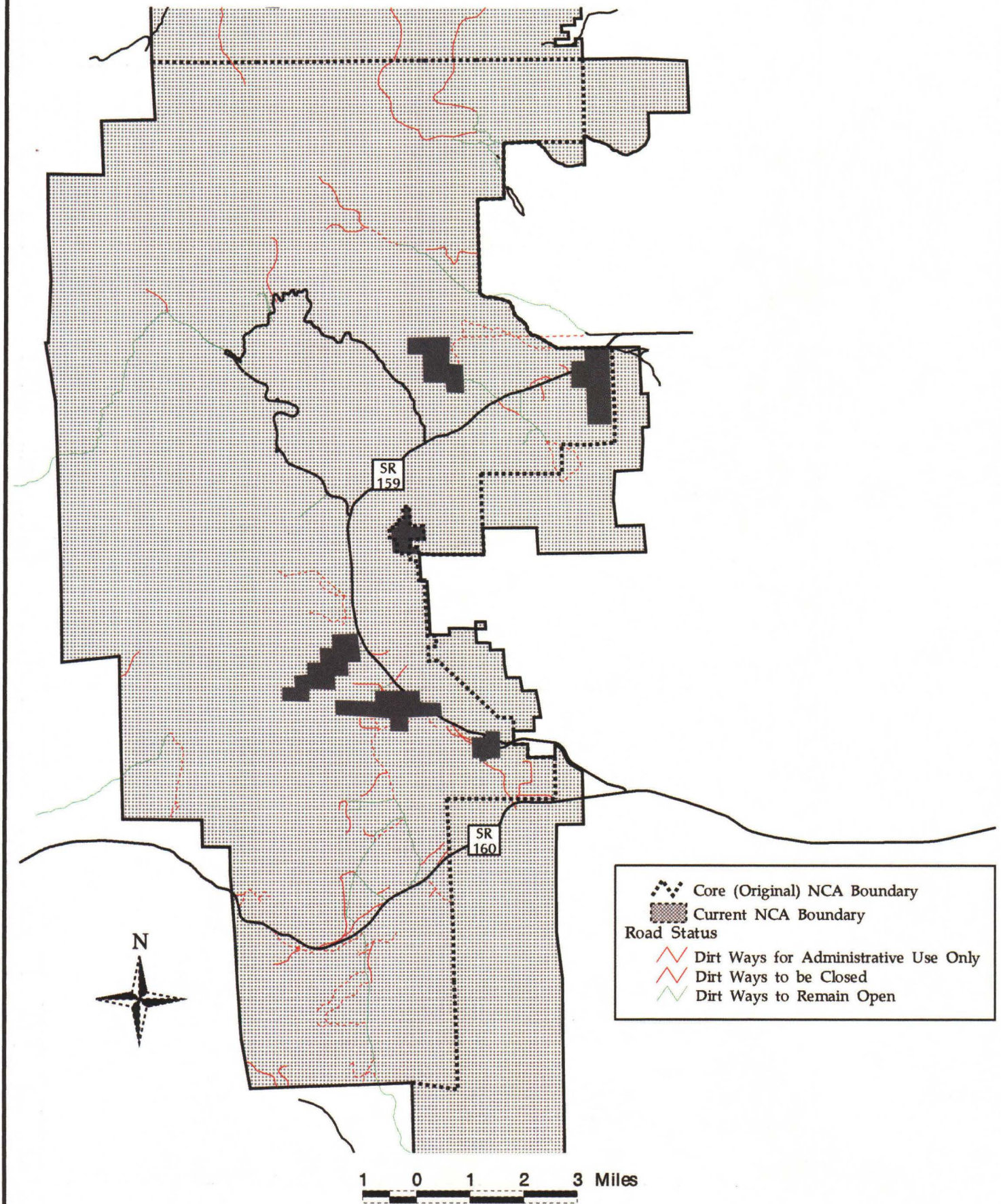


La Madre Mountain WSA Roads

-  Dirt Ways to Remain Open
-  Dirt Ways to be Closed



Management Common to All Alternatives Roads in Core Area (Original NCA)

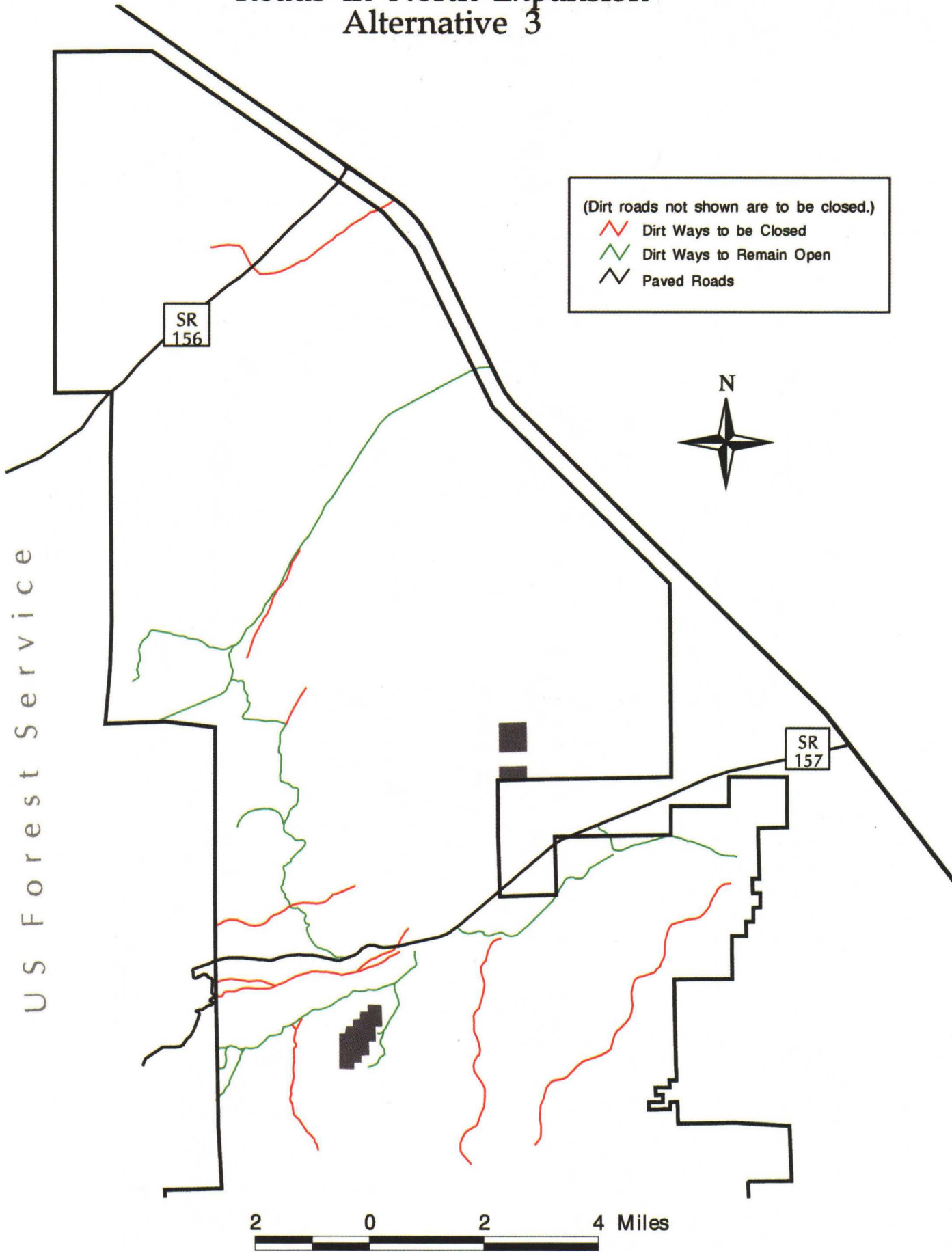


Core (Original) NCA Boundary
Current NCA Boundary




Road Status

- Dirt Ways for Administrative Use Only
- Dirt Ways to be Closed
- Dirt Ways to Remain Open

Roads in North Expansion Alternative 3



(Dirt roads not shown are to be closed.)

-  Dirt Ways to be Closed
-  Dirt Ways to Remain Open
-  Paved Roads

N

U S Forest Service

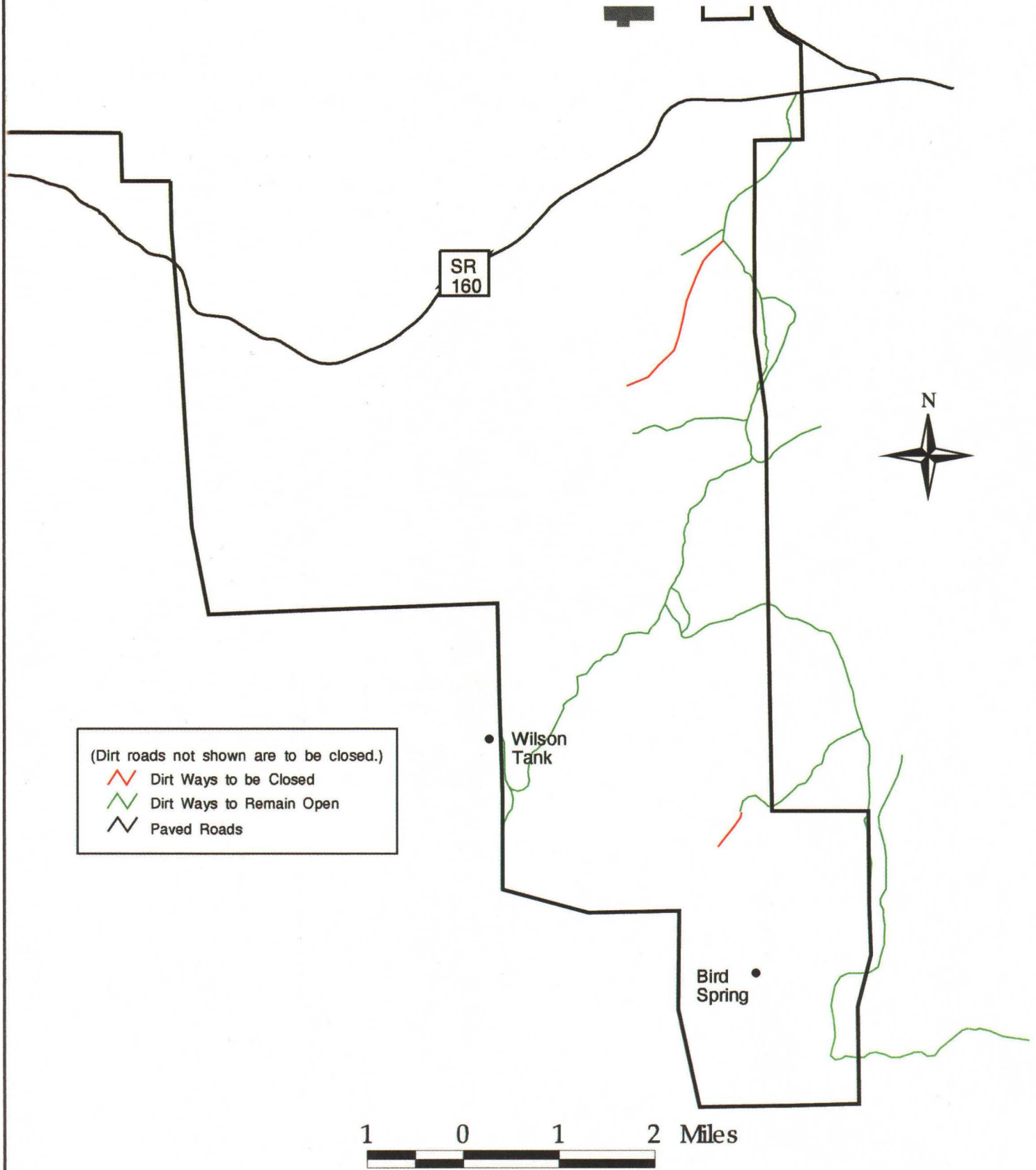
SR
156

SR
157




2 0 2 4 Miles

M9

Roads in South Expansion Alternative 3



(Dirt roads not shown are to be closed.)

-  Dirt Ways to be Closed
-  Dirt Ways to Remain Open
-  Paved Roads

1 0 1 2 Miles

Commercial Use

Commercial uses have grown steadily in the last five years. The major commercial uses for many years were tour bus trips and rock climbing schools. However, an increasing public interest and demand has generated new business interest in guided jeep (4X4) tours, horse rides and bike tours. Several businesses have expanded or been started to meet this demand. There have been no market surveys comparing the public demand for commercial services, the number of vendors and their impact on RRCNCA. Because of this lack of information, it is important to adequately monitor both use and impacts as compared to the number of vendors permitted.

In order to avoid establishing use patterns that might be detrimental to RRCNCA, and to give a benchmark for analysis, initial allocations of commercial permits would be established as listed below. As monitoring results are evaluated, the number of permits could increase or decrease in the future. Initial permit allocations will be as follows:

Guidelines carried forward from the Interim GMP:

1) **Rock Climbing Guides and Schools**

6 year-round permits

10 limited access "guest" permits

2) **Guided Horse Ride Operations**

5 permits (with no trail/use area overlap allowed between permittees)

3) **Bus and Limo Tours** (on Scenic Drive)

No limits on number of tours

Guidelines proposed for implementation:

4) **4X4 Vehicle Tour Operations** (on designated roads)

5 permits

5) **Guided Bike Tours**

5 permits (includes mountain bike and road bike touring)

6) **Guided Interpretive Hikes**

5 permits

Film permits, including still photography and video, are considered "lands actions". Land use authorizations are processed on a case-by-case basis as proposals are received. The authorization process involves analysis of potential impacts to the environment that could result from the proposed action. An Environmental Assessment or an Environmental Impact Statement, if appropriate, is prepared and resource protection stipulations are developed prior to the approval of such uses.

New types of commercial uses proposed will be evaluated to determine if they are appropriate and consistent with RRCNCA management guidelines, and if so, initial permit limits will be set.

ADMINISTRATION OF ENTRANCE FEES, PERMITS AND LEASES

Entrance Fees

The use of entrance fees to control visitation and cover some of the costs of operating the NCA has been discussed many times in the past, but until August 10, 1993, BLM was not authorized to collect entrance fees. On August 10, 1993 Congress passed the Omnibus Budget Reconciliation Act of 1993 (Public Law 103-66) which, in part, amended the Land and Water Conservation Fund Act of 1965 (LWCFA) and named Red Rock Canyon NCA as one of eight BLM National Conservation Areas now authorized to collect entrance fees. In 1996 Congress created the Pilot Fee Demonstration Program to give Federal land managing agencies the flexibility to test out fee collection methods and to retain the revenues to begin correcting backlogged maintenance needs and improve visitor services. RRCNCA began collecting entrance fees under this program in 1997.

Based on the first year's fee collection results, it appears that RRCNCA will collect, and have available, approximately one million dollars per year. The priorities for the use of these funds include:

- 1) repair and maintenance of existing facilities at Willow Spring and Red Spring;
- 2) updating and remodeling of Visitor Center restroom facilities and exhibits;
- 3) repairs to leaking roofs at the Visitor Center;
- 4) installation of restrooms at all parking areas and trailheads;
- 5) new and improved brochures, maps and publications; and
- 6) additional Park Rangers working at the Visitor Center and patrolling the trails and Scenic Drive.

Implementation of some of the above action items has already been started.

RRCNCA Entrance Fee Schedule established under the Pilot Fee demonstration Program

Private passenger vehicle, daily charge	\$ 5.00
Motorcycle, daily charge	\$ 2.00
Bicycle rider, paved roads	NC
Hiker access from State Route 159	NC
Bicycle use on mountain bike trails, daily (April 1999)	\$ 5.00
Commercial permits, daily per client (Applies to tours, climbing schools, riding stables, guided trips)	\$ 2.00
Golden Eagle Pass (yearly)	\$ 50.00
Golden Age Pass (lifetime)	\$ 10.00
Golden Access Pass	NC
Red Rock Annual Pass (yearly)	\$ 20.00
Family and Friends Pass Book (6 daily passes)	\$ 25.00
Special Rates	
Fund raising, non-profit events/per person	\$ 1.00

Recreation Use Permits - Commercial and Competitive Uses

Recreation Use permits for commercial and competitive activities such as filming, trail rides, bicycle events, weddings, rock climbing schools and outfitters and guides will continue to be managed under the BLM's permit guidelines and must comply with the Supplemental Stipulations for Red Rock Canyon NCA subject to the following limitations:

(stipulations which are current management approved in the Interim GMP are noted with (IGMP))

- 1) Proposed activities must be compatible with the IGMP management decisions and guidelines. As different permit applications are proposed, limits may be imposed to protect resources. (IGMP)
- 2) Permits will not be granted for any activity (vehicle or bicycle) in which speeds would exceed the posted speed limits of either the State Highways, County Roads or BLM Scenic Drive and other roads. (IGMP)
- 3) Permits for competitive vehicle or bicycle events on the Scenic Drive are no longer granted. (IGMP)
- 4) The number of year-round commercial rock climbing permits will be limited to six (6). An additional 10 "guest" permits for commercial rock climbing will be allowed. These guest permits are designed to accommodate commercial users who do not regularly use the NCA. They will be valid for 2 visits per year, of up to 5 days each, with a maximum of 10 students and 3 instructors. (IGMP)
- 5) The number of commercial trail ride permits will be limited to 5 permits at any one time. Permit locations will

be dispersed throughout the NCA with no permits being issued in the "Roaded Developed" MEA around the Scenic Drive. Proposed trails will be screened to avoid use conflicts and resource impacts. (IGMP)

- 6) The number of tour operators offering 4X4 vehicle tours would be limited to 5 permits at any one time. Permitted use must occur on designated existing roads.
- 7) The number of tour operators offering guided bike tours would be limited to 5 permits at any one time. Permitted use must occur on designated roads and trails that are approved in advance.
- 8) The number of tour operators offering guided interpretive hikes would be limited to 5 permits at any one time.
- 9) Outfitters and guides must comply with all State of Nevada licensing and hunting regulations.
- 10) Recreation Use Permits will be used to authorize use in "use by permit only" areas.
- 11) Fee payments may not be required for activities sponsored by charitable organizations if - entrance fees are a donation, there is competition, no prizes are awarded and no commercial sales are involved. (There will be an entrance fee charged for events which enter and use the Scenic Drive or Red Spring.)
- 12) Permittee may, at the authorized officer's discretion, be required to pay for the expense of providing additional staffing to monitor activities or protect resources or for costs not normally associated with permit processing.
- 13) Recreation Use Permit fees will be charged in accordance with the RRCNCA entrance fee schedule established under the Pilot Fee Demonstration Program (see Fee Schedule on previous page).

Recreation Use Permits - Special Area status, group use

A significant number of groups use RRCNCA, particularly the Scenic Drive, for their activities. Because some of these groups do not contact BLM in advance, but potentially involve large numbers of people or the use of already crowded areas, public safety and resource management issues are raised due to the congested nature of the Scenic Drive. Additionally, conflicts may arise with previously scheduled permitted activities. The NCA may be designated as a Special Area under the fee provisions of 43 CFR 8372. As such, permits and fees would be required of groups using the NCA, who do not presently fall under the definition of commercial or competitive.

Recreation Use Permits - Noncompetitive and Noncommercial Uses

Activities such as family gatherings, club functions, walk-a-thons, Metro Search and Rescue training and scientific research occur year-round within RRCNCA. These activities do not require a Recreation Use Permit. As both a public service and a early warning for BLM, Use Authorizations (UA) have been issued for these uses upon request. The UA does not reserve an area for use, but it does prevent scheduling conflicts and provides a way for otherwise prohibited uses to be authorized (such as after hours use of the Scenic Drive for reptile and bat research). These activities are subject to payment of the entrance fees for uses which take place on the Scenic Drive or at Red Spring.

Use Authorizations will continue to be issued upon request. Use Authorizations will continue to be issued for authorized studies of the NCA's resources. Permits for studies requiring State or Federal permits or clearances will not be issued until such permits and clearances have been obtained.

Recreation Concession Leases and Land Use Permits

Recreation concession leases are long-term authorizations (20+ years) to possess and use public lands to provide recreation facilities and services. Land Use Permits are long-term authorizations to possess and use public lands, usually with facilities provided, for other uses. No recreation concessions now exist in RRCNCA. Consideration of future recreation concession lease and land use permit applications will be guided by BLM regulations and the following:

- 1) No facilities would be allowed within the Non-motorized and Primitive MEAs. Services, such as trail rides, originating at areas outside of these MEAs could be allowed to use the areas.
- 2) No recreation concessions would be authorized at the Visitor Center or on the Scenic Drive.
- 3) Land Use Permits would be used to authorize uses which pre-date the NCA, but which have never been formally permitted. Where possible, land exchanges would be completed to dispose of lands permanently altered by pre-NCA facility developments (disposal can only occur through an act of Congress).
- 4) Applications for recreation concession leases and/or land use permits oriented to food service, automotive supplies and repair, general merchandising and camping facilities or uses involving vehicle and bicycle rentals and on-site guided services will usually be denied. These services are either presently provided close to or within RRCNCA on private lands, are more appropriately sited on private lands, are more appropriately considered as vendor permits or are not compatible with RRCNCA management guidelines. Exceptions to this general policy may be made if BLM determines that certain services or facilities, such as a campground, are more efficiently run by a concessionaire.

Vendor Permits

Vendor permits are temporary, short-term (not to exceed 3 year), nonexclusive, revocable authorizations without construction of permanent facilities which are authorized as Recreation Use Permits under 43 CFR 8372. Typical vendor permits are issued for food, beverage or T-shirt sales associated with recreational activities. Other types of vendor permits include firewood sales, groceries, supplies, equipment rentals, horse rentals and minor vehicle repairs. Sales and services provided by the Friends of Red Rock Canyon or the Red Rock Canyon Interpretive Association under BLM Cooperative Agreements are not considered vendor activities.

Vendor permits will be considered on a case-by-case basis subject to BLM regulations and the following -

- 1) Vendor permits will not usually be issued for services already provided by existing businesses within a reasonable distance of the NCA.
- 2) No real property improvements may be made. Continuous occupancy or use, including overnight

accommodations for the vendor, is not authorized.

- 3) Vendors must remain mobile and capable of moving on notice.
- 4) Vendors may only occupy locations approved by the authorized officer and may not interfere with public access, use or traffic.
- 5) Vendor permits for sales of merchandise or provision of services not directly related to the NCA's resources or primary uses will be denied.

Filming Permits

RRCNCA is a favorite location for filming commercials and motion pictures. More than fifty permits are issued annually. Filming will continue to be allowed subject to the following guidelines:

- * Applications are evaluated on a case-by-case basis.
- * Filming of video and/or large still productions will not normally be allowed on weekends or holidays on the Scenic Drive or in Red Spring.
- * Filming crews may not occupy more than 50 % of parking areas and trailheads on the Scenic Drive or at Red Spring.
- * RRCNCA entrance fees and costs for Law Enforcement Rangers shall be charged in addition to the filming permit fee.
- * Filming involving the use of helicopters, pyrotechnics, vehicles speeding, rigging of camera locations, Wilderness Study Areas, and/or catering operations exceed minimum impact and require additional review.

OTHER MANAGEMENT CONSIDERATIONS

Land Acquisition

Consider acquiring undeveloped inholdings within the NCA through exchange in order to:

1. Facilitate access to public lands and resources
2. Maintain or enhance important public values and uses
3. Maintain or enhance local social and economic values
4. Improve management efficiency through the blocking up of public lands
5. Facilitate implementation of other aspects of the GMP

Developed inholdings will only be considered for acquisition if they would contribute to better management of the NCA or provide a source of needed administrative facilities..

Utility/Rights-of-Way (ROW) Exclusion and Avoidance

Utility and transportation development are not normally compatible with the objectives of RRCNCA. Therefore, RRCNCA would be designated as a Right-of-Way exclusion area. In rare cases, due to public land boundaries and private inholdings, rights-of-way may be permitted based on consideration of the following criteria:

1. Type of and need for the proposed facility (local service to inholdings would receive priority consideration)
2. Conflicts with other existing or potential resource values and uses, particularly visual resource impacts
3. Availability of alternatives and/or mitigation measures

PUBLIC SAFETY AND RESOURCE PROTECTION

LAW ENFORCEMENT RESOURCE PROTECTION ANALYSIS

GENERAL: The current trend is that more people are using the NCA in more ways as different populations discover aspects of the area that meet their recreational and commercial needs. In 1998 more than 1 million persons traveled the Scenic Drive. This puts increasing pressure on finite and fragile arid lands resources, and creates conflicts with existing user groups. Rapidly growing populations in Las Vegas metropolitan area are also increasing pressure on the NCA as activities traditionally occurring on private property to the east are forced into the NCA by development. Improved access on upgraded roads, and new freeways increases use by reducing travel times from distant portions of the valley. The rapid growth of the Pahrump Valley is creating a daily commuter traffic pattern on State Routes 159 and 160 in the southern portion of the NCA.

In addition to the rapid growth of local population and user numbers, the RRCNCA has been expanded from the previous size of 83,000 acres to almost 200,000 acres. There has been no corresponding increase in the authorized number of Rangers to patrol the additional areas. The five Rangers authorized to cover the smaller area can no longer provide sufficient patrol coverage of the expansion areas while providing the customary coverage of the heavily used core area of the Scenic Drive. The result is an increase in vandalism, resource damage, commercial use violations, traffic accidents, and delays in answering service calls. Estimated personnel needs for adequate patrols, prosecution follow-up, training, leave and other down-time is a minimum of twelve (12) Rangers by the year 2005.

The objective of the Law Enforcement Resource Protection Program within the Red Rock Canyon National Conservation area is to minimize activities that damage resources and threaten users, and to reduce conflicts between different user groups through education and enforcement of federal regulations. State and local regulations will be enforced as need, opportunity and jurisdiction dictate. The primary areas of concern are discussed below.

TRAFFIC ENFORCEMENT: The greatest single threat to public safety in the NCA is from motor vehicle accidents due to speeding, reckless driving, and driving under-the-influence of drugs or alcohol. The growth of commuter traffic traversing the area, and the use by some motorcyclists for speed contests is incompatible with the primary use of the area by sightseeing drivers and non-motorized recreationists. Single vehicle accidents due to excessive speed occur more than once-a-month on the four State Routes that cross or enter the NCA. The majority of serious accidents occur on state highways crossing RRCNCA. In 1994-1995 there were ten fatalities on S.R. 159 alone, including two double fatal rollovers, and a double fatal collision. Collisions between vehicles and burros standing in, or crossing the road, are a serious problem with up to 20 burro kills occurring in some years. Enforcement of speed limits, no-passing zones, and other traffic control devices, as well as the apprehension of drunk drivers is necessary to protect legitimate users from the dangerous and illegal behavior of some motorists. State Route 160 is patrolled by Nevada Highway Patrol. There is no routine patrol of State Routes 156, 157, or 159 in the NCA. The Las Vegas Metropolitan Police Department is responsible for law enforcement on the roads, but has inadequate manpower to perform routine patrols, or to respond to any but the most serious accidents, and frequently calls upon BLM Rangers for assistance when there will be an extended response time from the southern or western portions of the county. The enforcement of traffic regulations will generally be by traffic stops of violators observed during normal patrols of the area. If circumstances warrant, special patrols will be instituted to target specific areas or problems, including DUI checkpoints, and stationary radar speed enforcement.

AREA CLOSURE AND CLOSURE VIOLATIONS: The Scenic Drive and Red Spring Picnic Area in Calico Basin are part of a core area that is designated for day use only. The purpose of the day use restriction is to limit incidental damage to resources that results from overnight use of fragile arid lands resources, and to exclude criminals committing illegal acts under cover of darkness. Principal closure violations are committed by persons who enter the area during the day, but fail to leave at the posted closure hour. Others violations are committed by people who enter the area during the late night or early morning hours to commit acts of vandalism, and drug, or alcohol violations. The enforcement of the Area Closure will be by regular patrols at the end of the day to clear all unauthorized persons and vehicles from the Scenic Drive and Red Spring, and by special patrols to deal with late night violators.

COMMERCIAL OPERATIONS: There is a growing number of entrepreneurs engaged in commercial operations to satisfy the recreational needs of different user groups, including guided equestrian rides, off-highway vehicle sightseeing trips, all-terrain bicycling and road bicycling, aircraft overflight tours, motor coach tours, guided technical climbing, and guided trail hiking. The spectacular scenery attracts still and motion picture photography for Hollywood films, vehicle and other product commercials, fashion catalogues, professional portfolios, magazines, and local advertisement backgrounds. All commercial photography requires permit authorization, and enforcement activities consist of ensuring compliance with this requirement, as well as ensuring that permittees do not interfere with other users or cause unacceptable damage to resources. Some permits require little more than spot checks, while other require constant monitoring and control of crew activities, and provision of traffic control for filming of vehicle sequences. Such high intensity monitoring takes Rangers out of regular patrol duties, and should utilize overtime assignments funded by proffer accounts from permit fees to allow normal operations to continue.

VISITOR SERVICES: The heavy use of the area creates a demand for assistance to visitors in terms of medical emergencies, search and rescue, vehicle mechanical assistance, delivery of emergency messages and attempts to locate. The implementation of fee collection creates a higher expectation of service in the minds of the visiting public. Response to these requests for non-emergency services is usually incorporated into regular patrol activities.

SEARCH AND RESCUES: The steep cliffs and remote canyons in the RRCNCA attract hundreds of thousands of hikers and climbers to the area each year. There are on average over 75 search and rescue (SAR) incidents per year that range from simple stranding on steep rock faces to falls resulting in serious injury or death. While legal responsibility for SAR lies with the Las Vegas Metropolitan Police Department, Rangers have historically provided a first response and size-up of incidents. If a major response is required LVMPD is called, assumes command of the incident and Rangers provide necessary support and assistance. As aspect of SAR not commonly considered by some is swift water rescue operations. There are numerous low-water crossings of major washes along both state highways and the Scenic Drive. In 1984 five persons drowned in two swift water incidents in the RRCNCA when attempting to drive across flooded roadways. Subsequent incidents have resulted in personal injury and property damage. Rangers will be trained in swift water rescue operations to provide a first response for rescues, as well as to competently evaluate dynamic flow conditions that would require the temporary closure of roads to public use.

PUBLIC EVENTS/SRP'S: RRCNCA is attractive as an area for bicycle races, charity walk-a-thons, fun runs, off-road vehicle caravans on backcountry roads, and other similar events ranging in size from less than 50 to more than 500 participants. Similar events held outside of RRCNCA also impact the area when participants attempt to camp in the NCA. Event organizers usually are required to hire extra security in the form of LVMPD officers. Work month costs are included in proffer accounts where applicable.

GANG ACTIVITY: There are over 100 active criminal gangs in the Las Vegas Metropolitan area within a 20 minute drive of the RRCNCA. Past activity has included illegal shooting, and spray paint vandalism of resources and facilities as well as drug and alcohol violations. Levels of activity are directly correlated to levels of Ranger patrols and enforcement of all regulations. Aggressive patrol and enforcement causes the gang members to seek less policed areas for criminal activity.

The RRCNCA is broken down into patrol sectors based on geographic area, and types of use. As opposed to other BLM areas these are relatively small and do not equate to 8-hour patrol units.

1. **TARGET PATROL AREA:** Calico Basin/Red Spring.

RESOURCE PROTECTION ISSUES: The Calico Basin/Red Spring area is a heavily used area that contains a developed picnic area designated for day use only, a separate popular boulder climbing area known as Kraft Rocks, a day camp operated by the Girl Scouts of America near Calico Spring, and a significant number of small tract private parcels of developed and undeveloped land.

The interface of heavily used recreational areas and private residences creates frequent conflicts between users and residents, and subsequent complaints to the Bureau. Such complaints frequently involve use of the recreational areas after hours by persons violating the area closure. Such violations usually include under-age drinking, public intoxication, illegal ground fires, possession, distribution and use of controlled substances, illegal fire arms discharge adjacent to residences, and violent assaults among violators and against local residents. Search and rescue operations are often initiated to remove violators stranded or injured while climbing on the steep cliffs.

Other issues in the Calico Basin area are derived from the public/private land interface and include various types of trespass, dumping, animal violations, and attempts by local residents to exercise "proprietary" control over public lands resources because they are "theirs" by reason of proximity.

Special resources of note in the Calico Basin area include significant cultural resources in the form of numerous rock art sites, middens, and rock shelters, and natural resources including a rare desert meadow environment, and several important springs with rare and fragile plant communities. The recently acquired Calico Spring area contains at least two plant species listed as threatened or endangered in the State of Nevada.

Natural and cultural resources are threatened by heavy public use, uses that are not compatible with the resources, as well as by vandalism and theft. The area is also a favorite destination for truants from local high schools. Such persons have frequently been involved in search and rescue incidents, traffic accidents, and alcohol violations.

2. **TARGET PATROL AREA:** Scenic Drive/Visitor Center.

PROTECTION ISSUES: The Scenic Drive and the Visitor Center represent the core of recreational development and the primary objective of most users of the area. On a recent weekend, over 2,000 persons per day utilized the Visitor Center, and an estimated 10,000 persons used the Scenic Drive. These levels of use are unprecedented and will only increase.

3. TARGET PATROL AREA: FOOT TRAIL SYSTEM

GENERAL: The foot trail system currently consists of ten separate maintained trails: Calico I, Calico II, Sandstone Quarry, Keystone Thrust, White Rock Spring to Willow Spring/White Rock Spring spur, Lost Creek, Willow Spring Complex, Icebox Canyon, Pine Creek, and First Creek. Other unmaintained trails exist in the La Madre Spring, Red Rock Summit, Red Spring, Oak Creek, and Velvet Canyon areas. These trails provide access to climbing areas, recreational hiking opportunities, and environmental education facilities.

Some areas are more attractive to visitors due to the presence of seasonal streams and waterfalls, large rock shelters, or expansive areas of slickrock. Short easy trails with heavy brush or rock shelters are attractive to those who wish to engage in illegal activities while avoiding enforcement personnel.

4. TARGET PATROL AREA: OAK CREEK CAMPGROUND.

PROTECTION ISSUES: The Oak Creek Campground was never officially planned or constructed. The facility is chronically overcrowded with serious resource damage resulting from trampling, illegal ground fires, collection of wood, littering, off-road travel, cutting of green vegetation, and improper disposal of human wastes.

The area has a history of long-term occupancy violations, vehicle burglaries, larcenies of campground equipment, assaults, illegal firearms discharge, under-age drinking, disorderly conduct, fugitives from justice.

The facility is due to be relocated which should reduce some resource violations. Property and violent crimes can be expected to occur in any campground.

5. TARGET PATROL AREA: WEST CHARLESTON, S.R. 159, DEDICATION SITE, CAVE PARKING AREA, FIRST CREEK TRAILHEAD, .

PROTECTION ISSUES: The primary focus of this sector is the relationship between traffic violations on the highway that exert a direct threat to resources and visitor safety. The primary violations include exceeding safe speed limits, and traffic congestion associated with visitor contact with wild burros.

The primary objective of enforcement in this zone will be to encourage compliance with speed limits to reduce the number of serious accidents that occur, and to reduce the amount of traffic congestion associated with visitor contact with burros. Violations observed incidental to these major activities will be handled as need, resources and jurisdiction permit.

6. TARGET PATROL AREA: PAHRUMP HIGHWAY, S.R. 160

PROTECTION ISSUES: Primary jurisdiction for traffic enforcement lies with the Nevada Highway Patrol. Excess speed on the highway is responsible for the deaths of +/- 10 wild burros and +/- 5 wild horses per year. Driving behavior that represents a threat to visitor safety or resources will be dealt with on a case by case basis. It will not be the policy to engage in frequent stationary radar patrols, or other high profile traffic enforcement activities. There is a powerline access road just east of the USFS boundary near mile 20. This road leads back up onto the sandstone escarpment from

the two-pole wooden powerline.

7. TARGET PATROL AREA: BACKCOUNTRY ROAD PATROL (ROCKY GAP, ETC)

PROTECTION ISSUES: The primary concerns in this area are off-road travel in the two wilderness study areas designated along the road. In the past there has been significant damage to vegetation from violators operating ORV's off-road, creating new roads, and turning foot trails into roads. As camping pressure increases in this area there will be increasing problems with litter, illegal ground fires, collection of wood, and cutting of green vegetation.

8. TARGET PATROL AREA: VELVET CANYON/COTTONWOOD VALLEY NORTH

PROTECTION ISSUES: The Velvet Canyon campsite used to absorb most of the overflow from Oak Creek but has been closed. However, visitors still attempt to camp here regularly creating an on-going enforcement problem. The remote location of this site makes patrolling difficult and time consuming. The area also contains significant cultural resources in the form of numerous rock art sites. The area contains several developed springs that are crucial for the wild horse herd that lives in the area. Littering and household/construction waste dumping has occurred adjacent to S.R. 160.

9. TARGET PATROL AREA: COTTONWOOD VALLEY SOUTH

PROTECTION ISSUES: The primary resources at stake in the area is the wild horse herd. The area has been extensively burned and is mostly exotic grasses and Russian thistle. Common problems include target shooting, dumping, and occasional incidents involving the shooting of wild horses.

10. TARGET PATROL AREA: LOVELL CANYON/MOUNTAIN SPRINGS

PROTECTION ISSUES: There are several roads leading into RRCNCA from the Lovell Canyon road including the road to Bootleg and Rainbow Spring. Seasonal concerns include cutting of fuel wood in the burned area, cutting of Christmas trees, dumping, cultivation of marijuana near the springs, protection of cultural resources in the form of roasting pits, control of OHV's's driving into the NCA from Mountain Springs, fireworks patrols in late June and early July, wildlife violations, and theft of sand and gravel.

11. TARGET PATROL AREA: ADJACENT PUBLIC LANDS:

PROTECTION ISSUES: RED ROCK WASH DETENTION BASIN
BLUE DIAMOND NDOT PIT
BLUE DIAMOND ROAD Mile 0.0 to 10.0.

The Red Rock Wash Detention Basin located at Mile 15 on S.R. 159 is the frequent site of illegal shooting, and has been the location for dumping and burning several stolen vehicles. The outlet tunnel is the favored site for local hate groups such as the SKINHEADS to hang out at night. The land ownership pattern is irregular so close attention must be paid to exact location in the basin to with respect to jurisdiction involved.

The NDOT pit on S.R. 159 at mile 1.0 has two entrances, one off of HICKEY ROAD, and the other off of Mile 1.5.

Both areas are susceptible to dumping, and theft of mineral materials as well as illegal shooting.

12. TARGET PATROL AREA: BROWNSTONE CANYON

PROTECTION ISSUES: Brownstone Canyon contains significant cultural resources in the form of numerous rock art panels, roasting pits, rock shelters, and historic water development dams built by the Civilian Conservation Corps. In addition there are several wildlife water developments in the upper portions of the canyon above the CCC impoundments. The area is an alternate trailhead for Turtlehead Peak. Violations commonly encountered are violations of vehicle closure, vandalism to gates, fences, and cultural resources, illegal shooting, illegal ground fires, under age drinking, possession and use of controlled substances, off-road travel. Stolen vehicles are occasionally dumped and burned on the road. On at least two occasions in the 1980's victims of homicides were also dumped on the road. The primary emphasis of patrols will be to enforce the vehicle closure which will prevent most of the other types of violations in the area.

13. TARGET PATROL AREA: LITTLE RED ROCKS.

PROTECTION ISSUES: The Little Red Rocks area is the first obvious outcrop of red sandstone visible from West Charleston Blvd. The area was added to the NCA with the enabling legislation. Prior to that it was undifferentiated public lands with few restrictions on use. All access is across private property owned by the Howard Hughes Corp. The area is severely impacted with numerous off-road vehicle trails resulting in major damage to vegetation, and soil erosion. The primary goals for this area will be to mark the boundary, establish one or two viable vehicle routes, close superfluous roads, control firearms discharge, littering, off-road travel, and other general public lands abuses.

14. TARGET PATROL AREA: EASTERN URBAN INTERFACE

PROTECTIONS ISSUES: The Eastern Urban Interface includes that area from south of the Red Rock Country Club and the Desert Sportsman's Rifle and Pistol Club, north along the RRCNCA boundary past Lone Mountain and up to the Kyle Canyon Road. Urban development is already present adjacent to the boundary in some areas, and will become monolithic during the life of this plan. Public pressure to provide recreational opportunities will increasingly conflict with stated RRCNCA resource protection mandates, and public use will intensify the already "non-traditional" role of the BLM law enforcement in this area. The influence of this area will extend south on S.R. 159 from the Red Rock Wash Detention Basin to Spring Mountain Ranch State Park. Current problems include dumping of construction and landscaping debris from urban development, wire burns, illegal shooting, off-road travel, dumping of stolen and burned vehicles, gang activities, homicides, theft of plant and mineral resources, occupancy trespass, and large parties of youths engaged in alcohol and drug parties. As increased urban development occupies open space at lower elevations previously favored by violators, these activities are increasingly moving up slope into the RRCNCA. Resource protection strategies include aggressive closure of illegal or superfluous roads and points of entry as well as installation of signs, and boundary fences where appropriate, and regular patrols, especially at night and on weekends to detect and prosecute violators.

15. TARGET PATROL AREA: BIRD SPRING RANGE:

PROTECTIONS ISSUES: This area includes the eastern foothills of the Bird Spring Range from Bird Spring, north

to State Route 160. The area contains the Wilson Tank/Tunnel Spring wildlife water development, an important and extensive Joshua tree forest, the Cottontail petroglyph archeological area, and the largest share of wild horses in the RRCNCA. The area is used by mountain bikers and off-highway vehicles, upland game hunters, and regularly scheduled OHV tours. Violations recorded in the past include off-road travel, illegal shooting and dumping, and theft of archeological resources. Public use of this area is rapidly increasing due to the rapid growth of urban development in the southwest Las Vegas Valley. Increasing resource damage from illegal dumping, litter associated with illegal shooting, and creation of new illegal roads are the chief problems anticipated in this area.

16. TARGET PATROL AREA: KYLE CANYON:

PROTECTIONS ISSUES: This area extends from approximately Mile 15 on State Route 157 to the border of the Spring Mountains National Recreation Area near the Harris Spring Road. Primary problems have been illegal dumping of construction and household trash by local residents, litter associated with illegal shooting, and creation of illegal roads and other routes of travel. The southern portion of the area includes the Deer Pasture drainage, site of a destructive fire started in 1997 by illegal shooting, and the lower Harris Spring canyon, site of the White Beauty Mine gypsum patents. The northern portion includes the Grapevine Spring area. Significant development of mountain biking trails is occurring the northern portion. In spite of several major clean-ups in the area, dumping continues in the area. Closure of traditional shooting areas closer to Las Vegas is increasing illegal shooting in this area.

17. TARGET PATROL AREA: LUCKY STRIKE CANYON

PROTECTIONS ISSUES: The lower portions of the canyon contain several traditional target shooting sites that contained significant amounts of litter. Illegal shooting continues to be a serious problem at Mile 100 on US 95, as well as near and west of the electrical power substation located at the mouth of Lucky Strike canyon. Installation of traffic barriers and boundary fences and signs followed up with increased patrols to enforce regulations are needed in this area.

18. TARGET PATROL AREA: LEE CANYON

PROTECTIONS ISSUES: The old Desert View Natural Area incorporated into the NCA contains an extensive Joshua tree forest. There are some illegal shooting sites, and this area will receive more illegal shooting pressure in the future due to restrictions closer to Las Vegas. Clean-ups, signs and barriers will be necessary to close old shooting sites, followed up with increased patrols.

COOPERATING ASSOCIATIONS AND FRIENDS GROUPS

It would be unrealistic to expect this plan to be implemented or current visitor services to be maintained without the continued assistance of the Friends of Red Rock Canyon (FORRC) and the Red Rock Canyon Interpretive Association (RRCIA). Both of these organizations contribute time and funds which make up for some of the shortages in BLM's staffing and funding, particularly for operation of the Visitor Center.

The members of FORRC provide critically needed assistance to the Visitor Center desk staff and the public. Volunteers are also heavily involved in leading hikes, presenting interpretive programs and working on resource management projects. FORRC contributed funds and materials have supported many past resource management, interpretive, educational and facility improvement projects.

RRCIA operates a bookstore in the Visitor Center and provides paid staff support to BLM's interpretive and natural history efforts. RRCIA provides the public with a wealth of interpretive and informative media with a specific focus on Red Rock Canyon. The literature provided by RRCIA far exceeds the capability or funding resources of BLM. RRCIA has a major focus on and has contributed significantly to the upgrading of the Visitor Center exhibits. In 1993 a major new exhibit featuring a large mural of Red Rock Canyon was opened. RRCIA staff also answer many public questions since their staff uses the same public contact area as does BLM/FORRC. As part of the Visitor Center remodeling, RRCIA opened a re-designed sales area providing more room and better protection of RRCIA materials.

The Nevada Natural Resource Education Council (NNREC) is a not-for-profit organization whose goal is to develop and promote natural resource education in Nevada. Their cooperative agreement with the BLM allows them to assist the Bureau in promoting natural resource education programs and workshops in the Las Vegas District. NNREC accomplishes this by training volunteers and acting as a clearinghouse for information and resources in natural resource education.

Photographic Arts of Nevada (P.A.N.) is a not-for-profit organization dedicated to education and the promotion of the camera arts. Their cooperative agreement with the BLM allows them to assist the Bureau in providing interpretive opportunities within the RRCNCA. P.A.N. achieves their goal by accepting voluntary services from P.A.N. membership in the work of providing photographic workshops, tours and displaying interpretive exhibits at RRCNCA.

COOPERATING AGENCIES

The three principal cooperating agencies are the Nevada Division of State Parks, Spring Mountain Ranch State Park (NDSP), the U.S. Forest Service (USFS) Spring Mountain National Recreation Area (SMNRA) and the Las Vegas Metropolitan Police Department (METRO).

The cooperative relationship with NDSP began in 1968 with the recognition by both BLM and NDSP of the uniqueness of Red Rock Canyon and the need to protect the area. BLM designated the area as the Red Rock Canyon Recreation Lands and shortly thereafter the State purchased, from private owners, the property now known as Spring Mountain Ranch State Park. During the past twenty years NDSP has provided both management support and law enforcement assistance to BLM. This relationship continues to date and is reviewed periodically and modified to meet changing agency missions, staffing and funding. Both agencies would like to add to existing efforts, especially in the areas of dual information desk staffing and cooperative interpretation and information efforts, if future funding allows.

As adjoining Federal agencies, the BLM/NCA has had an on-going but distant relationship with the USFS. Until some administrative boundary changes were made in 1989 and the NCA was enlarged in 1990, the NCA did not share a common boundary with the USFS administered lands. However, the 1993 designation of the Spring Mountain National Recreation Area as well as the need to deal with some long standing problems (like the Rocky Gap road) which cross jurisdictional lines has increased communication and cooperation between the agencies significantly. Future issues for joint resolution include wilderness area management and trail systems planning.

BLM Law Enforcement Rangers and the METRO officers cooperate most often on Search and Rescue (SAR) operations for lost, stranded or injured visitors. The County Sheriff has the responsibility and authority for SAR activities and the METRO SAR unit provides a quick highly trained response to the needs of NCA visitors. BLM Rangers and METRO officers also provide each other backup support for traffic accidents, DUI stops, arrest and transport of prisoners and other law enforcement activities as appropriate.

IMPLEMENTATION, FUNDING and COSTS

Implementation

The process of implementation of the GMP is gradual and takes place throughout the life of the GMP on a project by project basis, with priority based on need and available funding.

This plan is designed to maintain flexibility in order to maximize its useful life. This is done by incorporating a "Management Emphasis Area" (MEA) concept. All areas within the NCA are assigned a land classification value, which, in the future, determines what actions/changes are appropriate and in which areas of the NCA they may occur. Proposed actions that are not consistent with the standards for future condition will not be permitted. Proposed actions that are consistent with NCA resource management goals and the standards for the MEA zone in which they are proposed, will be evaluated. In this manner, future options may be considered and the Plan is not limited to our present awareness, information on RRCNCA resources or only one set of actions (MEAs are described in more detail in the Plan section of this document).

Implementation of all management actions, whether already included in the GMP or proposed at a future date, will require an environmental review. If the criteria is met, the action may qualify for a categorical exclusion. Projects not meeting the criteria will require an Environmental Assessment (EA) and "finding of no significant impact" (FONSI). If the analysis suggests a major federal action that would significantly affect the human environment, an Environmental Impact Statement (EIS) will be prepared under the direction of the BLM Nevada State Director.

Funding

Funding for implementation is expected to come from four primary sources. They are listed below. The probable use or direction for use of the funds is also listed.

Congressional appropriations

Base funding for existing RRCNCA operations and maintenance programs and existing staffing, some capital improvements

Entrance, Recreation Permit and Camping Fee revenues

Cost of collections, backlogged maintenance and public safety projects, facilities and visitor service enhancements, additional Park Ranger positions, habitat restoration

Proceeds from lands sales under the Southern Nevada Public Lands Management Act of 1998

Major capital improvements

Clark County Desert Conservation Program, Multi-species Plan

Monitoring and evaluation of ecosystem diversity and species at risk, habitat restoration, environmental education

Cost of Implementation

The total cost of implementation is unknown. Inflation and project modifications as site specific designs and requirements are developed would make any current estimate(s) quickly invalid.

However, the general costs of some high costs items have been evaluated or can be estimated.

Operations and maintenance

The day-to-day operation of the Visitor Center, Scenic Drive and other facilities along with the patrol functions of the staff and Rangers is estimated to cost \$ 1 million dollars annually. This figure is expected to remain constant with considerations for inflation.

Cost of fee collections

The cost of fee collections (without consideration for facility improvements) will average between \$ 250,000 and \$ 300,000/year depending on hours of operation, visitor use levels and staff resources required. This includes seven day/week manning of the Scenic Drive entrance station and periodic collections from self service fee stations.

Visitor Center Expansion

The Concept Plan prepared to assess the Visitor Center's needs and shortcomings to provide continued quality visitor service estimated the cost of the 12,000 sq. ft. expansion in 1996 to be \$ 6.6 million dollars. The expansion would relieve overcrowding of office and storage space, provide additional restrooms, add an auditorium facility and develop a combination environmental education and meeting center.

Sandstone to Visitor Center loop road

Based on comparable costs of similar construction projects recently completed, this 2 ½ mile road would cost between \$ 660,000 and \$ 1 million .

Sandstone to Willow Bike Trail

Based on comparable costs of similar construction projects recently completed, this 2 ½ mile trail would cost between \$ 400,000 and \$ 550,000 .

MONITORING AND EVALUATION

Monitoring

Several actions and programs proposed in this plan also include a monitoring program as part of the proposal. There are specific references to monitoring in regards to wildlife, ecosystem management, commercial uses, wild horses and burros, and other concerns. Monitoring is actually an integral part of all actions and programs in order to measure the effectiveness of actions implemented or record the impacts to the natural resources. Whenever monitoring shows impacts that are considered significant, mitigation will be taken to reverse the situation. This may include a reduction in or elimination of the action or situation causing the impact.

Some program areas have monitoring systems developed or in place while others would need to have monitoring techniques developed and tested to determine how to best evaluate conditions and implementation results.

Evaluation

The following factors provide a Desired Future Condition and summary of the many objectives of the GMP. An assessment of how these factors are being met, maintained or enhanced will provide an evaluation of the overall effectiveness of the selected management plan.

Actions proposed and/or implemented are consistent with the standards for future condition as specified for the Management Emphasis Areas.

Ecosystem health and function are sustained. A mosaic of ecological communities are maintaining plant and animal diversity. All native and managed non-native species have viable self-sustaining populations. Historic disturbances, including fire, continue to operate or are being mimicked to maintain ecosystem health. Plant, animal, and community (combination of plants and animals in an area) diversity is maintained or enhanced. Desired plant community objectives would be met including maintaining a 20 % canopy cover, a basal cover of 5 % (minimum) of native grass species and a perennial native grass composition (measured by dry weight) of 5-10 %. Unique habitats, such as cliffs and caves, are providing habitat for unique and/or rare species.

Riparian vegetation is healthy, at historic locations, and covers the historic area (size). Soil erosion and compaction are minimized. Impacts to riparian areas from wild horses, burros, and recreation have been eliminated. In areas where wild horses and burros remain, if any, water is provided at a location outside of the riparian area. No new campgrounds, picnic areas or trails are within the riparian areas. Trails impacting riparian areas have been re-routed. The public is presented with a variety of educational and interpretive media on the uniqueness of riparian areas. Water quality and in stream flows are providing habitat for native aquatic invertebrate populations, endemic flora, and for healthy riparian vegetation.

Fire plays an important role in ecosystem function and health. The historic role of fire is mimicked through prescribed burns and prescribed natural fires. Fuel loads are managed to prevent catastrophic fires. Burned areas are rehabilitated either naturally or, as a last resort, through active seeding, and form an important link in the early seral stage in that vegetative community. Native species are being used in rehabilitation of burned areas.

Air quality is adequate for the protection and use of resources, and meets or exceeds standards monitored by Clark County Health District. Visual quality is not being impacted by air pollution within control of the BLM. Smoke from prescribed fires is within Health District standard or is minimized in smoke sensitive areas, including travel corridors (highways, flight paths), residential areas, developed recreation facilities, and the Las Vegas valley.

Where historic sources have been impacted by urbanization or concentrated recreation use, water sources have been developed, outside Wilderness and/or WSA's, to improve wildlife habitat and distribution, and to improve utilization of habitat. Water sources have been developed within the Wilderness and WSA's only to improve desert bighorn sheep habitat and protect wilderness character. Water quality meets or exceeds state water quality standards. BLM facilities are not adding significant effluent to surface and groundwater systems. Flows at surface waters have been restored to historic levels. Unnecessary improvements at water sources have been removed. All necessary improvements at water sources have been maintained, constructed, or restored to provide habitat for species of concern, and for public use as appropriate. RRCNCA sets an example for proper water conservation and treatment of groundwater resources.

Habitat for threatened, endangered, and sensitive species has been protected, restored, or maintained, and is not fragmented by new development. New recreation developments are located outside sensitive habitat for species of concern. Populations of threatened and endangered species are recovered. No additional species have become threatened or endangered.

Areas with high biodiversity and/or a number of species of concern are protected from improper development of facilities and trails, and impacts from wild horses and burros. Large blocks of land remain unfragmented by facilities, roads, and motorized trails.

Partnerships are in place to study many species of concern, and the ecosystem processes necessary to ensure their continued existence. Cooperative actions to implement the Clark County Multi-species Plan are occurring.

Native and desired non-native animal populations have genetic diversity, are at sustainable levels, and have sufficient habitat to ensure their continued existence. Wildlife species distribution is not constrained by recreational use and/or developments. Management indicator species are being monitored and evaluated.

STANDARD OPERATING PROCEDURES

The following management guidance applies to, and is a part of, the Proposed Management Prescription as well as all alternatives considered. All Standard Operating Procedures (SOPs) are based on existing laws, regulations and policy.

Allowable Uses

The public lands will be managed under the principles of multiple use and sustained yield as required by the Federal Land Policy and Management Act (FLPMA). Any authorized use, occupancy, or development of the public lands that conforms with the GMP will be considered. Those uses, including rights-of-way, leases, and permits, will be subject to environmental review and may require limitations or stipulations to protect and preserve natural resources. Limitations may also be imposed on either the type or intensity of use, or both, because of environmental values, hazards, or special management considerations. Some limitations have already been identified for specific areas, and are included in the management objectives in this plan.

Coordination With Other Agencies, State and Local Governments, and Indian Tribes

BLM will ensure that the detailed management plans and individual projects resulting from the GMP are consistent with officially adopted and approved plans, policies, and programs of other agencies, state and local governments, and Indian Tribes. Cooperative agreements and memoranda of understanding will be developed as needed to promote close cooperation between BLM and other federal agencies, state and local governments, organizations and Indian Tribes.

Air Quality

Under the Clean Air Act (as amended, 1977), BLM administered lands were given a Class II air quality classification, which allows moderate deterioration associated with moderate, well controlled industrial and population growth. BLM will manage all public lands as Class II unless they are reclassified by the state as a result of the procedures prescribed in the Clean Air Act (as amended, 1977). Administrative actions on the public lands will comply with the air quality classification for that specific area and appropriate State Implementation Plans.

When applicable (activities with the potential to affect air quality), the BLM would determine and document "conformity" with local, state, tribal and Federal air quality laws, regulations, and standards (per 40 CFR 93.100 et seq). Conformity determinations would be included in site specific activity plans and/or NEPA documentation.

Hazardous Materials

Prevent hazardous materials contamination of public lands.

Minimize releases of hazardous materials through compliance with current regulations. When hazardous materials are released into the environment, assess their impacts on each resource and determine the appropriate response, removal, and remedial actions to take.

Reduce risks associated with hazardous materials on public lands.

Evaluate all actions (including land use authorizations and disposals, mining and milling activities, and unauthorized land uses) for hazardous materials, waste minimization and pollution prevention.

Complete site-specific inventories when lands are being disposed or acquired. It is departmental policy to minimize potential liability of the Department and its bureaus by acquiring property that is not contaminated, unless directed by Congress, court mandate, or as determined by the Secretary.

Inspect mining and milling sites to determine appropriate management for hazardous materials.

Barrier Free Access

Access for and use by the physically challenged will be considered in all project planning.

Unauthorized Use

It is BLM policy to identify, abate and prevent unauthorized use of public land. Existing unauthorized uses of public land will be resolved either through termination, temporary authorization by short-term permit, issuance of rights-of-way, leasing through the Recreation and Public Purposes Act, or other appropriate manner.

Vegetative Management

There will be no sales of desert vegetation.

No firewood permits will be issued.

Feed provided for horses used in all commercial guiding operations must be weed free.

Wildlife

Wildlife habitat will be evaluated on a case-by-case basis as a part of project-level planning. Such evaluation will consider the significance of the proposed project and the sensitivity and importance of wildlife habitat in the affected area. Stipulations will be attached as appropriate to assure compatibility of projects with management objectives for wildlife habitat. Habitat improvement projects will be implemented where necessary to stabilize or improve unsatisfactory or declining wildlife habitat condition. Such projects will be identified through habitat management plans or project plans.

Threatened, Endangered and Sensitive Species Habitat

Whenever possible, management activities in habitat for threatened, endangered or sensitive species will be designed to benefit those species through habitat improvement.

The Nevada Division of Wildlife and the U.S. Fish and Wildlife Service will be consulted prior to implementing projects

that may affect habitat for threatened and endangered species. If a "may affect" determination is made by a qualified BLM wildlife biologist, consultation with the U.S. Fish and Wildlife Service will be initiated in accordance with Section 7 of the Endangered Species Act of 1973, as amended.

Soil and Water Resources

Soil and water resources will be evaluated on a case-by-case basis as a part of project level planning. Such an evaluation will consider the significance of the proposed projects and the sensitivity of the resources. Stipulations will be attached as appropriate to prevent adverse impacts to soil and water resources.

Water quality will be maintained or improved in accordance with state and federal standards. State agencies will be consulted on proposed projects that may significantly affect water quality. Management actions on public land within municipal watersheds will be designed to protect water quality and quantity.

The following apply to water development:

1. Free water for use by wildlife shall be maintained at or within 1/4 mile of all spring developments.
2. Adequate water shall remain at spring developments to maintain any associated riparian zone.
3. Height of troughs or other water containers shall not exceed 20 inches above ground level.
4. Bird ladders or other appropriate wildlife escape devices will be installed and maintained in all water troughs.

All BLM initiated or authorized actions potentially affecting wetland-riparian areas will comply with the spirit and intent of Executive Order 11990 (Wetlands Act) and BLM Manual Section 6740.06. These directives stress the avoidance of (1) "...long and short-term adverse impacts associated with the destruction, loss, or degradation of wetland-riparian areas" and (2) the preservation and enhancement of "the natural and beneficial values of wetland-riparian areas which may include constraining or excluding those uses that cause significant, long-term ecological damage."

Recreation

A broad range of outdoor recreational opportunities will continue to be provided for all segments of the public. Trails and other means of public access will continue to be maintained and developed where necessary to enhance recreation opportunities and allow public use. Developed recreation facilities receiving the heaviest use will receive first priority for operation and maintenance funds. Sites that cannot be maintained to acceptable health and safety standards will be closed until deficiencies are corrected.

Recreation resources will be evaluated on a case-by-case basis as a part of project-level planning. Such evaluation will consider the significance of the proposed project and the sensitivity of recreation resources in the affected area. Stipulations will be attached as appropriate to assure compatibility of projects with recreation management objectives.

Visual Resources

Visual resources will be evaluated as a part of activity and project planning. Such evaluation will consider the significance of the proposed project and the visual sensitivity of the affected area. Stipulations will be attached as appropriate to maintain visual resources.

Wilderness Resources

The La Madre Mountains and Pine Creek Wilderness Study Areas (WSAs) will continue to be managed in compliance with the *Interim Management Policy for Lands Under Wilderness Review*, H-8550-1(IMP) until reviewed and acted upon by Congress. If all or part of these areas are designated as wilderness by Congress, they will be managed under BLM's Wilderness Management Policy. A site-specific wilderness management plan will be developed to guide future management.

If all or part of the La Madre Mountains and Pine Creek WSAs are not designated as wilderness, those portions will be managed under the multiple use guidelines set forth in this GMP.

Cultural Resources

BLM is required to identify, evaluate and protect cultural resources on public land under its jurisdiction and to ensure that Bureau authorized actions do not inadvertently harm or destroy non-federal cultural resources. These requirements are mandated by the Antiquities Act of 1906, the National Historic Preservation Act of 1966 and amendments, the National Environmental Policy Act of 1969, Executive Order 11593 (1971), and the Archeological Resources Protection Act of 1979, together with 36 CFR 800.

Prior to starting any Bureau initiated or authorized action that involves surface disturbing activities, the BLM will conduct, or cause to be conducted, a Class III (intensive) inventory as specified in BLM Manual Section 8111.4. This intensive inventory supplements previous surveys and will be done to locate, identify, and evaluate cultural resource properties in the affected areas. If properties that may be eligible for the National Register are discovered, the BLM will consult with the State Historic Preservation Officer (SHPO) and forward the documentation to the Keeper of the National Register to obtain a determination of eligibility in accordance with 36 CFR Part 63.

Since any Bureau authorized or initiated action recognizes and accommodates cultural resources by virtue of standard operating procedures, the only activity that may damage these resources is unplanned public use. Such activities include unauthorized recreational vehicle use, artifact collection, and illegal excavation for materials and antiquities. The location of these activities is impossible to predict and may occur in spite of measures designed to exclude or limit them.

Cultural resource values discovered in a proposed project or authorized action area will be protected by adhering to the following methods:

Avoidance - Cultural resources would be protected by redesigning or relocating the project or excluding significant cultural resource areas from

development, use or disposal.

Salvaging - If a project cannot be redesigned or relocated, cultural resource values will be salvaged through controlled, scientific methods pursuant to the SHPO agreement.

Project/Action Abandonment - If the site is determined to be of significant value or the above mentioned methods are not considered adequate, the project will be abandoned.

All cultural sites identified as special management areas will be closed to off-road vehicle use, vegetation manipulation, and surface occupancy.

All cultural sites known to be eligible for National Register nomination or listed on the National Register will be protected from deterioration and be retained in federal ownership.

American Indian human remains will not be held or stored. In accordance with the Native American Graves Protection and Repatriation Act, remains and/or grave goods will be returned to the appropriate tribe upon their written request. (No items are known to be in the RRCNCA inventory.)

Inadvertent field discovery of American Indian human remains and/or grave goods will not be disturbed until the appropriate tribe is notified. All activity around the discovery will be halted, in accordance with the Native American Graves Protection and Repatriation Act, until the tribe has determined their recommendations.

American Indians may gather or tend traditional native plants or materials for personal use and/or use traditional religious sites without obtaining a special use permit. Non-native plants may not be introduced. American Indians will be asked to inform the Visitor Center staff if they are gathering, tending or using traditional religious sites in the area of the Scenic Drive so that there will not be a possibility of conflict with visitors who may not understand the activity occurring and think that, and report to the BLM that, unauthorized collection or use is occurring.

Paleontological Resources

Paleontological resources will be managed to protect specimens and maintain or enhance sites or areas for their scientific and educational values.

The potential impacts to the paleontologic resources of the NCA are unknown, as an inventory has not yet been completed. Once an inventory is completed and site clearances become standard practice, the resource will be adequately protected.

Cadastral Survey

Cadastral surveys support of resource management programs. Survey requirements and priorities will be determined on a yearly bases as a part of the annual work planning process.

Site Specific Project Plans

The GMP provides general guidance for the NCA. More detailed management plans called "project plans" will be prepared to deal with site specific resource projects. Project plans include a detailed plan for completion of a particular project and an environmental assessment to evaluate any potential resource impacts.

Economic and Social Considerations

BLM will ensure that any management action undertaken in connection with this plan is cost-effective and takes into account local social and economic factors. Cost-effectiveness may be determined by any method deemed appropriate by the Bureau for the specific management action involved.

Environmental Review

Prior to implementation of proposed projects, a review will be done to determine if criteria is met for a categorical exclusion. Projects not meeting the criteria will require an Environmental Assessment (EA) and finding of no significant impacts. If the assessment suggests a major federal action that would significantly affect the human environment, an Environmental Impact Statement (EIS) will be prepared under the direction of the BLM Nevada State Director.

PART 2

DRAFT ENVIRONMENTAL IMPACT STATEMENT
ON THE PROPOSED PLAN AND THE ALTERNATIVES

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**COMPARISON SUMMARY
OF
ALTERNATIVES**

ISSUE/ACTION	ALTERNATIVE 1	ALTERNATIVE 2
BIODIVERSITY PRESERVATION		
Re-introduce springsnails into restored Willow Spring riparian habitat	do not re-introduce	do not re-introduce
Install bat gate at Wounded Knee cave	install gate	install gate
ECOSYSTEM MANAGEMENT		
Utilize prescribed burns for resource enhancement	no prescribed burning	no prescribed burning
WILD HORSE AND BURRO MANAGEMENT	For Red Rock Herd Management Area only	
Amendment to Las Vegas RMP Red Rock HMA boundary (within NCA only)	expand to the east to include the area surrounding Calico Basin and the area around Mile 13 Campground	no change in boundary
Burro viewing areas (SR 159)	develop viewing areas along SR 159	develop viewing areas along SR 159
Safety and access	fence both sides of SR 159 and construct highway underpasses	remove nuisance animals along SR 159 as needed; additional fencing if necessary
Additional developments for water availability	initiate developments to Shovel Spring, Willow Spring, White Rock Spring, Red Spring, Pine Creek, and Wheeler Camp Spring	no new developments proposed
Existing developments	improve developments at Mud Spring #1, Lone Grapevine Spring, Tunnel Spring and Bird Spring	improve developments to Mud Spring #1, Lone Grapevine Spring, Tunnel Spring and Bird Spring
Area closure	Cottonwood Valley would be closed to organized hiking, equestrian and mountain biking events during foaling season (March - May)	Cottonwood Valley would be closed to organized hiking, equestrian and mountain biking events during foaling season (March - May)
COMMERCIAL PURPOSES	same for all alternatives - see Management Common To All Alternatives	
CULTURAL RESOURCES MANAGEMENT	same for all alternatives - see Management Common To All Alternatives	
NATIVE AMERICAN CONCERNS	same for all alternatives - see Management Common To All Alternatives	

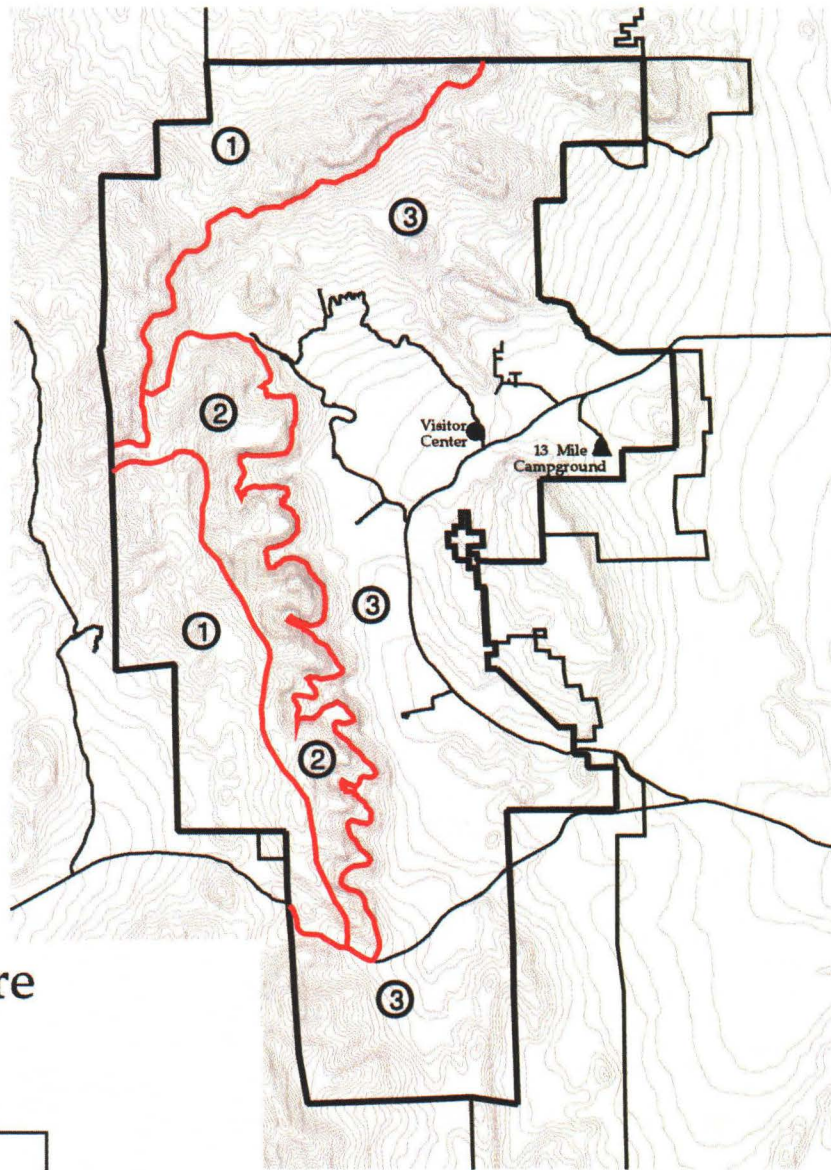
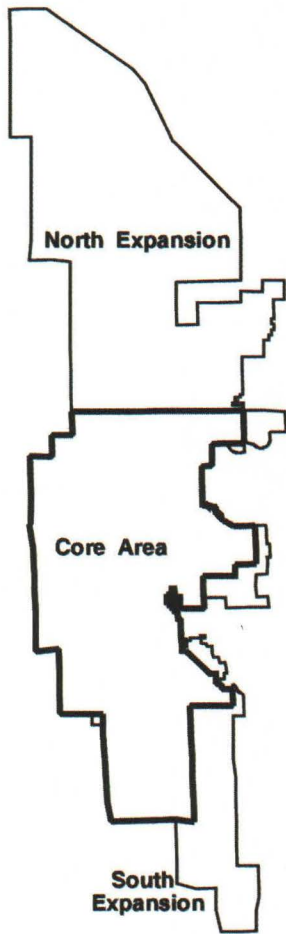
* Many actions are the same for all alternatives and are not included in this comparison summary; see Management Common To All Alternatives in Chapter 2 for a more in depth listing.

* HMA maps for each alternative can be viewed in Chapter 2

ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
re-introduce if surveys continue to indicate none exist on site	re-introduce if surveys continue to indicate none exist on site	re-introduce if surveys continue to indicate none exist on site
install gate	install gate	install gate
allow prescribed burning	allow prescribed burning	allow prescribed burning
delete area north of Spring Mtn Ranch on west side of SR 159 and area north of ten mile Canyon on the east side of SR 159	delete all north of SR 160	delete all within the NCA
viewing areas not proposed	SR 159 corridor not in HMA	SR 159 corridor not in HMA
remove nuisance animals along SR 159 as needed; additional fencing if necessary	SR 159 corridor not in HMA	SR 159 corridor not in HMA
no new developments proposed	new developments proposed; remove protective fencing outside of HMA if no longer needed	no new developments
improve developments at Mud Spring #1, Lone Grapevine Spring, Tunnel Spring and Bird Spring as necessary	improve developments at Tunnel Spring and Bird Spring as necessary; restore Lone Grapevine Spring and Mud Spring #1 (outside HMA)	remove protective fencing developments no longer needed; reconstruct Tunnel Spring and Bird Spring to accommodate wildlife
closure not proposed for foaling period	closure not proposed for foaling period	no foaling closure needed
same for all alternatives - see Management Common To All Alternatives		
same for all alternatives - see Management Common To All Alternatives		
same for all alternatives - see Management Common To All Alternatives		

ISSUE/ACTION	ALTERNATIVE 1	ALTERNATIVE 2
CAMPING	Proposals	
Campgrounds	use 13 Mile Campground (all other sites used in the past are closed)	use 13 Mile Campground (all other sites used in the past are closed)
Allowable camping in the "core" area (general)	same for all alternatives (see map on following page)	same
Specific consideration in core area	allow limited camping in Cottonwood Valley by permit (for events only)	no camping in Cottonwood Valley
North of La Madre Mountain	dispersed camping allowed	dispersed camping allowed
East of Bird Spring Range	dispersed camping allowed	no dispersed camping
Stay limit	14 day limit for all camping	14 day limit for all camping
Distance restrictions	no camping within 1/4 mile of springs and riparian areas; no camping within 1/2 mile of wild horse and burro water sources	no camping within 1/4 mile of springs and riparian areas
ROCK CLIMBING	same for all alternatives - see Management Common To All Alternatives	
TARGET SHOOTING	designate area at the mouth of Lucky Strike Canyon	no target shooting in the NCA
HUNTING	allowed in accordance with State regulations, except in the "cave" area which is closed	allowed in accordance with State regulations, except in the "cave" area which is closed

ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Proposals		
use 13 Mile Campground (all other sites used in the past are closed)	use 13 Mile Campground (all other sites used in the past are closed)	use 13 Mile Campground (all other sites used in the past are closed)
same	same	same
no camping in Cottonwood Valley	no camping in Cottonwood Valley	no camping in Cottonwood Valley
dispersed camping allowed on disturbed sites, but if monitoring shows additional impacts, sites will be designated	dispersed camping allowed on disturbed sites, but if monitoring shows additional impacts, sites will be designated	dispersed camping allowed on disturbed sites, but if monitoring shows additional impacts, sites will be designated
allowed within 200 feet of designated roads on disturbed sites	no dispersed camping	allowed within 200 feet of designated roads on disturbed sites
14 day limit for all camping	7 day limit for dispersed camping and maximum group size of 10 people; 14 day limit in campground	14 day limit for all camping
no camping within 1/4 mile of springs and riparian areas	no camping within 1/4 mile of springs and riparian areas	no camping within 1/4 mile of springs and riparian areas
same for all alternatives - see Management Common To All Alternatives		
no target shooting in the NCA	no target shooting in the NCA	no target shooting in the NCA
allowed in accordance with State regulations, except in the "cave" area which is closed	allowed in accordance with State regulations, except in the "cave" area which is closed	allowed in accordance with State regulations, except in the "cave" area which is closed



Camping in Core RRCNCA

This map does not refer to the NCA expansion areas which are covered in the alternatives.

The boundary along La Madre Mountain follows a contour of 6500 ft.

The boundary along the base of the escarpment follows a contour of 4400 ft, which basically separates the escarpment and the canyon floor.

The boundary following the Spring Mountain Range along the top of the escarpment follows the crest of the range.

Overnight parking along the Scenic Drive requires a permit regardless of camping location.

Any camping within 1/4 mile of the Rocky Gap Road requires a permit.

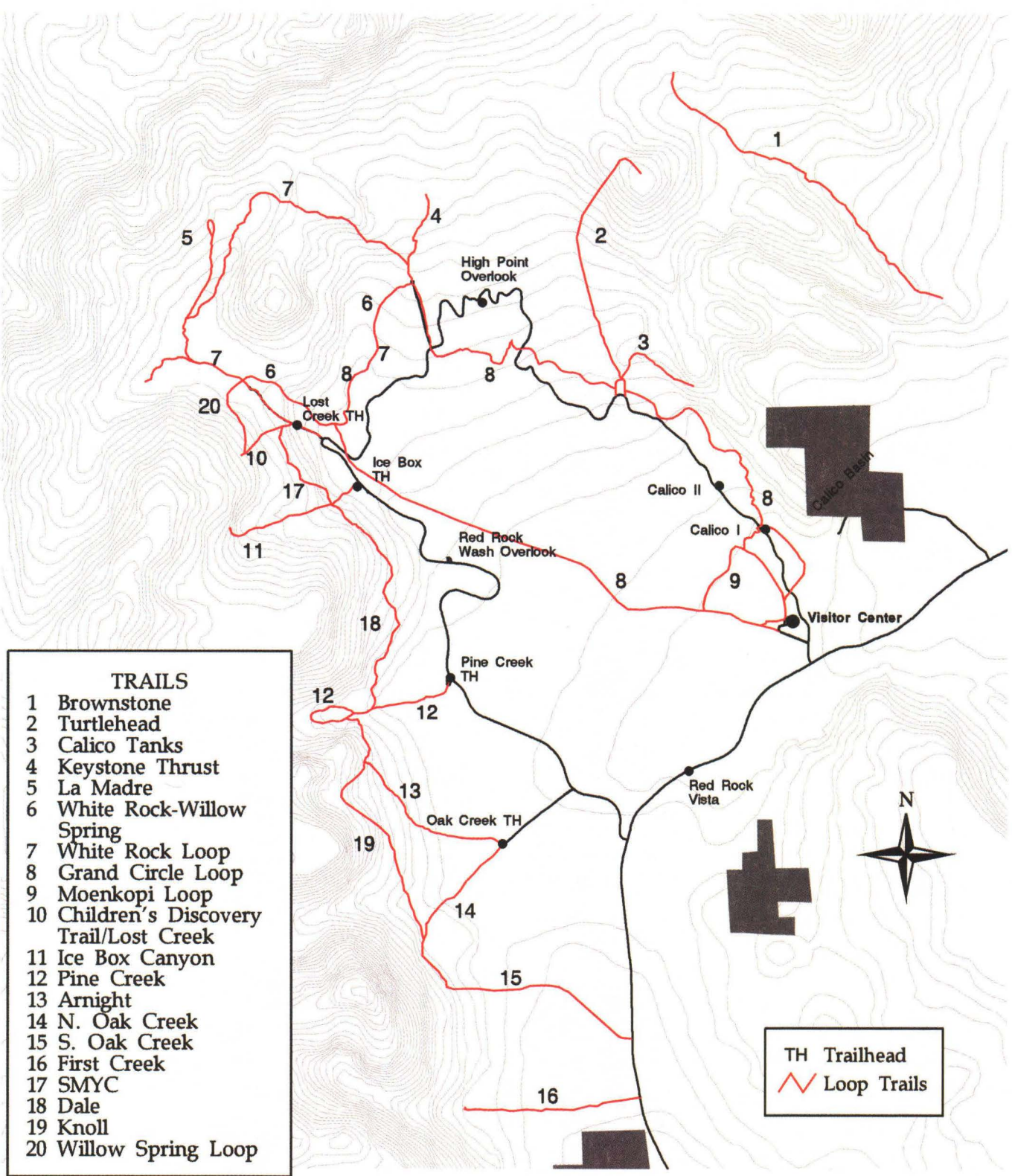


- ① OPEN - NO PERMIT NEEDED**
- ② PERMIT ONLY**
- ③ CLOSED TO CAMPING**

ISSUE/ACTION	ALTERNATIVE 1	ALTERNATIVE 2
TRAILS (existing)	Designated Use	
Brownstone	hiking and equestrian	hiking and equestrian
Turtlehead	hiking only	hiking only
Calico Tanks	hiking only	hiking only
Keystone Thrust	hiking and equestrian	hiking and equestrian
La Madre	hiking and equestrian	hiking and equestrian
White Rock Loop	hiking and equestrian	hiking and equestrian
Grand Circle Loop	Visitor Center to White Rock road - hiking only White Rock road to Scenic Drive - add equestrian Scenic Drive to Visitor Center - add equestrian & mtn biking	Visitor Center to White Rock road - hiking only White Rock road to Scenic Drive - add equestrian Scenic Drive to Visitor Center - add equestrian & mtn biking
Moenkopi Loop	hiking only	hiking only
Childrens Discovery/Lost Creek	hiking only	hiking only
Ice Box Canyon	hiking only	hiking only
Pine Creek	hiking only	hiking only
Arnight	trailhead to Knoll Trail intersection - hiking and equestrian from intersection to Pine Creek - hiking only	trailhead to Knoll Trail intersection - hiking and equestrian from intersection to Pine Creek - hiking only
Oak Creek North	hiking, equestrian and mtn biking	hiking, equestrian and mtn biking
Oak Creek South	hiking, equestrian and mtn biking	hiking, equestrian and mtn biking
First Creek	hiking and equestrian	hiking and equestrian
Knoll	hiking and equestrian	hiking and equestrian
Dale	hiking only	hiking only
SMYC	hiking only	hiking only
Willow Spring Loop	hiking only	hiking only
Red Valley	equestrian (close to mtn biking)	equestrian & mountain biking


ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Designate Use		
hiking and equestrian	hiking and equestrian	hiking and equestrian
hiking only	hiking only	hiking only
hiking only	hiking only	hiking only
hiking and equestrian	hiking only	hiking and equestrian
hiking only beyond White Rock Loop portion	hiking only	hiking only beyond White Rock Loop portion
hiking and equestrian	hiking only	hiking and equestrian
Visitor Center to White Rock road - hiking only remainder of trail back to Visitor Center - add equestrian (no mtn bikes)	all sections, other than the White Rock road, are designated as hiking only	Visitor Center to White Rock road - hiking only remainder of trail back to Visitor Center - add equestrian (no mtn bikes)
hiking only	hiking only	hiking only
hiking only	hiking only	hiking only
hiking only	hiking only	hiking only
hiking only	hiking only	hiking only
trailhead to Knoll Trail intersection - hiking only from intersection to ridge south of Pine Creek - add equestrian	hiking only	trailhead to Knoll Trail intersection - hiking only from intersection to ridge south of Pine Creek - add equestrian
hiking and equestrian	hiking and equestrian	hiking and equestrian
hiking and equestrian	hiking and equestrian	hiking and equestrian
hiking and equestrian	hiking and equestrian	hiking and equestrian
hiking only equestrian	hiking only	hiking and equestrian
hiking only	hiking only	hiking only
hiking only	hiking only	hiking only
hiking only	hiking only	hiking only
designate existing trail for mtn biking and construct a second trail for equestrian use	designate existing trail for mtn biking and construct a second trail for equestrian use	designate existing trail for mtn biking and construct a second trail for equestrian use

Existing Trails - Scenic Drive Vicinity



TRAILS

- 1 Brownstone
- 2 Turtlehead
- 3 Calico Tanks
- 4 Keystone Thrust
- 5 La Madre
- 6 White Rock-Willow Spring
- 7 White Rock Loop
- 8 Grand Circle Loop
- 9 Moenkopi Loop
- 10 Children's Discovery Trail/Lost Creek
- 11 Ice Box Canyon
- 12 Pine Creek
- 13 Arnight
- 14 N. Oak Creek
- 15 S. Oak Creek
- 16 First Creek
- 17 SMYC
- 18 Dale
- 19 Knoll
- 20 Willow Spring Loop

TH Trailhead
 Loop Trails

1 0 1 Miles

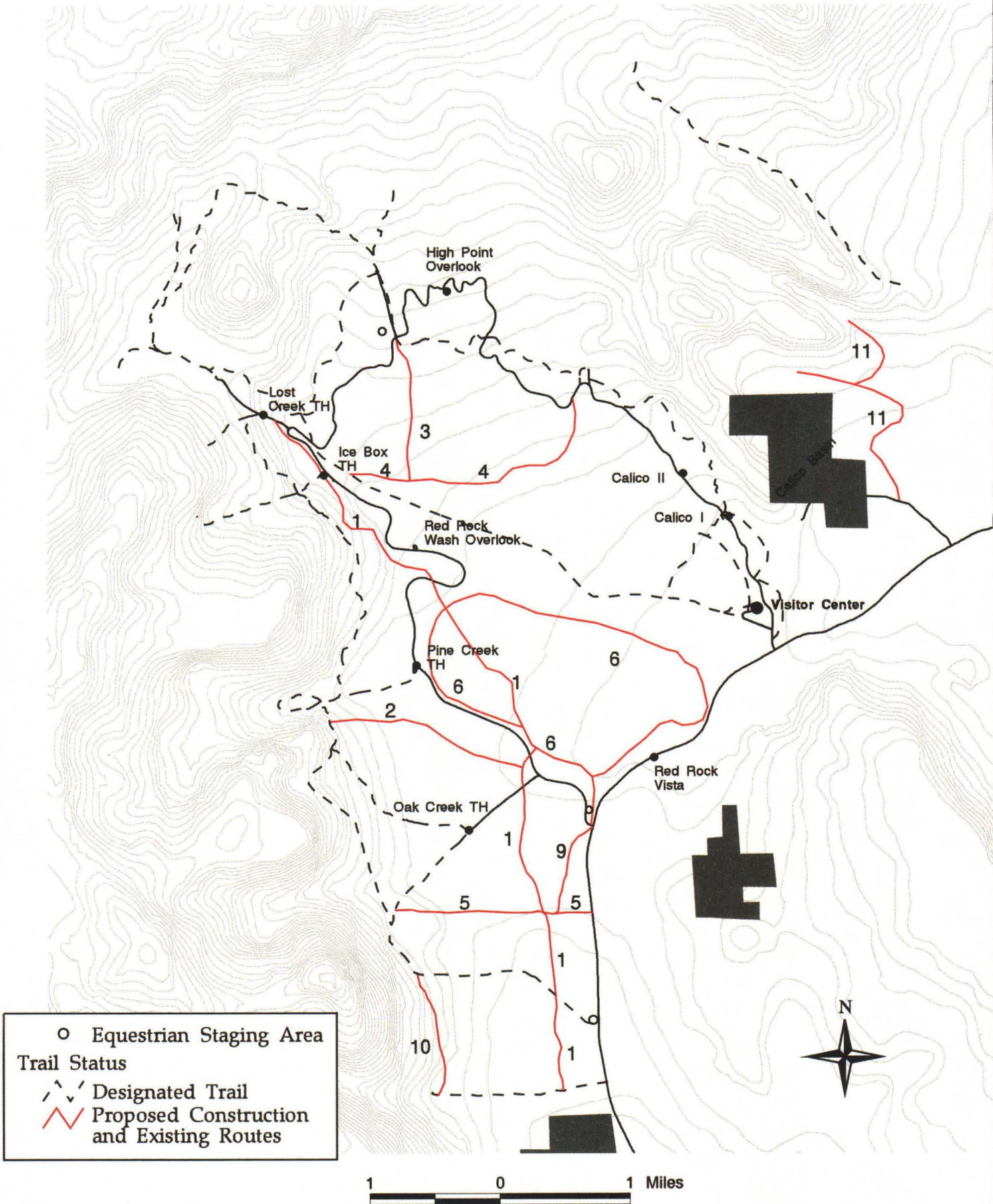


ISSUE/ACTION	ALTERNATIVE 1	ALTERNATIVE 2
TRAILS (existing routes - not official trails)	Trail Proposals	
1. First Creek to Lost Creek (away from escarpment base)	designate as equestrian trail	designate only the section running north-south between the 2 Oak Creek Canyon accesses as equestrian trail
2. Oak Cr/Scenic Drive to Pine Creek (old road)	designate as equestrian trail	no trail designation
3. White Rock/Scenic Drive due south to intersection (old road)	designate as equestrian trail	no trail designation
4. Sandstone Quarry to Willow Spring area within Scenic Drive loop (old road)	pave and designate for hiking, equestrian and bicycle use	no trail designation
5. SR 159 due west to Oak Creek Canyon (old road)	designate for hiking and equestrian use	no trail designation
6. Loop route directly north of Red Rock Vista	designate for hiking and equestrian use	no trail designation
7. Blue Diamond to Jean route (portion within NCA)	designate for equestrian and mountain biking	no trail designation
8. Twilight Zone routes (north of Kyle Canyon Road)	designate for equestrian and mountain biking	no trail designation
9. Existing routes from Scenic Drive exit to adjacent trails	designate for connectivity between equestrian staging and adjacent trails	no trail designations
TRAILS (new construction)	Trail Construction Proposals	
10. First Creek to Oak Creek	construct for hiking and equestrian use	construct for hiking and equestrian use
11. Access to Kraft Rocks	construct for hiking only	construct for hiking only
TRAILS (other related issues)	Trail Related Proposals	
Hiking - dispersed use	no restrictions on dispersed casual use	no restrictions on dispersed casual use
Equestrian - dispersed use	allow dispersed casual use, but encourage using designated trails	allow dispersed casual use
Mountain biking - dispersed use	no dispersed use, mountain bikes are restricted to trails designated for their use, and roads	no dispersed use, mountain bikes are restricted to trails designated for their use, and roads
○ Equestrian staging areas	none specifically designated	none specifically designated

* Any commercial or other permitted uses related to the above activities will have special stipulations directing how use may occur.

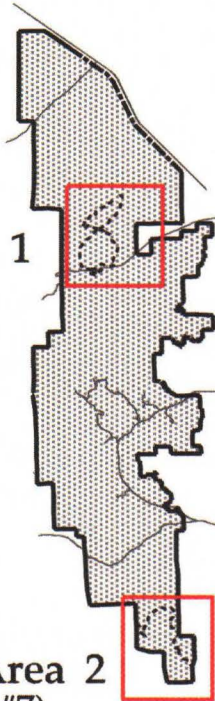
ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Trail Proposals		
designate as equestrian trail	designate as equestrian trail	designate as equestrian trail
designate as equestrian trail	no trail designation	designate as equestrian trail
no trail designation	no trail designation	no trail designation
pave and designate for hiking, equestrian and bicycle use	no trail designation	pave and designate for hiking, equestrian and bicycle use
no trail designation	no trail designation	no trail designation
designate for hiking and equestrian use	designate for hiking and equestrian use	designate for hiking and equestrian use
designate for equestrian and mountain biking	designate for equestrian and mountain biking	designate for equestrian and mountain biking
designate for equestrian and mountain biking	designate for equestrian and mountain biking	designate for equestrian and mountain biking
designate for connectivity between equestrian staging and adjacent trails	designate for connectivity between equestrian staging and adjacent trails	designate for connectivity between equestrian staging and adjacent trails
Trail Construction Proposals		
construct for hiking and equestrian use	construct for hiking and equestrian use	construct for hiking and equestrian use
construct for hiking only	construct for hiking only	construct for hiking only
Trail Related Proposals		
no restrictions on dispersed casual use	no restrictions on dispersed casual use	no restrictions on dispersed casual use
restricted to designated trails within original NCA designation (south of La Madre to the south edge of Cottonwood Valley)	restricted to designated trails within original NCA designation (south of La Madre to the south edge of Cottonwood Valley)	restricted to designated trails within original NCA designation (south of La Madre to the south edge of Cottonwood Valley)
no dispersed use, mountain bikes are restricted to trails designated for their use, and roads	no dispersed use, mountain bikes are restricted to trails designated for their use, and roads	no dispersed use, mountain bikes are restricted to trails designated for their use, and roads
Scenic Drive exit lot; Oak Creek Campground location (after campground is relocated)	Scenic Drive exit lot; Oak Creek Campground location (after campground is relocated)	Scenic Drive exit lot; lower White Rock parking lot; Oak Creek Campground location (after campground is relocated)

Existing Routes in Scenic Drive Vicinity



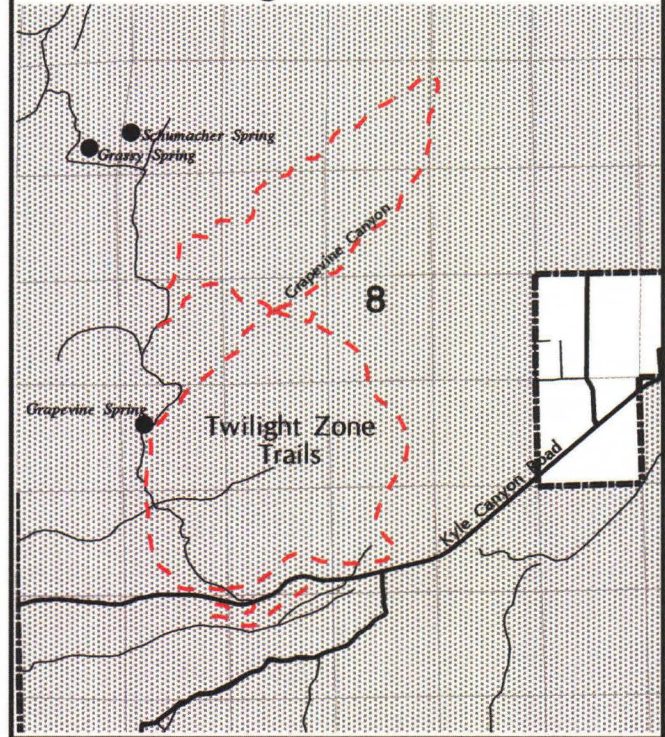
Blue Diamond to Jean and Twilight Zone Trails

Map Area 1
(Trail #8)

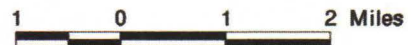
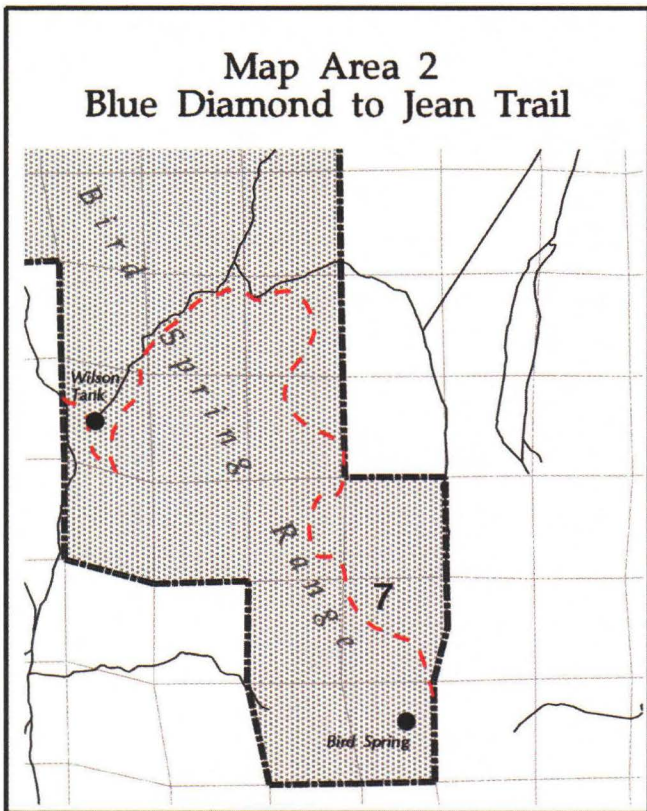


Map Area 2
(Trail #7)

Map Area 1
Twilight Zone Trails



Map Area 2
Blue Diamond to Jean Trail



ISSUE/ACTION		ALTERNATIVE 1	ALTERNATIVE 2
DIRT ROADS		Miles (acres) to remain opened or to be closed	
North of La Madre	remain open	53.2 mi 128.8 ac	53.2 mi 128.8 ac
	close	16.4 mi 39.8 ac	16.4 mi 39.8 ac
Original NCA	remain open	23.9 mi 57.8 ac	23.9 mi 57.8 ac
	close	49.8 mi 72.5 ac	49.8 mi 72.5 ac
Southern Expansion	remain open	15.7 mi 37.8 ac	15.7 mi 37.8 ac
	close	0.0 mi 0.0 ac	0.0 mi 0.0 ac
TOTALS	remain open	92.8 mi 224.4 ac	92.8 mi 224.2 ac
	close	66.2 mi 112.3 ac	66.2 mi 112.3 ac
PAVING (existing roads, lots and overlooks)		Pave/Do Not Pave	
Red Spring		yes	yes
White Rock (road & lot)		yes	yes
Willow (bus turn around loop)		yes	yes
Lost Creek (lot at trailhead)		yes	yes
N Oak Creek (road & lot)		yes	yes
PAVING (new construction)		Amount of Paving	
Calico III Parking/Overlook		1.2 acres	1.2 acres
Short Loop (return road from Sandstone Quarry)		2.65 miles (5.78 acres)	do not construct
Sandstone/Turtlehead (parking/trailhead)		.52 acre	do not construct
Red Rock Wash (expansion)		.5 acre	.5 acre
Rangers Choice (overlook)		.47 acre	do not construct
Pine Creek (expansion)		.36 acre	.36 acre

* For a more in depth breakdown of dirt roads by alternative, see appendix 20.

ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Miles (acres) to remain opened or to be closed		
36.4 mi 87.9 ac	31.0 mi 74.9 ac	35.5 mi 85.8 ac
33.2 mi 80.7 ac	38.6 mi 93.7 ac	34.1 mi 82.8 ac
23.9 mi 57.8 ac	23.9 mi 57.8 ac	23.9 mi 57.8 ac
49.8 mi 72.5 ac	49.8 mi 72.5 ac	49.8 mi 72.5 ac
13.5 mi 32.3 ac	11.2 mi 26.9 ac	12.8 mi 30.9 ac
2.2 mi 5.5 ac	4.5 mi 10.9 ac	2.9 mi 6.9 ac
73.8 mi 178.0 ac	66.1 mi 159.6 ac	72.2 mi 174.5 ac
85.2 mi 158.7 ac	92.9 mi 177.1 ac	86.8 mi 162.2 ac
Pave/Do Not Pave		
yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes
yes	yes	yes
Amount of Paving		
1.2 acres	1.2 acres	1.2 acres
2.65 miles (5.78 acres)	do not construct	2.65 miles (5.78 acres)
do not construct	do not construct	do not construct
.5 acre	.5 acre	.5 acre
do not construct	do not construct	do not construct
.36 acre	.36 acre	.36 acre

CHAPTER 1

PURPOSE AND NEED

The purpose of this project is to develop a new management plan for the Red Rock Canyon National Conservation Area (RRCNCA), which addresses and updates management policy for the present and future needs of RRC. Until June of 1995, management of Red Rock Canyon (RRC) was guided by the "Red Rock Canyon Master Plan" which was developed in 1976. Several changes have occurred since 1976 which require an updated plan to manage RRCNCA and deal with current issues and use problems.

In November of 1990, Congress passed the Red Rock Canyon National Conservation Area Establishment Act designating RRC as a National Conservation Area (NCA). The legislation includes general management direction to be followed and requires the development of a new management plan. The legislation calls for providing recreation opportunities allowing the public to enjoy and appreciate the unique natural setting which composes Red Rock Canyon, but the primary direction is to conserve and protect these natural resources.

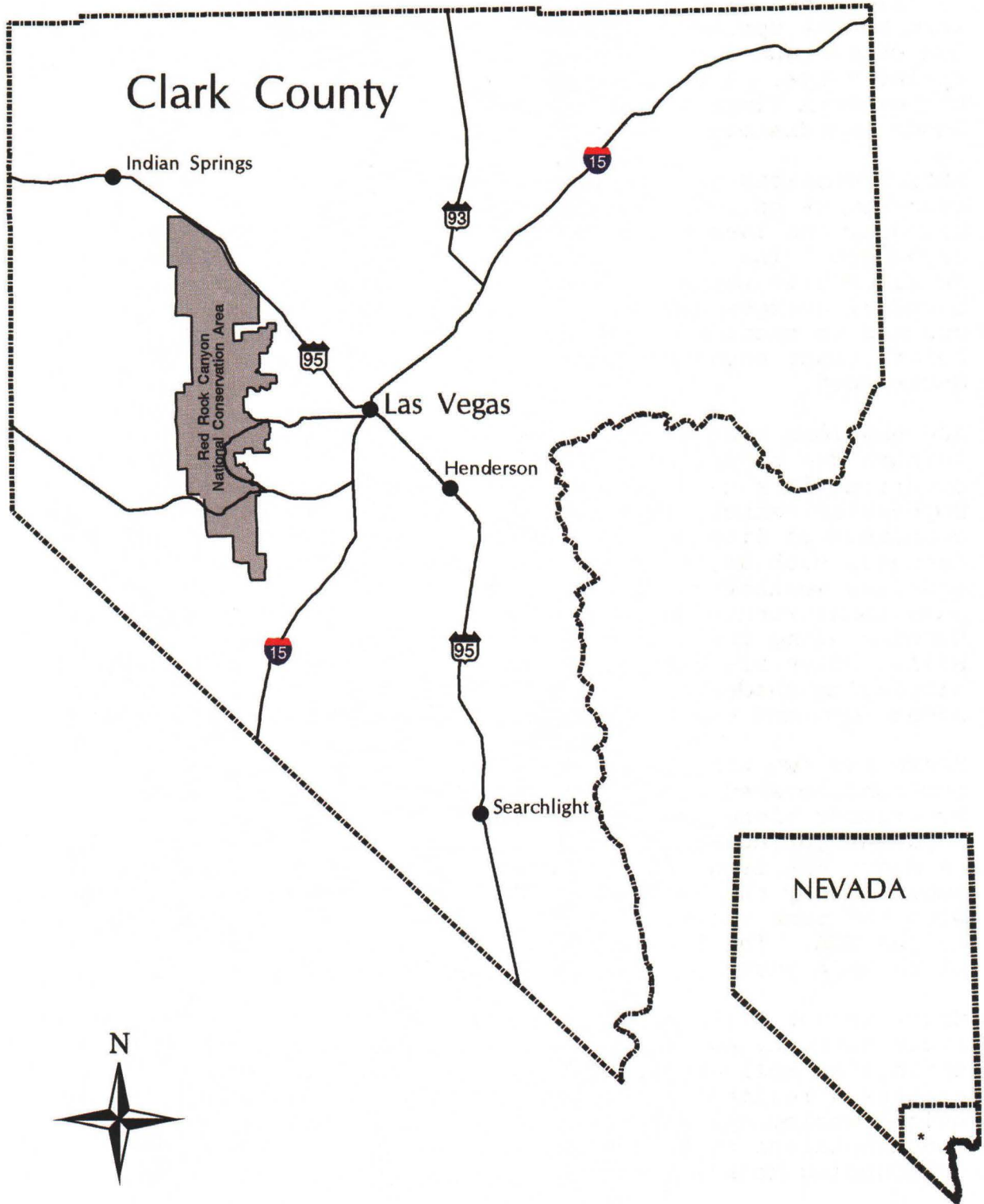
Other concerns contributing to the need for a new management plan include visitor use that has increased at a faster rate than anticipated and the accelerated popularity of recreational activities that were not a factor when the 1976 Master Plan was developed. The population of Las Vegas was 371,260 in 1976, and has now increased to well over a million, with Las Vegas being among the fastest growing cities in the United States. Current projections expect the population to reach 2 million by the year 2005. The westward expansion of the Las Vegas community has now reached RRCNCA's eastern boundary with the development of the Red Rock Country Club immediately adjacent to the RRCNCA boundary south of Charleston Blvd. At present, the community planning has been completed for all of the remaining buffer zone and the initial transportation system implementation is well under way.

There has been a tremendous growth in recreation activities including hiking, scenic viewing, horse riding, mountain biking and technical rock climbing. In 1976, technical rock climbing and mountain biking were relatively insignificant as far as requiring special attention and thus no mention of them was made in the Master Plan. At present, both activities are very significant in RRCNCA and management of both activities needs to be addressed. To add to the complexity of the increased recreational use, there is an increasing interest in commercial guiding of all of the above mentioned activities. With the increased interest in commercial and recreational activities, it is important to determine carrying capacities for the various

interests and set allowable limits.

In June of 1995, the Interim General Management Plan (IGMP) was approved to replace the 1976 Master Plan. The IGMP was devised from the Draft GMP completed in April of 1994. In November of 1994, Congress passed legislation to expand the boundary of the NCA. The expansion legislation more than doubled the size of RRCNCA, and the planning process was re-initiated to design a comprehensive plan covering the entire acreage. The IGMP is now in effect, but it is only designed to provide administrative direction and defers controversial action proposals to the final GMP planning process for additional analysis. The Proposed and Final GMPs will consider the entire NCA as it exists at present and place more emphasis on biodiversity analysis than had been done in the previous planning process.

VICINITY MAP



DESCRIPTION OF PLANNING AREA

Red Rock Canyon is located in Clark County, Nevada approximately 15 miles west of the city of Las Vegas. It is bordered on the west by the Spring Mountain range, extends north to the mouths of Lee Canyon and Cold Creek and extends south to include the Bird Spring Range. A substantial portion of the eastern boundary is the western limit of the Summerlin Master Planned Community. Lands immediately adjacent to RRCNCA are now being developed.

RRCNCA consists of approximately 196,000 acres. Acreage may vary from source to source due to minor adjustments to the NCA boundary and land which has been acquired through several exchanges. The latest adjustments occurred with the Southern Nevada Public Lands Management Act, passed in 1998. Some of the boundary changes designated in the Act follow land forms as opposed to section lines and will require land surveys to be done before exact boundary location and true acreage can be determined.

RRC has long been a popular location for public recreation and leisure due to unique geological and ecological characteristics occurring in a natural setting so close in proximity to a major population center. The geologic features of the area includes an abundance of limestone and sandstone formations, including unique features such as older limestone covering and protecting younger and less weather resistant sandstone. The result is a 3000 foot escarpment running north-south along the west side of RRC. Running along the east side of the Scenic Drive are the Calico Hills, which are another magnificent sandstone formation displaying shades of red, brown, buff and gray. Weathering has added form and texture, including potholes, domes, and arches.

There are two wilderness study areas (WSAs) which have major portions located within RRCNCA. The Pine Creek WSA includes the escarpment along the western border of and extends onto the adjacent Spring Mountains National Recreation Area (SMNRA). The La Madre WSA is north of the Pine Creek WSA and the two are separated by the Rocky Gap Road. It includes La Madre Mountain, with the peak elevation recorded at 8754 feet, the highest point in the NCA. The lowest elevation occurs along the east boundary of the NCA just south of the Lucky Strike road, and is 3000 feet.

Water is not a plentiful resource, but due to the past geologic fault activity and the permeable strata, RRCNCA contains over 40 springs as well as many tinajas (natural catchment basins). This creates a reliable source of water for wildlife, provides some unique ecological environments and allows for higher concentrations of plants and animals than can be found in the surrounding Mojave Desert. Many species of plants and animals

are endemic to southern Nevada with some being found only within the Spring Mountains ecosystem.

RRCNCA also offers a wealth of cultural resources from both historic and prehistoric eras. To date, studies have shown the presence of human inhabitants as early as 3500 B.C. and possibly several thousand years earlier. Some of the cultural resources include shelter caves, roasting pits, rock art (petroglyphs and pictographs) and a portion of the Spanish Trail.

ISSUE IDENTIFICATION

The GMP planning process was re-initiated in September of 1995 with scoping meetings held to gather comments and concerns from the public concerning the management of RRCNCA. The focus of the process is to determine the key issues which need to be addressed in the planning process. The key issues are derived from the comments and concerns collected at the public scoping meetings, from comments mailed in during the scoping phase and from comments from local, State and Federal agencies. To assist the BLM in interpreting the data collected, a planning group was formed from members of the Las Vegas community, representing a diverse range of interests (see Chapter 5 - Consultation and Coordination). Not surprisingly, the 8 key issues which were developed in the first planning process, resulting in the Interim General Management Plan (IGMP), all resurfaced along with an additional 4 issues to be considered. The final list of issues includes the following (listed in no particular order):

1. What measures should be taken to preserve biodiversity?
2. How should riparian areas be protected?
3. How should wild horses and burros be managed?
4. How should cultural and paleontological resources be managed?
5. What opportunity settings (Management Emphasis Areas) should be offered to visitors?
6. What recreation opportunities should be offered to visitors and how should they be managed?
7. How should road and trail systems be managed to provide for hiking, bicycling, horse riding, motor vehicle use, and other possible uses, while protecting the environment?
8. What camping opportunities and facilities should be provided?
9. How should technical rock climbing be managed?
10. To what extent should target shooting be allowed?
11. To what extent should commercial purposes be allowed?
12. How do we properly recognize and provide for Native American concerns?

EXPANDED DISCUSSION OF THE ISSUES

The issues were further studied and discussed in more depth for clarification by the planning group. The following is a look at background information for each issue, along with a more defined description and some concerns and opportunities that arose during this process.

ISSUE 1

What measures should be taken to preserve biodiversity?

BACKGROUND

Biodiversity involves all components of an environment, their interrelation and the ecological processes and cycles that occur and sustain that environment. To preserve biodiversity, an ecosystem must be considered in its entirety as opposed to the individual components. To manage biodiversity in Red Rock Canyon, the proper level of geographic consideration should be the Spring Mountains ecosystem, of which the entire NCA would be a part.

RRCNCA biodiversity is of significant quality. One important reason is species diversity, particularly that of reptiles, bats and other mammals, birds, and especially plants. Another key factor is rarity of both species and plant communities. RRCNCA hosts two federally-listed Threatened & Endangered species, and 43 other Species of Concern. Of these species, 9 are southern Nevada endemics, 8 are Spring Mountain endemics, and 4 occur nowhere else on earth. Finally, RRCNCA biodiversity is also significant for its ecological integrity. Few intact landscape ecosystems survive in today's world of widespread habitat fragmentation and loss, let alone those which are entirely protected under public land ownership. As such, the Spring Mountains ecosystem (RRCNCA; USFS Spring Mountains National Recreation Area) affords the exceedingly rare opportunity to preserve intact, landscape-scale biodiversity.

ISSUE DESCRIPTION

Human use impacts, non-native animal disturbances, exotic plant invasions, and ecological process disruptions all have the potential to adversely impact the functioning of the Spring Mountains ecosystem. As such, all must be managed appropriately to avoid adverse impacts to the biodiversity of RRCNCA, which is included within the Spring Mountains ecosystem. Appropriate management must consider the full interrelational health and

vitality of the Spring Mountains ecosystem as opposed to species by species consideration.

CONCERNS

All planning and management efforts should proceed from the recognition that each NCA land use action affects the integrity of the Spring Mountains ecosystem, and this carries the potential to incrementally diminish biodiversity of RRCNCA.

Cumulative effects on the environment should be an evaluation criterion in all management decisions.

Exotic plants and non-native animals should be aggressively controlled due to their severe impact on both native biota and the Spring Mountains ecosystem.

Human access should be recognized as a critical biodiversity preservation factor.

To the extent possible, biodiversity preservation efforts should include ecological processes, such as wildfire.

OPPORTUNITIES

Protect and restore springs and riparian areas as sensitive habitats.

Protect rare springsnail species (*Pyrgulopsis* spp.) and their habitats at Lost Creek Spring, Willow Spring, La Madre Spring and Red Spring.

Revive the Pine Creek Natural Area designation in order to limit human access in to the North Fork Canyon biodiversity; hotspot (ie, high sensitivity and diversity area).

Protect the Bridge Mountain biodiversity hotspot.

Prevent federal listing of the RRCNCA endemic Blue Diamond cholla (*Opuntia whipplei* var. *multigeniculata*).

Protect bat Species of Concern, with particular attention to maternity roost habitat (caves & mines).

Emphasize public education efforts to promote awareness of biodiversity preservation.

Cooperatively manage the Spring Mountains ecosystem with the USFS, and with assistance from other agencies, citizens groups, academia, etc.

ISSUE 2

How should riparian areas be protected?

BACKGROUND

Riparian areas are essentially the transition zone between permanently saturated wetlands and dry uplands. Riparian areas occur adjacent to flowing rivers and streams, and also along the shores of permanent lakes and reservoirs. Permanent water must be present, but can be either surface (standing water) or subsurface (saturated soil). Riparian areas are recognizable by their plant species and associations, which differ markedly from the upland species which grow just outside the zone of permanent water. Upland plants can tolerate extended drought periods. Riparian plants need at least moist soil, and wetland species require saturation. Ephemeral streams and washes channel water only during precipitation episodes, and are not riparian areas, despite the deceptive appearance of such species as Seep willow (*Baccharis* spp.) and Rabbitbrush (*Chrysothamnus* spp.), which are greener than their upland neighbors.

RRCNCA has numerous riparian areas, owing to the unique conditions of the Spring Mountains. Elevation, topography, and geology combine to support an unusually large number of perennially and intermittently flowing springs. Literally, RRCNCA and the Spring Mountains are an oasis in the Mojave and Great Basin Desert. The physical variety of its habitats and the abundance of its waters directly explain the unique biodiversity of the Spring Mountains. Springs create a continuum of soil conditions, from wet to moist to dry, each sustaining differently adapted to their respective vegetative habitats. Consequently, springs and riparian areas are the epicenter of RRCNCA biodiversity. This includes many of the area's endemic, rare and sensitive species, some of which are exclusively adapted to riparian conditions. In fact, the known world population of a recently discovered springsnail (*Pyrgulopsis* nov. la) exists in one spring. The ecological importance of RRCNCA riparian areas is not limited to considerations of diversity and sensitivity. As with all desert waters, springs and riparian areas attract and concentrate the populations of area mammals, birds, reptiles, and amphibians.

ISSUE DESCRIPTION

In order to protect riparian habitat, appropriate management of human, burro and horse use needs to be developed for riparian vicinities.

CONCERNS

Riparian areas are RRCNCA's most ecologically critical resources, and also the most susceptible to environmental disturbance and eventual destruction.

Recreational use patterns tend to center on riparian areas. Trail braiding, vegetation loss, streambank erosion, and wildlife disruptions are on-going impacts.

Wild horses and burros cluster in riparian areas, resulting in soil churning, plant loss wildlife disruption, and springflow failures.

Most riparian areas already host the invasive exotic Salt cedar (*Tamarix ramosissima*), which not only displaces native plants, but can also lower water tables to the point of springflow failure.

Existing pipe and trough spring developments benefit wild horses/burros and humans, to the detriment of riparian biodiversity and proper ecological functioning.

OPPORTUNITIES

Minimize any developments that would attract additional visitation from humans or non-native animals.

Monitor use impacts in riparian areas of most concern.

Pursue an AML for wild horses and burros.

Implement measures to enhance rehabilitation of damaged spring locations.

Enhance visitor awareness and cooperation of riparian protection measures.

ISSUE 3

How should wild horses and burros be managed?

BACKGROUND

Wild horses and burros are non-native species in the Spring Mountains ecosystem and contribute serious impacts to the NCA environment. Numerous springs have been severely impacted by their sustained over-use, to the extent of bank erosion, soil churning, and significant springflow reductions (or failures in some cases). Since wild horses and burros habitually reside near water sources and springs, they are also causing extensive damage

to riparian plant species and vegetative communities through their grazing, trampling, soil churning, erosion, and springflow reduction effects. Many of RRCNCA's rare and sensitive plants are riparian species, meaning that biodiversity is also directly jeopardized. The indirect environmental impacts are also of consequence. Chronic soil and vegetation disturbance creates site conditions favoring invasive exotic plants, which typically outcompete and displace native plant species. Because the two most common RRCNCA exotics are both fire-prone annual grasses, the larger impact is the establishment of recurring wildfire cycles that further perpetuate the site disturbance conditions favorable to these exotic invaders. Wild horses and burros threaten not only the species diversity, but also the biodiversity represented by plant community compositions and successional patterns. Another ecosystem wide impact results from their network of trails, which increase human access into relatively undisturbed habitats.

ISSUE DESCRIPTION

Wild horses and burros can have severe impacts on riparian habitats, through both direct and indirect means. They should be managed for their aesthetic and emotional value to the public, but strictly within the constraint that they do not jeopardize the biodiversity and functionality of the Spring Mountains ecosystem.

CONCERNS

Wild horses and burro have the potential to exert significant adverse impacts to ecosystem management and biodiversity preservation.

Public sentiment and political pressure may be strong obstacles to implementing RRCNCA management policies and actions that are ecologically appropriate.

Riparian areas are the most ecologically critical RRCNCA resources, yet they are the most severely impacted by wild horses and burros.

OPPORTUNITIES

Prioritize public education campaigns focused on wild horse and burro management and concerns.

Produce quantified carrying capacity assessments for Red Rock, formalize NCA herd Appropriate Management Level (AML), and conform management actions accordingly (removals, pipeline/trough projects, animal gathers, road crossing facilities).

ISSUE 4

How Should Cultural And Paleontological Resources Be Managed?

BACKGROUND

The study of cultural resources enhances our present knowledge of plants, animals and man's interactions with his environmental and cultural habitats. Examining past cultural sites allows us the opportunity to understand the processes that have developed present ecological and cultural environments. The more intact a cultural site is, the more likely it is to yield valuable scientific and cultural information.

RRCNCA is rich with cultural resources left by Native Americans, early settlers and miners in the region. One of the two major Native American cultures represented, the Anasazi, no longer exists and their history is irreplaceable when lost. The Paiute culture remains are both prehistoric and historic and contain information regarding man's adaptation to the Mohave Desert. The historic cultural resources consist of mining, ranching and Civilian Conservation Corps thematic periods. These historic resources have a better written record, however, their surface remains can be as easily destroyed by natural and man made actions as the prehistoric cultural resources.

The increasing recreation demands and visitation at RRC has affected the integrity of many cultural resources. The majority of cultural sites are found in locations which continue to entice human visitation. The impacts are more often a result of carelessness and overuse of the sites from lack of awareness than from a conscious effort to vandalize.

ISSUE DESCRIPTION

Determine the best way to manage cultural and paleontological resources to allow for scientific study and public interest, while protecting site integrity. Recreational use in sensitive areas needs to be controlled.

CONCERNS

Uncontrolled or undermanaged visitor use results in cultural resource degradation.

Lack of public understanding results in unintentional and intentional damage to sites.

In general the public does not have a good understanding of the significance of cultural resources and the need to maintain these resources in an undisturbed condition.

OPPORTUNITIES

Develop a program for interpretation and public education designed to promote an understanding and appreciation for the cultures of this areas historic and prehistoric past.

Determine the best way to allow for public visitation of actual cultural sites with minimum impact to the resources.

Manage other recreational use in a manor that avoids disruption of sensitive cultural sites.

Inclusion of Native American input in management of cultural sites enhances knowledge and site protection.

ISSUE 5

What opportunity settings (Management Emphasis Areas) should be offered to visitors?

BACKGROUND

During the scoping process, it was determined that in order for this plan to have any longevity, it needs to be developed in a manner that considers the possibility of additional actions or modified management techniques in the future. The tool devised to allow for this flexibility is the "Management Emphasis Area" (MEA) concept. It is fashioned after the "Recreation Opportunity Spectrum", a system developed by the U.S. Forest Service.

The MEAs are a collection of five settings, which offer a range of activity level and development to occur. Each setting is defined by a selection of characteristics which include access, remoteness, naturalness, number of social encounters, and the degree of site management and facilities available. The settings range from having an abundance of each of the above characteristics, on one end of the spectrum, to having little or none on the other. Once the settings are assigned to areas within RRCNCA, only actions and developments that are consistent with the assigned characteristics will be allowed in any setting.

Use of MEAs will make it possible for future actions to be incorporated into RRCNCA if they are consistent with the defined settings. This also eliminates the inclusion of future actions not consistent with NCA values.

ISSUE DESCRIPTION

RRCNCA needs to offer a range of opportunity settings for recreation experiences that are consistent with biodiversity objectives.

CONCERNS

With the rapid rate of growth and change in the vicinity, the GMP could become outdated in only a few years.

ISSUE 6

What recreation opportunities should be offered to visitors and how should they be managed?

BACKGROUND

The governing document for Red Rock Canyon, prior to the Interim General Management Plan, was the Clark County Management Framework Plan (MFP), which was approved in January of 1984. The MFP gives direction on the management of BLM lands that are within Clark County, including RRC. The direction put forth, concerning RRC, was that it should be managed primarily as a recreational resource with other planning policy being subordinate to the recreation plan. This was actually done to allow for public appreciation of the outstanding resources RRC offers and with the intent of protecting the resources from other more potentially impacting uses.

In November of 1990, stronger measures were taken to protect the natural resources, with the passage of the Red Rock Canyon National Conservation Area Establishment Act. The Act withdraws RRC from certain high impacting activities and focuses on management more in harmony with the resources. Thus, recreation opportunities provided should focus on appreciating the existing natural resources. Activities not necessarily dependent on RRCNCA resources should be considered for other more appropriate locations.

ISSUE DESCRIPTION

Recreation opportunities need to be developed and managed in a manner that will allow the public to enjoy the natural environment of RRCNCA. These opportunities need to be compatible with the natural resources, so that future generations have the same chance to appreciate RRCNCA.

CONCERNS

Uncontrolled or undermanaged activities could result in resource damage.

There are an abundance of recreational activities that could take place in RRCNCA, but those that do, should relate to the resources of the NCA; they should not occur in RRCNCA just because it is a convenient location.

There are several recreational uses that are appropriate activities in RRCNCA, but as participation increases they may approach levels that RRCNCA can no longer accommodate.

OPPORTUNITY

Merge the management planning of recreation and biodiversity to assure both are properly administered.

ISSUE 7

How should road and trail systems be managed to provide for hiking, bicycling, horse riding, motor vehicle use, and other possible uses, while protecting the environment?

BACKGROUND

There is quite a diversity of roads and trails throughout RRCNCA. Paved roads are limited to the Scenic Drive and four State Routes dispersed throughout the lower elevations of the NCA. Dirt roads are numerous and range from bladed roads, allowing easy two-wheel drive access, to fairly obscure 2-track routes pioneered throughout more remote areas of the NCA. There are no off-road opportunities for any motor vehicles in the NCA. All motor vehicles are limited to designated roads. The roads and trails have been inventoried in the core NCA, and the IGMP set direction as to which would be officially designated and which would be closed. Most of the hiking, equestrian, and mountain biking trails planned in the IGMP have been developed, although many need formal designation on the ground and comprehensive trail maps to alleviate visitor confusion. Although most of the trail system is in place, some trails need to be revisited to determine designation of appropriate user groups.

ISSUE DESCRIPTION

Opportunities need to be provided for hiking, horse riding, bicycling and motor vehicle driving. The first priority in providing these opportunities must be the welfare of the natural environment.

CONCERNS

Trail and road systems need to be in coordination with SMNRA, Summerlin and Clark County.

Trail location and construction needs to be done in a manner that will eliminate existing braiding and discourage braiding in the future.

ISSUE 8

In addition to the selected campground location, what camping opportunities and facilities should be provided?

BACKGROUND

Since the early 1980s, camping in Red Rock has been restricted (with minimal enforcement) to the Oak Creek Campground, the Black Velvet campsite and areas above 5,000 feet elevation. The impacts of camping have become a larger issue since the interest in and reputation of Red Rock's year-round climbing opportunities became more well known in the last ten years. Red Rock also became a convenient location for long-term transients who either were working in the area temporarily or homeless.

The issue involving a formal designated campground was resolved with the completion of the IGMP. The 13 Mile Campground has reached the stage of development where it is ready to open for public use, although there is still additional development to be completed. Other areas used as permanent or temporary campgrounds are now closed or will be in the near future.

With the passage of Public Law 103-450, the Red Rock Canyon National Conservation Area Boundary Expansion, two large tracts of land, equaling the total acreage of the original NCA, were added. They include the area north of La Madre Mountain, taking in Kyle and Lee Canyons, and an area to the south of the original NCA, taking in the Bird Springs Range. These areas have been fairly liberal in regards to camping, with the main regulation being a 14 day stay limit at any particular location. There was no analysis done for these areas during the planning process leading to the IGMP, but they are now part of the NCA and a higher level of regard is now placed on resource impacts.

ISSUE DESCRIPTION

Prior to inclusion into RRCNCA in 1994, the expansion lands were managed under the general 14 day camping limit for BLM lands. As additions to the NCA, what camping policies are now appropriate?

CONCERNS

Campers are naturally drawn to areas which cannot absorb continuous human impacts, such as riparian zones.

Restrictions in the core area could result in increased use in the expansion lands, causing unacceptable impacts.

OPPORTUNITIES

Direct camping to areas which can absorb the additional use without environmental harm.

Protect natural resources, especially riparian areas, with appropriate restrictions on camping.

Demonstrate that protective designations are multiple use in intent and do not necessarily mean increased use restrictions.

ISSUE 9

How should technical rock climbing be managed?

BACKGROUND

Although technical rock climbing has been around for quite some time in one form or another (such as mountaineering), it has increased dramatically in recent years. Several types of climbing take place in RRCNCA including bouldering, sport climbing, traditional climbing and big wall climbing. In fact, RRC climbing has become so popular that it is considered to be among the top five climbing areas in the United States and attracts climbers from all over the world.

Along with the increase in popularity and use, come the associated impacts of that use on the natural resources as well as other user groups. Related concerns include braiding of approach trails, various impacts to rock surfaces, potential impacts to rock art sites, visual intrusion of hardware, slings and brightly clad bodies on rock surfaces, effects on wildlife, and impacts to vegetation. Also of concern is the availability of campsites and parking spots for other visitors when the climbing season is in full swing during the spring and fall months.

One of the more difficult aspects of the climbing issue, to resolve, is the use of permanent anchors (bolting) in wilderness and wilderness study areas. The appropriateness of bolting in wilderness has been and is still being considered at all management levels of several federal agencies. At present, no final determination has been made, and it is up to local management to determine what is appropriate for their particular resource area.

To keep up with the challenge of climbing management, the BLM has worked with the climbing community, including the Access Fund, climbing permittees, local climbing businesses and casual climbing enthusiasts. In general, they have proven to be a very favorable community to work with. Climbing policy is now

included in the Interim General Management Plan (IGMP), but some of those policies will likely change as the Final GMP is developed.

ISSUE DESCRIPTION

With the steadily increasing interest in rock climbing, there is a need to manage the activity in a manner that is compatible with the natural resources and the other visiting publics.

CONCERNS

Because of the popularity of climbing in RRCNCA, other interests are often excluded from camping opportunities and parking at overlooks.

During the spring and fall, when the peak climbing season occurs, Oak Creek campground is normally filled to capacity with climbing enthusiasts. Other groups or individuals looking for camping opportunities are forced to look for other options. The parking areas along the Calico Hills, including Calico I, Calico II and Sandstone Quarry, are also filled to capacity by climbers parking to climb for the day. This excludes the visitors touring the scenery of the Calico Hills from stopping along their tour.

OPPORTUNITIES

Opportunity to improve existing climbing policy as developed in the IGMP.

Enhance raptor management with the cooperative efforts of the BLM and the climbing community.

ISSUE 10

To what extent should shooting be allowed in RRCNCA? (Shooting refers to target practice or random fire arm discharge. It does not refer to legal hunting practices, which are allowed in portions of the NCA in accordance with State regulations.)

BACKGROUND

At present, the only shooting allowed within RRCNCA is at the Desert Sportsman's shooting range. In fact it is illegal to have a loaded firearm in the NCA, except in designated hunting areas during open season.

Although shooting is not allowed, there has been a significant amount occurring throughout roaded portions of RRCNCA. Problems resulting include large collections of refuse and broken bottles

used as targets, vandalism of signs and property attributed to some of the more profound aficionados of the shooting community, and altercations between shooters and trail users. There is a portion of the shooting community that has demonstrated a lack of formal education in the use of firearms, placing other visitors to the area in a potentially hazardous situation.

A question surfaced during the plan scoping process as to whether shooting is an appropriate activity within RRCNCA. The activity does not derive any appreciable value from what the NCA resources have to offer. It could occur equally as well in many places outside of Red Rock Canyon.

ISSUE DESCRIPTION

First it is necessary to determine if shooting is an appropriate activity for RRCNCA. If it is deemed appropriate, where would it be allowed to take place and how should it be managed?

In Clark County, all BLM lands are available for recreational target shooting with the exception of those lands within RRCNCA, the Las Vegas Valley, Sunrise Mountain, Nellis Dunes and Apex areas, which are closed to shooting by Clark County ordinance and BLM regulation.

CONCERNS

With the amount of visitor use RRCNCA receives, any unregulated shooting is a safety concern.

Areas within RRCNCA, where target shooting has been taking place, have become trashed with broken glass, kitchen appliances, and other items used as targets.

OPPORTUNITIES

Designation of a safe, suitable shooting area.

If an area meeting safety and other needs were set aside, it could reduce the amount of illegal and unsafe shooting occurring in other locations within RRCNCA and within the Las Vegas Valley in general.

Do not allow shooting inside the RRCNCA boundaries.

ISSUE 11

To what extent should commercial pursuits be allowed?

BACKGROUND

In the past, commercial permits were issued to anyone who applied, as long as they met the necessary criteria and it was determined that the impacts from the proposed activity would be within acceptable limits. With the growth of the local population and the increasing interest in various activities, such as climbing and mountain biking, visitor use and pressure on the natural resources of RRCNCA have increased dramatically. In 1991, the NCA Manager placed a moratorium on the number of commercial climbing permits that could operate at any one time, until further analysis could be done and general management of the activity could be determined. Since that time, there have been at least 20 additional inquiries for commercial climbing permits, from all over the country. The IGMP also set a limit on the number of guided horse ride permits and set up zones to disperse the use throughout the NCA. Requests from these operators usually include a network of trails that have not been previously planned, an area to set up their base camp, signs and other facilities desired to enhance their operations.

In recent years there have been permit requests for a variety of commercial operations; some are quite innovative. Besides those activities mentioned above, the list includes jeep tours, guided hiking tours, night hikes with night vision goggles, guided mountain bike tours, guided running tours and tours guided from a cassette tape to be played in the vehicle of the touring party. Applications which have not received consideration include vendors and operations that are not consistent with what the natural resources offer.

ISSUE DESCRIPTION

With the rapid growth of the population in the local vicinity and the increasing interest for commercial ventures in Red Rock Canyon, there is a need to determine appropriate allowable levels for the various commercial operations to ensure the avoidance of unacceptable resource impacts.

CONCERNS

Issuing too many commercial permits for activities, even though those activities are appropriate uses in RRCNCA, will result in unacceptable impacts to the resources.

Permits may be issued for commercial activities that are not really appropriate for operation within RRCNCA.

OPPORTUNITIES

Set maximum limits for the number of permits issued for various

commercial activities.

Determine which commercial operations are and which are not acceptable within RRCNCA.

ISSUE 12

How do we properly recognize and provide for Native American concerns?

BACKGROUND

Federal agencies have a special obligation to include the Native American community in the planning processes used to determine how Federal lands will be managed. This is supported by the passage of special laws addressing Native American rights and the granting of sovereign status to Indian tribes.

The purpose of consultation with the Native American community is to identify cultural values, religious beliefs, traditional practices, and the legal rights of Native American people which could be affected by BLM actions on Federal lands.

Cultural resources can usually be identified by archaeologists and mitigation can be determined to avoid physical impacts. The spiritual value is the more challenging aspect to consider in the planning process. The spiritual aspect, in this instance, includes the entire Spring Mountain vicinity and beyond. The concept of dividing the Spring Mountains into areas of greater and lesser spiritual value is not valid. It is necessary to have input from the local Native American communities to arrive at mutually acceptable management of the area.

ISSUE DESCRIPTION

Red Rock Canyon is a focal point of local Native American spiritual beliefs. It is important to give strong consideration to these values throughout the planning process.

CONCERNS

Without adequate input from the Native American community, a lack of understanding of spiritual values would result in inappropriate management direction for the NCA.

OPPORTUNITIES

Opportunity to work with the Native American community to develop the most mutually agreeable management for this issue.

Develop a management direction consistent with the policy

developed by the U.S. Forest Service.

The Forest Service manages the Spring Mountain National Recreation Area (SMNRA), which runs adjacent to the west boundary of RRCNCA. Together, they comprise an area central to the spiritual beliefs of the local Native American community. The Forest Service completed the management plan for the SMNRA and worked closely with local tribes to reach mutual agreement on management policy affecting Native American values. Because the two areas are not separate in regards to this issue, management policy should be consistent throughout.

PLANNING PROCESS AND SELECTION OF PROPOSED ACTION

The planning process for the GMP is unique in that the process will have been completed two times before the plan is done. The initial process began in January of 1992 and ended in June of 1995 with the completion of the Interim General Management Plan (IGMP), which is intended to serve as the GMP for the National Conservation Area (NCA) until a final plan has been completed. Normally the process would have ended with the final plan at that time, but after a Proposed GMP/EA was printed and distributed for public review, congressional legislation was passed in November of 1994, which more than doubled the total acreage of the NCA. For this reason, along with concerns involving the level of analysis, it was decided to revisit the planning process and complete an Environmental Impact Statement as opposed to an Environmental Assessment. Although the entire planning process is being revisited, the information gathered in the first planning process is still relevant and will be utilized.

The planning process was re-initiated in September of 1995 with public scoping meetings held at the BLM District Office. The intent of scoping meetings is to discuss the project proposal and guiding direction, in this case the goals and objectives outlined in the NCA legislation, and gather concerns and comments to be considered in the planning process. Comments are also accepted via mail in response to letters sent out to interested parties on project mailing lists. All of the input gathered is reviewed, analyzed and condensed to derive the key issues, which orient the planning process to concentrate on the most significant concerns and conflicts to be resolved.

A valuable and positive aspect of this planning effort has been active public involvement throughout the planning process. A team of individuals representing the various environmental and recreational interests throughout the local community, along with representatives from commercial interests, the Native American community and other agencies, has been meeting with the BLM interdisciplinary team on a regular basis to continually review and assist in plan development (see Chapter 5 - Coordination and Consultation).

After the list of key issues is developed, the Analysis of the Management Situation (AMS) is completed. Drawn from inventories, studies, existing records and other sources, the AMS provides essential information and understanding about resource conditions and uses, management activities, and natural relationships to support subsequent actions. The AMS is a support document and is not actually part of the Plan/EIS document.

The list of issues, the AMS, and the planning criteria are used to formulate a range of plan alternatives. Planning criteria are

based on laws, regulations, agency direction, input from other agencies, and analysis of available data and information (see Planning Criteria in Plan portion of this document). Plan alternatives offer a range of possibilities to provide for multiple-use management while addressing the issues derived from scoping. One alternative must be a "no action" alternative, which would propose the continuation of the present management scenario.

Once the alternatives have been designed, each alternative must be analyzed to deduce what affects implementing the proposed actions would have on the existing environment. The implementation of the proposed actions may result in positive or negative impacts. The alternatives can then be compared as to how well goals and objectives are met, issue resolution, and the environmental consequences of implementing the proposed actions. After reviewing the comparison of alternatives, the lead agency selects a preferred alternative, which they feel best meets the comparison criteria.

All of the information and proposal development derived from the planning process is assimilated into a Draft Plan/EIS and is distributed for review by the agencies, organizations, and general public concerned. Public meetings are again held to allow feedback, concerns and alternative preference. The comments collected at the meetings and those expressed in written commentary during the review period are studied and adjustments are made to the Draft Plan to develop the actual proposed Plan. Final approval of the Plan is made by the Nevada State Director.

Once the Plan is in place, it is continually monitored and evaluated to determine progress toward established goals and objectives. This also serves to determine impact levels from management actions and whether mitigation measures are satisfactory. Through proper monitoring and evaluation, the useful life of a plan may be extended.

In summary, the planning process follows a progression of phases involving the following nine elements.

1. Identification of Issues
2. Development of Planning Criteria
3. Inventory Data and Information Collection
4. Analysis of the Management Situation
5. Formulation of Alternatives
6. Estimation of the Effects of Alternatives
7. Selection of Preferred Alternative
8. Selection of the Resource Management Plan
9. Monitoring and Evaluation

ALTERNATIVES SELECTED FOR ANALYSIS

An important aspect of the planning process for all major actions is to create a range of alternatives from which to select the preferred plan to govern the proposed action. Each alternative should be based on the project goals and objectives, the list of developed issues, and the affects that implementing the actions proposed will have on the natural environment. Although each alternative considers these criteria, they will differ in that the focus of each leans more toward certain aspects that need to be considered and less on others. In all circumstances, one of the alternatives proposed must be a "no action" alternative, under which no changes to the current management regime would occur.

A range including four alternatives has been developed for the RRCNCA General Management Plan. The gist of each is described in the following paragraphs.

PREFERRED ALTERNATIVE

This alternative emphasizes biodiversity enhancement. Included are specific actions designed to enhance riparian restoration, biological preservation, and ecosystem health. Recreational access and proposed facilities are concentrated within the developed Scenic Drive area. The miles of dirt roads remaining open, while still substantial, is reduced to a minimum and limited recreation enhancements and developments are proposed.

ALTERNATIVE 1

This alternative focuses more on facilities development and associated recreation opportunities. Access would be more readily available with a more extensive trail system and fewer dirt roads being closed. Biodiversity enhancement would be less encompassing than in other alternatives with fewer specific enhancement actions being proposed.

ALTERNATIVE 2

This is the "No Action" alternative, meaning that the NCA would continue to be managed under the existing situation. Presently, the governing document for the NCA is the Interim General Management Plan (IGMP). The original intent of the IGMP was to administer the NCA until the completion of a final plan. The planning analysis for the IGMP did not include the expanded portions of the NCA since the expansion occurred after analysis had been completed.

ALTERNATIVE 3

Alternative 3 features a full array of actions promoting biodiversity, with some reduction to dirt road access and moderate enhancement of the trails network.

ALTERNATIVE 4

This alternative favors biodiversity, providing a greater number of actions promoting riparian restoration, biological preservation, and ecosystem management. The dirt road network is reduced to a minimum and the fewest recreation enhancements are proposed.

Although the focus of the individual alternatives varies, there are also actions that are favored regardless of the alternative selected. These actions are part of each alternative and are included under the heading of Management Common To All Alternatives. Each alternative must also abide by the Standard Operating Procedures, which are based on laws, regulations and policy.

ALTERNATIVE ACTIONS CONSIDERED BUT NOT CARRIED FORWARD

ROAD CONSTRUCTION PROJECTS

2-Way Road between Scenic Drive Exit & N Oak Creek Road

The intent of the 2-way section of road was to simplify access to some of the escarpment canyons and trails toward the end of the Scenic Drive. Due to the implementation of the entrance fee at the entrance of the Scenic Drive, this action is now moot and is no longer being considered.

Shuttle Frontage Road

The frontage road, paralleling State Route 159 between the entrance and exit of the Scenic Drive, was not a particularly popular proposal. The intent of the proposal was to allow shuttle operations, without conflicting with highway traffic. This proposal has been dropped, although the possibility of a shuttle system being implemented at some future date remains an option for consideration.

TRAILS

Escarpment Crest Trail

This trail was proposed as optional, to be implemented only if necessary to mitigate damage to the resources from overuse and/or trailbraiding. It will not be included in any of the alternatives, although it could be considered at some future time if the above mentioned impacts become evident.

Base of the Escarpment Trail South of First Creek

The original proposal was to consider a trail all along the base of the escarpment from Lost Creek to State Route 160. The decision in the IGMP was to include the trail from First Creek north to Lost Creek and defer south of First Creek. The concern being that the canyons south of First Creek are in a more pristine state than those to the north, and additional analysis was needed to determine potential impacts. The canyons north of First Creek are already provided with direct access, so the additional trail would not increase the visits into the canyons significantly and may even reduce it due to the additional hiking options provided.

The escarpment trail north of First Creek is again considered in this document, although most of the

construction has already been completed. The gist of the consideration is to decide what uses are appropriate for different sections of the trail. After further review of the proposed escarpment trail south of First Creek, there has not been enough support for the proposal to justify further consideration.

DRILLING OF WELLS

Red Rock Herd Management Area south of State Route 160

A proposal was made that wells should be drilled in the area south of State Route 160 to supplement the limited amount of water available in this area for wild horses. Bird and Tunnel Springs have limited flows and Tunnel is dry periodically. This proposal was not carried forward because the artificial modification or creation of habitat, or more favorable habitat conditions, within the NCA, for the benefit of a single species, not identified as threatened, endangered, State sensitive or at risk, does not appear to meet the direction for managing the NCA included in the Act. If supplemental water sources and wells are required, they should be developed outside the NCA in the southern end of the HMA.

CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

The alternatives developed within this planning process offer a range of actions combining differing strategies for the management of natural resources and human uses. A different composition of actions and management strategies is proposed under each. However, some actions and management strategies were evaluated as being appropriate to include in every alternative. Rather than list these items repetitively under each alternative description, they are included below under "Management Common to All Alternatives". The alternatives descriptions following will focus on actions and management strategies that differ between the alternatives.

The Bureau's Proposed Action is described in Alternative *.

MANAGEMENT COMMON TO ALL ALTERNATIVES

The objectives, goals and actions listed below would be implemented under all alternatives.

Biodiversity - includes the issues concerning biodiversity, ecosystem management, and wild horses & burros

Biodiversity Preservation:

Continue to conduct raptor nesting surveys, with emphasis on monitoring areas where Peregrine falcon may be nesting to, confirm actual nesting status. If confirmed, monitor and evaluate recreation activity occurring and determine restrictions needed, if any. (App. 1, Part A.)

Ensure full compliance of the Blue Diamond Cholla Conservation Agreement; discourage recreational use of Blue Diamond Hill; inventory adjacent areas for potential additional occupied habitat. (App. 2)

Install a bat gate at Wounded Knee Cave (Townsend's Big-eared bat maternity colony; *Myotis* spp.). (App. 6, Species List, Bats)

Remove/rehabilitate unauthorized trails within Pine Creek WSA.

Monitor cumulative recreation use impact on Bridge Mountain (biodiversity hotspot; global population of *Ionactis caelestris*). (App. 2, Priority Management Areas)

Re-emphasize conservation management for the North Fork Pine Creek Canyon Natural Area (biodiversity hotspot) with emphasis on:

- Sensitive species, including Spring Range endemics (*Astragalus remotus*; *Angelica scabrida*)

- 9 species of fern or fern allies, including Polystichum scopulinum (rare in Nevada)
- 2 spikemosses, both rare in NV (Spring Range only) - Selaginella leucobryoides; S. utahensis (only RRCNCA population)

Implement management actions to preserve and ensure habitat suitability for native wildlife species; minimize habitat fragmentation from roads; work as a partner in implementing the Clark County Multi Species Habitat Conservation Plan. (App. 1, Part C., Special Status Species)

Ecosystem Management:

Implement strategies to minimize type conversion fires stemming from invasive exotic annual grasses.

Implement aggressive fire suppression policy for all fires in low elevation communities (Blackbrush).

Establish "Limits of Acceptable Change" and monitor dispersed recreational use impacts focused on, but not limited to, riparian areas and other high density visitor use locales.

Visitor Education/Environmental Awareness:

Modify existing brochures/visitor information services to discourage recreational use in biologically sensitive areas (North Fork Pine Creek Canyon; Bridge Mountain; La Madre Spring).

Devise signing/visitor outreach program to publicize Red Rock's significant biological quality and value:

- Landscape ecosystem integrity, high biodiversity, endemism (rarity of both species and communities);
- Threats to biological and ecosystem integrity.

Recreation/Trails/Access Issues:

Reroute existing Bridge Mountain trail to remedy erosion problems and avoid key biodiversity hotspots on Bridge Mountain.

Riparian, Air and Vegetative Resources - includes issues associated with riparian restoration, air quality and vegetation.

Riparian Restoration:

Eradicate non-native species with emphasis on tamarisk removal. (App. 15, Part A., Disturbed Habitat Areas)

Ensure proper functioning condition of riparian areas. Restore surface flow for riparian vegetation where they have been decreased or eliminated by diversion or impoundment. (App 10, Inventory of Springs)

Restore spring brook flows and riparian areas in Red Spring and Willow Spring to ensure adequate habitat for springsnails (pyrgulopsis deaconi and P. turbatrix). Maintain protective fencing around key habitat areas, springs and riparian areas as needed.

Implement protective measures at degraded spring sites sufficient to allow natural revegetation to occur (Shovel; Mud #1; Lone Willow; Schumacher). Utilize fencing only as a last resort. Remove fencing if factors causing degradation are mitigated.

Design all future trails to minimize impacts to riparian areas.

Riparian water resources would be protected from wild horse, burro and human impacts. Fences, if required, would be designed to meet wildlife needs and adequate water would be made available outside the fenced water source for wild horses, burros and equestrian use. Most wild horse and burro trails lead to water which creates natural routes for recreationists into these sensitive areas. A complete review of the trail system would be undertaken to reroute existing human use trails away from waters and determine which trails can be mitigated and remain in the Herd Management Area.

Maintenance or reconstruction of historic projects or development would be completed to assure dependable water availability for wild horses and burros, riparian resources, wildlife and equestrian horse use. Water developments which divert 100% of available waters would be evaluated to determine the feasibility of reconstruction to reduce the amount diverted and restore natural riparian systems.

The actual range improvement implementation schedule, determination of Appropriate Management Levels (number of wild horses and/or burros), and project specifications would be addressed in a Herd Management Plan (HMP). The HMP is an activity level plan that tiers off this plan and the Las Vegas Resource Management Plan and is consistent with the management decisions of these plans.

For proposed maintenance, reconstruction or construction of water projects, the following stipulations would be required:

1. The Interim Management Policy For Lands Under Wilderness Review (IMP) procedures and guidance would be followed (or the Wilderness Management Act or Plan if Congress has designated any of the lands as wilderness).
2. Projects would comply with the visual resource management

class(es) for the project site.

3. Diversion structures (headbox) shall be located below the spring source and/or existing/rehabilitated riparian area to ensure that adequate waters are provided for riparian purposes, to maintain springbrooks where they exist and to limit disturbance within riparian areas. In most existing improvements all waters are captured at a headbox located at the spring source (Mud Spring #1, White Rock Spring, Willow Spring, Bird Spring, Wilson Tank/Tunnel Spring). If further development takes place at these locations, the headbox would need to be relocated to allow an adequate riparian area to be protected and meet proper functioning condition objectives. All pipelines would be equipped with a float or flow control device designed to limit water diversion to the amount required to keep the drinking trough full of water.
4. No more than 25% of available waters may be diverted. This continues the allocation decision made in the (Interim) General Management Plan for RRCNCA in 1995.
5. No development of minor seeps or wet spots which produce no measurable water flow would be allowed.

Wild horses and burros in the Wheeler Pass HMA would be managed in accordance with the Interagency Agreement between BLM and USFS, the Toiyabe National Forest Plan, Spring Mt. National Recreation Area Amendment, and the Las Vegas Resource Management Plan. The Forest Service has the lead for wild horse and burro management in this HMA. The Forest Plan decision was to remove all animals in the Kyle, Deer Creek (Lucky Strike) and Lee Canyon drainages and manage for 26 horses in the Cold Creek area. That decision would be adopted and implemented cooperatively with the Forest Service. A future BLM Herd Management Plan may have a different allocation of wild horses and/or burros (AML) on BLM lands in the HMA.

Air Quality:

Pave, or treat with soil stabilizers, all high use dirt roads and parking areas to reduce creation of suspended particulate matter (PM 10) in conformance with local government's efforts to improve air quality within the Las Vegas Valley Non-attainment Area. Primary focus will be on areas around the Scenic Drive, the campground and the Red Spring Picnic Area.

Vegetation:

Continue to inventory NCA lands to more accurately determine the location and population density of plants listed as threatened, endangered or sensitive by Federal or State agencies. (App. 1, Special Status Species)

Maintain or improve the condition of vegetation to a potential natural community or desired community. Desired community will be determined for those sites with limited potential for improvement.

Maintain a canopy cover of 20% (minimum), a basal cover of 5% (minimum) perennial native grass species, and manage for perennial native grass species composition (by dry weight) of 5-10%, as limited by potential natural community, an established desired plant community or site improvement potential.

Restore plant productivity on disturbed areas.

Rehabilitate, reclaim or revegetate, with native species, areas subjected to surface disturbing activities and closed roads, where feasible.

State of Nevada Water Rights

Prior to the development of any water project, where there is a State water right the State of Nevada will be consulted for their review and concurrence in compliance with the Memorandum of Understanding between BLM and the State covering waters in the NCA (Jan. 12, 1981 as amended April 4, 1997). This includes the following springs - Red Spring, White Rock Spring, Lone Grapevine spring, and Mud Spring # 1.

Recreation Opportunities - includes the issues concerning camping, rock climbing, target shooting, trails and roads

Camping:

Expand the public education program of "Leave No Trace" recreation ethics and land stewardship.

Complete the Mile 13 Campground.

This will be the only campground designated in the NCA, with approximately 100 individual/family sites and 10 group sites.

After completion of the Mile 13 Campground:

- close Oak Creek Campground;
- continue closure of the Black Velvet area to camping;
- close 10-mile Canyon to camping usage;
- discontinue use of the "Spanish Trail" overflow camp area across from the James-Hardie Gypsum Plant.

Camping along Rocky Gap Road or on the Escarpment will be

authorized by permit only.

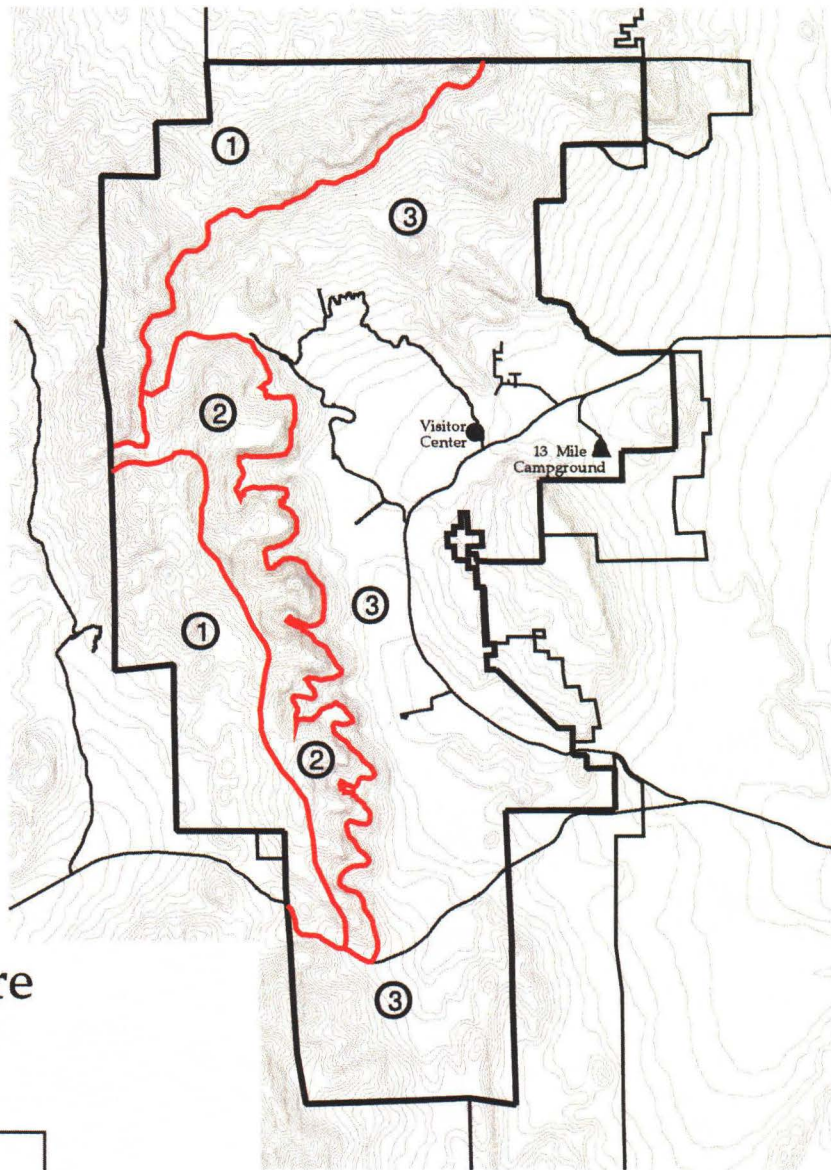
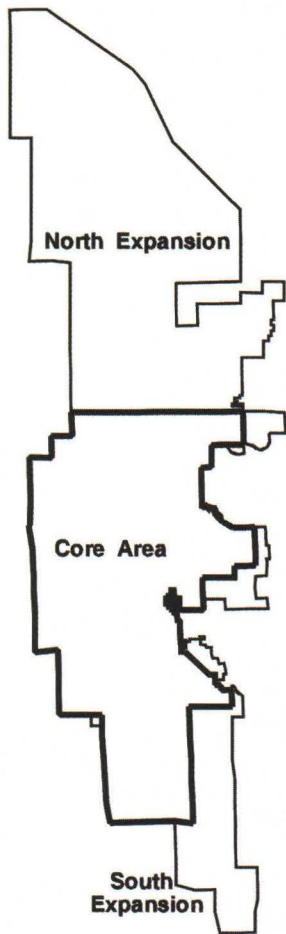
From La Madre Mountain to the Forest Service/BLM boundary, 3 miles south of SR 160, camping will be managed as follows: (see following "Camping" map)

- camping northwest of the 6,500 ft elevation contour on La Madre Mountain does not require a permit;
- camping west of the Spring Mountains ridge-line does not require a permit;
- within the Pine Creek WSA, camping between the Spring Mountains ridge-line and eastward to the canyon floor (4,400 ft. contour) requires a BLM camping permit;
- no other camping is allowed in this area except in the designated campground, unless specifically agreed upon in writing by an authorized BLM representative.

Hunting:

The center or "core" area of the NCA would remain closed to the use of firearms, and therefore hunting, as a result of public safety concerns due to the intensity of recreation activity in this area. This core area can best be described as the area bounded by State Route 160 on the south, La Madre Mt./Little Red Rock on the north, Summerlin on the east and the sandstone cliffs on the west. An exception to the closure is specific sections in the Brownstone Canyon area that are open to bighorn sheep hunting as allowed by the State of Nevada.

All other areas in the NCA would be open or closed to hunting under the regulations and seasons set by the State of Nevada. The closure of the Cottonwood Valley trails south of State Route 160 for the week before and the first two weekends of upland game bird season in October would continue.



Camping in Core RRCNCA

This map does not refer to the NCA expansion areas which are covered in the alternatives.

The boundary along La Madre Mountain follows a contour of 6500 ft.

The boundary along the base of the escarpment follows a contour of 4400 ft, which basically separates the escarpment and the canyon floor.

The boundary following the Spring Mountain Range along the top of the escarpment follows the crest of the range.

Overnight parking along the Scenic Drive requires a permit regardless of camping location.

Any camping within 1/4 mile of the Rocky Gap Road requires a permit.



- ① OPEN - NO PERMIT NEEDED
- ② PERMIT ONLY
- ③ CLOSED TO CAMPING

Rock Climbing:

Liaison Council

Manage rock climbing in partnership with the climbing "Liaison Council" (LC) composed of representatives from the local community, permittees and/or sports shop interested in representing the climbing community in information exchange and issue resolution with the NCA staff.

Coordination efforts between the LC and the BLM would include:

- proposals for bolt replacement on wilderness climbing routes;
- working together to organize resource protection projects, such as designated approach routes to avoid trail braiding, or removing chalk, ropes and slings from climbing surfaces;
- joint efforts to inform non-local climbers of NCA policies and regulations and keep local climbers updated on any new and relevant information;
- maintaining communications, keeping each other up to date on pertinent information and constituent concerns;
- Possible changes to climbing management in the NCA in the future.

Climbing Restrictions

The climbing restrictions listed below are identical to those adopted in the 1995 "Interim" GMP. No changes have been made.

The BLM is engaged in long-term monitoring of various RRCNCA plants and animals. If raptor nest sites are found, climbing restrictions may be imposed during critical nesting periods. Should any T&E species become an issue, appropriate mitigation actions will be taken.

Alteration of the rock surfaces by gluing, chipping or chiseling, is not allowed.

Cultural resources restrictions include the following:

- no climbing allowed within 50 feet of rock art.
- known cultural sites, such as in Sandstone, Willow Spring and Red Spring, will be signed to alert climbers about restrictions.

No permanent fixed ropes or cables for climbing or belaying purposes would be allowed.

Bolting is not allowed in the following locations:

- Sandstone Quarry area within 1/4 mile from each side of the parking area

The Sandstone Quarry area has an abundance of cultural resources and is considered a historic area because of the quarry and related artifacts. To avoid detracting from the visual experience of scenic viewers and because of the abundance of cultural resources, no new bolting will take place in the vicinity as stated above.

- Within the Wilderness Study Areas (WSAs)

The placement of new bolts will not be allowed in WSAs (or in future designated wilderness). The Pine Creek and La Madre Mt. WSAs are recommended for Wilderness designation. Should the (eventual) Congressionally designated boundaries be different from those proposed, NCA policy and management will adjust accordingly.

- Replacement of existing bolts in the afore mentioned locations should be presented to the Liaison Council for review.

BLM strongly encourages the use of the following equipment:

- the "Bison Ball", "X-Factor" or the like, as opposed to an open chalk bag;
- tinted bolts and hangers which blend with the rock face;
- drab colored web gear, when used for a rappel anchor.

Commercial Climbing

The following policies are designed to provide adequate access to commercial services for visitors while avoid overcrowding and maintaining continued access for commercial outfitters and guides.

1. The number of commercial (outfitter and guide) rock climbing permits, authorizing full time year-round use, will be limited to no more than six at any one time. In addition, ten "guest permits" will be available to allow limited use to commercial operations who wish to offer Red Rock Canyon as an option to clients. The guest permits will be limited to two visits, of up to five days per visit, in a calendar year (one ten day visit is permissible). There is no guaranteed renewal of guest permits. If the situation arises where there is more interest than permits available, some form of lottery may be implemented. (This continues the current situation.)
2. In order to ensure adequate access to commercial outfitter and

guide services, a minimum use standard would be implemented. Regular full time permits not utilizing a minimum of 100 visitor days per year for two consecutive calendar years would be canceled. This standard would be implemented the first full year following completion of this plan so the standard would have to be met in the years 2000 and 2001 for a permit to remain active. (for additional permit information, see section on "permits" in this document)

3. Commercial group size in any one area is limited to 10 students plus instructors. (Current situation)
4. No more than two different commercial groups may use the Sandstone area, the Gallery, Kraft Rock, Calico I, Willow Spring/Lost Creek or Pine Creek at any one time. The two groups may not be operating under the same permit. (Current situation)
5. Full time permittees must provide a list of guides working for their guide service and will assume full responsibility for the actions of all guides listed.
6. There is no subcontracting of climbing permits. Any climbing service working with Red Rock Canyon permittees must do so as clients and must be accompanied by a guide representing the permitted service while operating in the Red Rock Canyon National Conservation Area.

Scenic Drive Access

Early Access Permits - Early access to the Scenic Drive may be attained by registering a day ahead with the Visitor Center. The desired climbing route must be one that justifies the additional time. No more than two parties will be granted early access for any one day. (This continues current management direction.)

Late Exit and Overnight Parking Permits - Parking on the Scenic Drive at Willow Spring, Ice Box, Pine Creek, Oak Creek or other designated sites, after closing hours, may be authorized by an after hours permit, which can be obtained at the Visitor Center. To avoid waiting for the Visitor Center to open, permits should be filled out prior to the day of the climb. Late Exit permits are only issued for long one-day climbs where even with an early morning start, it is likely that return to the trailhead will occur after the Scenic Drive's posted closing hours. Late Exit permits will not be issued to climbing parties who simply begin their trip late in the day. Overnight permits will only be issued for certain routes that have been determined to be multi-day climbs requiring an on-wall bivouac. (This continues current management direction.)

Camping at the base of the escarpment would not be allowed. The

intention of "bivouac" is an overnight stay on the rock wall, above the base, on a multi-day climb. (Current policy.)

Trails: (the following trails actions are included on the trails maps for each alternatives)

The complete trail system in the NCA would be reviewed and each trail designated for specific uses or combination of uses. Until designations are completed, incidental biking, riding and hiking would be allowed to continue on existing trails. Restrictions may be implemented during periods of heavy recreational use. Any wild horse and burro trail not now designated for recreational use would not be open to organized recreational events.

Mountain bikes would be allowed on designated trails only.

Portions of the trail network designated in the Cottonwood Valley Mountain Bike and Equestrian EA would be realigned to accommodate the new underpass access points on SR 160.

Monitor the existing designated trails in the Scenic Drive vicinity south to First Creek. Implement limited use designations if necessary to mitigate excessive impacts.

Designate the first half of the Grand Circle Trail, from the Visitor Center to the White Rock entrance, for hiking only.

The Pine Creek, Ice Box and Lost Creek trails would be designated for hiking (foot traffic) only.

The Dale Trail (Pine Creek to Ice Box) and the SMYC Trail (from Ice Box to Lost Creek) portions of the Escarpment Base Trail would be designated for hiking only.

Designate the First Creek Trail and Brownstone access (beyond the gate) for hiking and equestrian use only (no mountain bike use).

Provide an access (hiking and horses) to Kraft Rocks and Gateway Canyon.

Construct the final portion of the Escarpment Base Trail (between First Creek and Oak Creek) and designate for hiking and equestrian use.

Continue to work with Clark County and the Howard Hughes Corporation to develop and implement a coordinated trail system.

Roads:

Dirt roads which would remain open in NCA core area (North and west of the Bird Spring Range and south of La Madre Mountain) include the following:

- Rocky Gap road
- White Rock road (planned for paving)
- Oak Creek, Scenic Drive (planned for paving)
- Rainbow Spring (close 1/4 mile downstream of spring)
- Wildhorse Loop roads and access to Black Velvet area
- Cottonwood Valley road (to Good Springs)
- Access roads to private inholdings
- Access road to 13-mile Campground (closed beyond)

Access routes which require coordination with adjacent private landowners to determine future status:

- Calico Basin
- Little Red Rock (BLM and the Howard Hughes Corporation (THHC) have reached a preliminary agreement that will allow for public non-motorized hike/equestrian trail access as part of valley-wide trail system)
- Brownstone Canyon access road, up to gate (BLM and THHC have reached a preliminary agreement that will allow for continued public access (motorized, foot and horse) through THHC lands to public lands. The BLM closure gate would remain in place.)

Other dirt roads in the core area will be gated for administrative use only or closed and allowed to revert to a natural state.

Construct Calico III parking area between Calico II and Sandstone Quarry

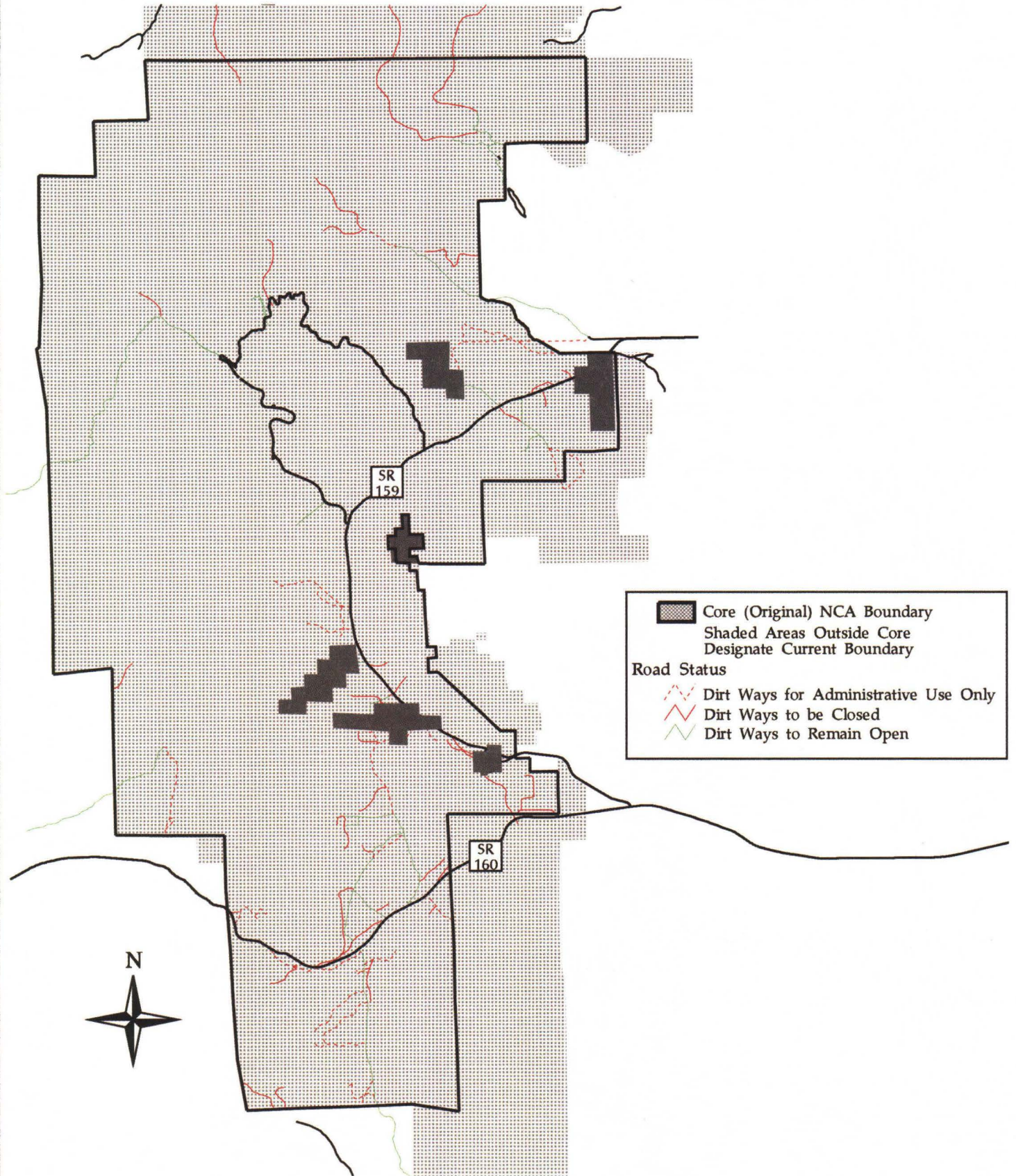
Calico III will accommodate long term parking, while Calico I and Calico II will limit parking duration to better serve short-term visitors.

The roads labeled 14, 15, 16 and 17 (Map) fall within the La Madre Mountains Wilderness Study Area (WSA). Until Congress decides the wilderness designation issue, the study area must maintain the character that made it eligible for wilderness consideration.

Roads 14 and 15 were used prior to WSA designation and thus use of the roads may continue at this time. However, both roads will be closed if they eventually fall within designated wilderness, since neither road is cherry stemmed (altering wilderness boundary around roads to allow them to stay open).

Roads 16 and 17 will be closed until Congress decides the wilderness issue, since they were not in use prior to the WSA designation. If they eventually fall within designated wilderness, they will remain closed. If 17 falls outside of eventual wilderness designation, it may be opened for public use.

Management Common to All Alternatives Roads in Core Area (Original NCA)



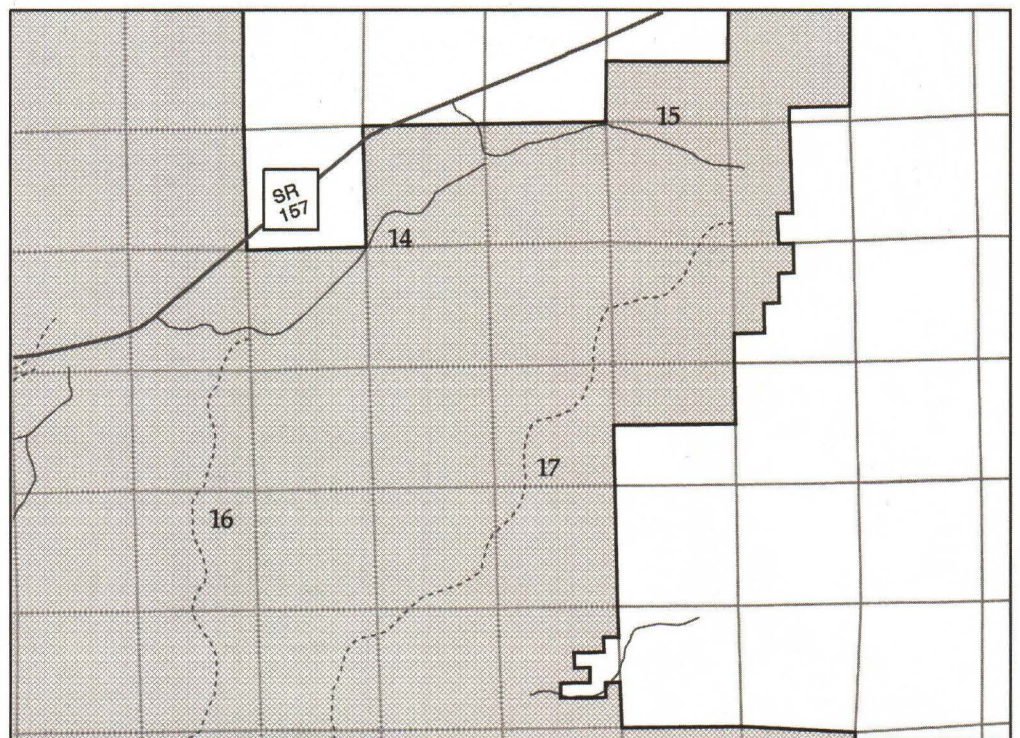
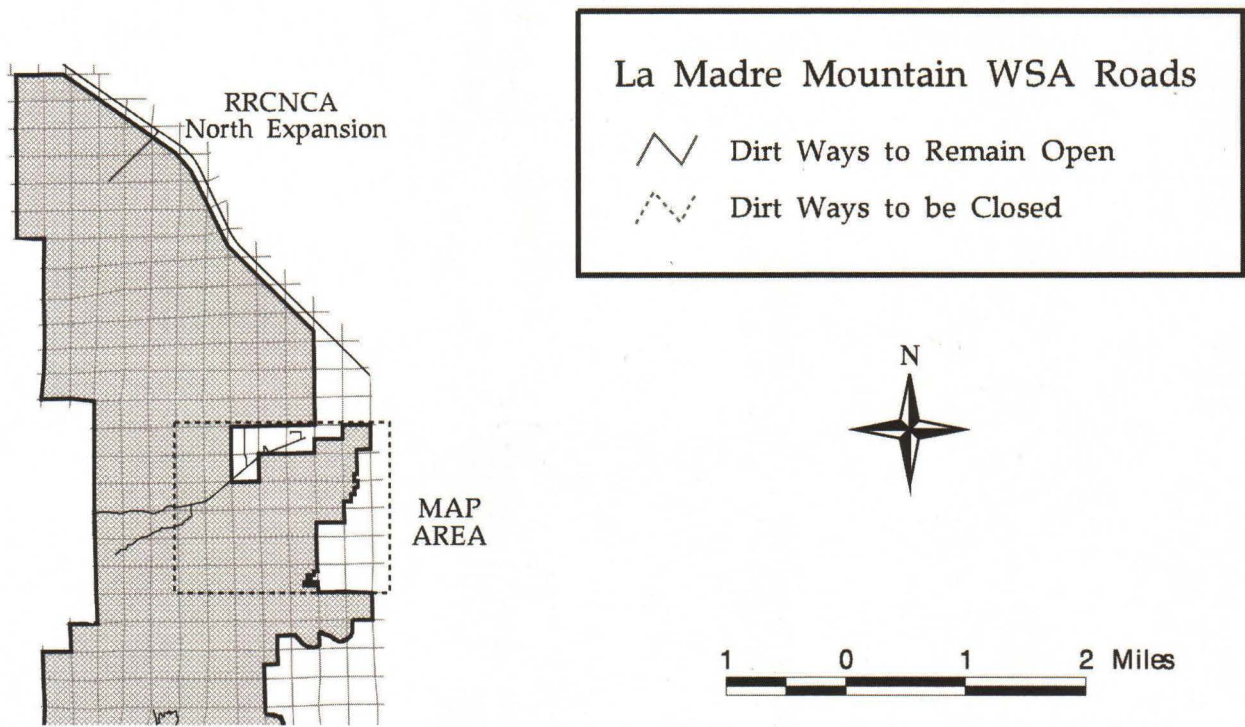
■ Core (Original) NCA Boundary
■ Shaded Areas Outside Core
— Designate Current Boundary

Road Status

- Dirt Ways for Administrative Use Only
- Dirt Ways to be Closed
- Dirt Ways to Remain Open



Management Common to All Alternatives



Commercial Use

Commercial uses have grown steadily in the last five years. The major commercial uses for many years were tour bus trips and rock climbing schools. However, an increasing public interest and demand has generated new business interest in guided jeep (4X4) tours, horse rides and bike tours. Several businesses have expanded or been started to meet this demand. There have been no market surveys comparing the public demand for commercial services, the number of vendors and their impact on the NCA. Because of this lack of information, it is important to adequately monitor both use and impacts as compared to the number of vendors permitted.

In order to avoid establishing use patterns that might be detrimental to the NCA, and to give a benchmark for analysis, initial allocations of commercial permits would be established as listed below. As monitoring results are evaluated, the number of permits could increase or decrease in the future. Initial permit allocations will be as follows:

Guidelines carried forward from the Interim GMP:

1) Rock Climbing Guides and Schools

6 year-round permits

10 limited access "guest" permits

2) Guided Horse Ride Operations

5 permits (with no trail/use area overlap allowed between permittees)

3) Bus and Limo Tours (on Scenic Drive)

No limits on number of tours

Guidelines proposed for implementation:

4) 4X4 Vehicle Tour Operations (on designated roads)

5 permits

5) Guided Bike Tours

5 permits (includes mountain bike and road bike touring)

6) Guided Interpretive Hikes

5 permits

Film permits, including still photography and video, are considered "lands actions". Land use authorizations are processed on a case-by-case basis as proposals are received. The authorization process involves analysis of potential impacts to the environment that could result from the proposed action. An Environmental Assessment or an Environmental Impact Statement, if appropriate, is prepared and resource protection stipulations are developed prior to the approval of such uses.

New types of commercial uses proposed will be evaluated to determine if they are appropriate and consistent with NCA management guidelines, and if so, initial permit limits will be set.

Cultural Resources

Locate trails and human activities away from cultural and paleontological sites so that physical damage does not occur.

Inventory the known historic and prehistoric sites acquired in the 1994 additions to the NCA. Submit 36 CFR 60.4 National Register of Historic Places nominations for eligible sites.

Coordinate with Native American interests on educational, interpretive and other related program activities.

Enhance partnerships using volunteers to conduct photo monitoring and patrolling of sites to monitor recreational use.

Maintain existing interpretive exhibits at the Visitor Center, Willow Spring/Lost Creek, Sandstone Quarry, White Rock, Rocky Gap, La Madre Spring and the Red Spring Project Plan.

Maintain vehicle closure at Brownstone Canyon.

Install educational/interpretive signs at the Gallery, Brownstone Canyon, Sandstone Quarry, Lone Grapevine Spring, the Spanish Trail, Cottontail, Cottonwood Valley, Lucky Strike and Grassy Spring.

Provide BLM sponsored guided activities at cultural sites where management deems safe for the resources.

Protect sensitive rock art panel at Brownstone Canyon. Consider placing a low level fence in front of the site along with an interpretive sign if this would be the minimum tool to protect the panel. Consider additional protective measures if fencing is not successful.

Native American Concerns

Solicit Native American comments on proposed actions which may have an impact on cultural resources or Native American values. Where

possible, provide partnership opportunities for Native Americans to express their interest at RRCNCA.

Work closely with the USDA Forest Service, Spring Mountain National Recreation Area, to develop coordinated management direction regarding Native American relations.

Locate trails and human activities to avoid impacting cultural sites.

Enhance existing Visitor Center cultural exhibits by incorporating local Native American beliefs and knowledge.

Allow for Native American use of sensitive resources when involved with traditional ceremonial purposes.

Invite Native Americans to present cultural/educational activities for volunteers and the general public at RRCNCA.

Land Acquisition

The BLM will consider acquiring undeveloped inholdings within the NCA through exchange in order to:

1. Facilitate access to public lands and resources
2. Maintain or enhance important public values and uses
3. Maintain or enhance local social and economic values
4. Improve management efficiency through the blocking up of public lands
5. Facilitate implementation of other aspects of the GMP

Developed inholdings will only be considered for acquisition if they would contribute to better management of the NCA.

Utility/Rights-of-Way (ROW) Avoidance

Utility and transportation development are not normally compatible with the objectives of the NCA, but in rare cases, may be permitted based on consideration of the following criteria:

1. Type of and need for the proposed facility,
2. Conflicts with other existing or potential resource values and uses,
3. Availability of alternatives and/or mitigation measures.

ALTERNATIVE 1

This alternative has the most proposed water development projects, facilities and associated recreation opportunities. Access would be more readily available with a more extensive trail system and fewer roads being closed. Biodiversity enhancement would be less encompassing than in other alternatives with fewer specific enhancement actions being proposed. This alternative provides for the management of wild horses and burros at a population level appropriate for the habitat and restricts recreation use to limit impacts on wild horses and burros. In general, all waters would be available and many would be developed for wild horses and burros, wells would be developed (outside the NCA) to disperse wild horse and burro use and riparian areas would be protected through fencing. Trails would be designated for specific uses. Timing of access would be controlled, use of wild horse trails by recreationists would be restricted, and the trail system would utilize more of the dirt roads available in the HMA. The actual implementation of wild horse and burro decisions and specific Appropriate Management Level (AML) determination; project specifics and locations; and specific management actions would be addressed in a Herd Management Plan. To facilitate the urban interface situation, numerous facilities (water developments) would be needed to enhance management and protect resource values.

This alternative includes the actions listed in the Management Common To All Alternatives and the Standard Operating Procedures as well as the actions listed below.

Biodiversity - includes the issues concerning biodiversity, ecosystem management, and wild horses & burros

Biodiversity Preservation:

(See Management Common to All Alternatives)

Ecosystem Management:

(See Management Common to All Alternatives)

Wild Horse and Burro Management:

The Red Rock Herd Management Area (HMA) would be amended from the boundary decision of the Las Vegas Resource Management Plan (10/98) with the addition of the Calico Basin area and the lands east of Calico Basin surrounding the new 13 Mile Campground.

Wild horses would be managed within the Red Rock Herd Management Area (HMA) in their primary use area south of Bonnie Springs to south of Bird Spring and the town of Goodsprings. The remaining portion of the HMA including the

area north of Bonnie Springs would be open to incidental horse use.

Burros would be managed in their primary use area from Bonnie Springs north and east to White Rock and the Red Spring (Calico Basin) area. The remainder of the HMA would be open to incidental burro use. Burros that become acclimated to tourists and beg for food along State Route 159, creating a nuisance and public hazard would be removed.

To accommodate the public interest in wild burros within the Red Rock HMA, burro viewing areas would be developed on SR 159 (after approval by the Nevada Department of Transportation (NDOT)). These areas would be fenced to keep the burros off the highway. Information signs will be placed at each viewing area giving the history of the Red Rock animals and the 1971 Wild Free-Roaming Horse and Burro Act. No viewing areas for wild horses in Red Rock HMA or horses or burros in the Wheeler Pass HMA are planned but may be needed at a later date.

Both sides of SR 159's right-of-way would be fenced to provide for the safety of motorists and burros. Development of underpasses that allow wild burros to make use of both sides of SR 159 would be proposed to NDOT in order to mitigate the fragmentation of the Red Rock HMA due to fencing. The existing deep wash near the RRCNCA visitors center will be evaluated as a potential underpass site for wild burros to cross SR 159. Training of the animals to use the underpass(es) would be accomplished by passive management, such as periodically placing water or feed at the underpass(es). The Wheeler Pass HMA will be assessed for the need to fence the highway rights-of-way and to locate potential sites for underpass(es).

During the foaling season of March thru May, organized biking, equestrian and hiking events would not be authorized, unless specific impacts to wild horses and burros can be mitigated. Incidental biking, riding or hiking would be permitted. Signs would be posted at all underpasses advising the public of wild horse and burro use and restrictions to vehicle parking within 1,000 feet of underpasses (as well as the flood potential during storms).

Wild horse and burro numbers would be managed and maintained in a thriving natural ecological balance by conducting annual or regular herd removals. First efforts to remove animals would be through bait or water trapping. If this is unsuccessful, helicopter trapping would be used.

Resolve the HMA boundary questions and determine the future status of the band that inhabits the Calico Basin area. The following factors have combined to reduce the range quality

and cause habitat fragmentation in the Calico Basin area:

- habitat fragmentation due to fencing of State Route 159 and Calico Basin Road to eliminate off-road vehicle use;
- increased residential development in Calico Basin;
- rapid development of private lands on West Charleston Boulevard;
- and effective loss of the use of Red Spring, due to increased recreation use and fencing installed to aid in protection and recovery of the springsnail.

Proposed Water Developments; New, Maintenance and Re-construction

The following water project developments are proposed and may be implemented (after site specific project design and environmental analysis) in the Red Rock HMA to provide additional water for wild horses and burros. All developments would provide water for wildlife and riparian purposes (except non-riparian developments such as water hauls).

1. Permanent Water Haul Sites - storage tanks and troughs, numbers and locations not yet identified. Use of water haul sites may be an alternative to development of some of the springs listed below.
2. Mud Spring #1 - Reconstruct the existing development (spring box, pipeline, and trough).
3. Shovel Spring - Initiate development (headbox, pipeline and trough).
4. Willow Spring - Initiate development designed to move water out of the developed picnic area for wild horses and burros (pipeline and trough).
5. White Rock Spring - Initiate development to move water off site for wild horses and burros (headbox replacement, pipeline and trough). Desired water location is in the center of the Scenic Drive loop.
6. Red Spring - Initiate development to move water off site for wild horses and burros (headbox, pipeline and trough).
7. Pine Creek - Initiate development to move water off site for wild horses and burros (headbox, pipeline and trough). Concurrence from the State of Nevada would be required since the bottom (meadow area) of Pine Creek is State land.

8. Lone Grapevine Spring - Complete re-development to move water off site for wild horses and burros (headbox, pipeline and trough).
9. Wheeler Camp Spring - Initiate re-development to move water off site for wild horses and burros (headbox, pipeline and trough).
10. Wilson Tank/Tunnel Spring - Complete redevelopment for improved reliability (excavation, headbox, pipeline and trough). Since this source is such a low producer and geographically critical to wildlife, water yield needs to be evaluated to determine if any water remains available after wildlife needs are satisfied.
11. Bird Spring - Install a pipeline to move water off site (away from road) to reduce human influence and improve wild horse and burros use.
12. Wells - Develop 2-3 wells with associated pipelines to distribute use and reduce pressure on natural water sources within the HMA. NOTE - All proposed locations are in the southern portion of the HMA south and east of the NCA so this proposal is not analyzed in this document. See future HMA management plan.
13. Potosi Spring and Pipeline - Develop the spring by installation of a pipeline system with multiple troughs. NOTE - This area is on private and Forest Service lands and is not analyzed in this document. See future HMA management plan.
14. Cave Spring - Complete development to move water off site for wild horses and burros (headbox, pipeline and trough). NOTE - This site is not within the NCA and is not analyzed in this document. See future HMA management plan.

Sequence of short term actions:

1. Evaluate existing and potential water sources for maintenance needs, potentials and development costs. Investigate the potential for acquiring access to waters from private sources in the HMA adjacent to RRCNCA.
2. Maintain Tunnel (Wilson Tank) and Bird Spring developments to correct known maintenance needs, ensure more reliable water availability and move troughs away from roads.

3. If possible pipe water from Lone Grapevine Spring 1.5 miles southeast under State Route 160 to provide a water source immediately south of State Route 160 eliminating the need for horses to travel north of the highway for water. Along this pipeline provide a water trough(s) distant from Lone Grapevine Spring to draw animals away from the spring area and better distribute use patterns.
4. Determine the carrying capacity or Appropriate Management Level (AML) for both wild horses and burros in the HMA using an interdisciplinary resource team.
5. Using the desired plant community objectives in the GMP (discussed in Chapter 3), establish the criteria (range condition, water availability, riparian health) that must be monitored and analyzed .
6. Establish a minimum of one ten acre enclosure (660' x 660') in each identified habitat type to act as control plots for vegetation monitoring.
7. Conduct a scientifically valid inventory of vegetation condition, trend and frequency to establish baseline data.
8. Complete a Herd Management Plan (HMP) for the entire HMA including both lands within and lands outside of RRCNCA.
9. Complete development of additional waters as proposed in the HMP (both inside and outside of RRCNCA).

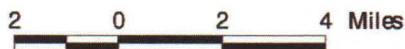
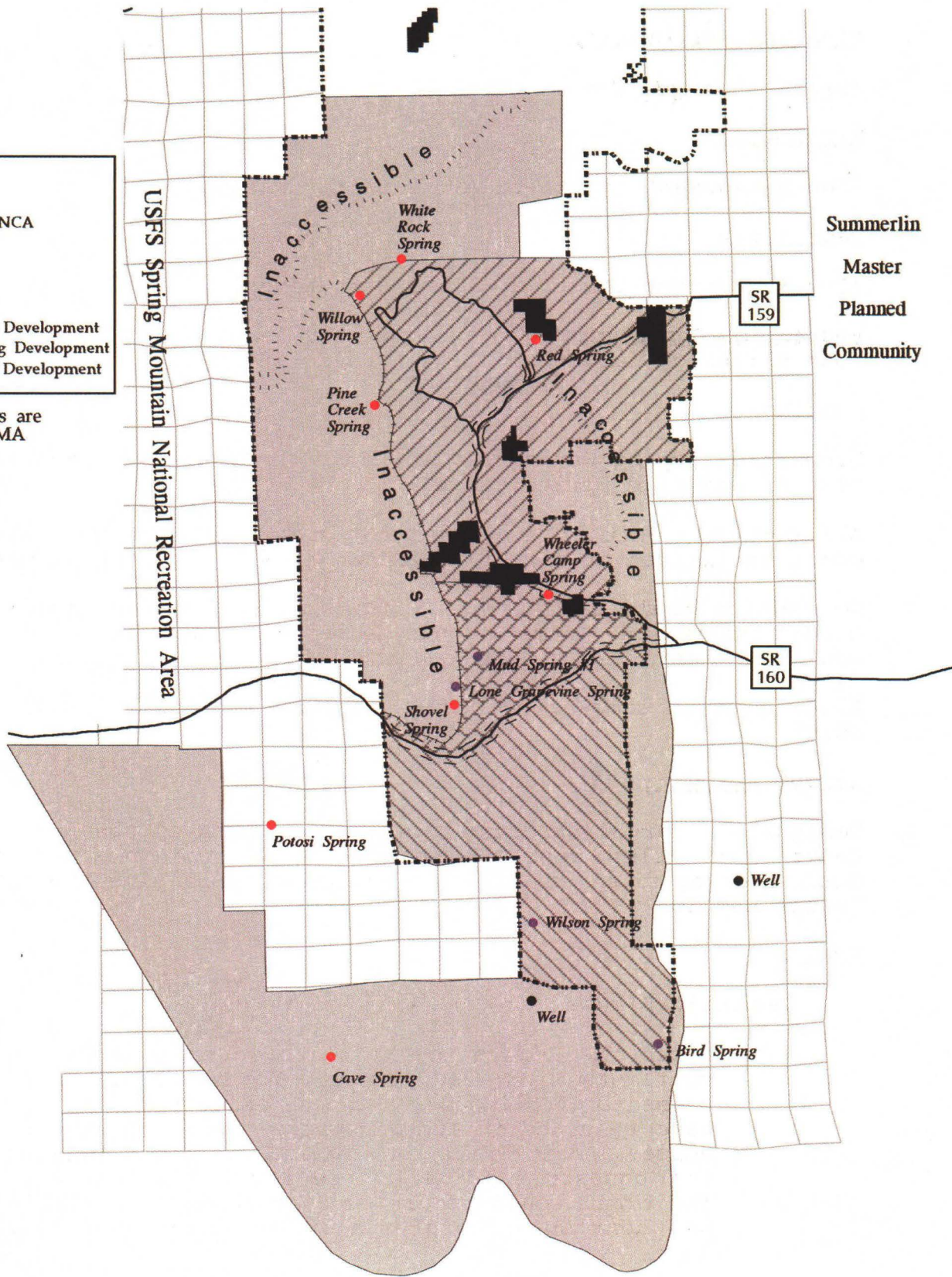
Sequence of long term actions:

10. Conduct annual trend studies to determine vegetative response and progress towards meeting desired plant community objectives.
11. Conduct annual utilization studies in both areas occupied by wild horses and burros and areas not used for comparison purposes.
12. Monitor vegetation trend, condition and utilization to ensure that desired plant community objectives are maintained.
13. Adjust animal population as required.

Red Rock Herd Management Area (HMA) Alternative 1

- | | |
|----------------------------------|-----------------------------|
| | Fence |
| | Cliff |
| Primary Animal Use in NCA | |
| | Burros |
| | Horses |
| | Joint Use |
| Water Developments | |
| | Existing Spring Development |
| | Proposed Spring Development |
| | Proposed Well Development |

All gray-shaded areas are within designated HMA boundary.



Water, Air and Vegetative Resources - includes issues relating to riparian restoration, air quality and vegetation

Riparian Restoration:

(See Management Common to All Alternatives)

Air Quality:

(See Management Common to All Alternatives)

Vegetation:

(See Management Common to All Alternatives)

Recreation Opportunities - includes the issues concerning camping, rock climbing, target shooting, trails and dirt roads

Camping:

Dispersed camping would be allowed north of La Madre Mountain and east of the Bird Spring Range.

All camping, whether dispersed or in the designated campground, would be limited to a 14 day maximum stay. (Current situation)

No camping would be allowed within ½ mile of waters used by wild horses and burros. Camping outside of the wild horse and burro HMA would be restricted within 1/4 mile of any water source.

Allow limited camping by permit in Cottonwood Valley (for events only).

Target Shooting:

Designate a target shooting area at the mouth of the Lucky Strike Canyon two miles west of Highway 95 at the existing illegal dump/shooting site (see location on map accompanying the following Trails section).

Trails:

Mountain Bikes:

Close the Red Valley trail to mountain bike use due to conflicts with wild horses. The speed of the bikes and presence of blind turns on the existing wild horse trail have resulted in numerous near misses between biker and horse. Additionally, there are conflicts between bikers and equestrians due to speed and right-of-way issues. The trail would remain open to equestrian and hiker use as their speeds are usually compatible with wild horse

travel.

Designate the Oak Creek trails to include mountain bike use.

Designate the Blue Diamond to Jean route (portion within NCA) that has been used annually for a group ride event, subject to restrictions for wild horse and burro management (see Equestrian trails).

Designate the "Twilight Zone" trails north of the Kyle Canyon road.

Designate the old road from Willow to the Visitor Center to include mountain bike use.

Road bikes:

Pave the old road between Sandstone Quarry and Willow Spring to provide an alternative to the Scenic Drive between these two points. This will eliminate the most dangerous sections of the Scenic Drive and reduce the number of riders who turn around and ride the wrong way after being defeated by the steep hills beyond Sandstone Quarry.

Equestrian:

Encourage equestrian use of designated/existing trails to minimize impacts while continuing to allow dispersed (off-trail) use. The trail system would be reviewed to identify conflicts and to provide for wild horse and burro needs and recreation opportunities. Dirt roads would be the preferred routes as equestrian trails except where they lead to water sources.

Designate the following routes and trails to include equestrian use:

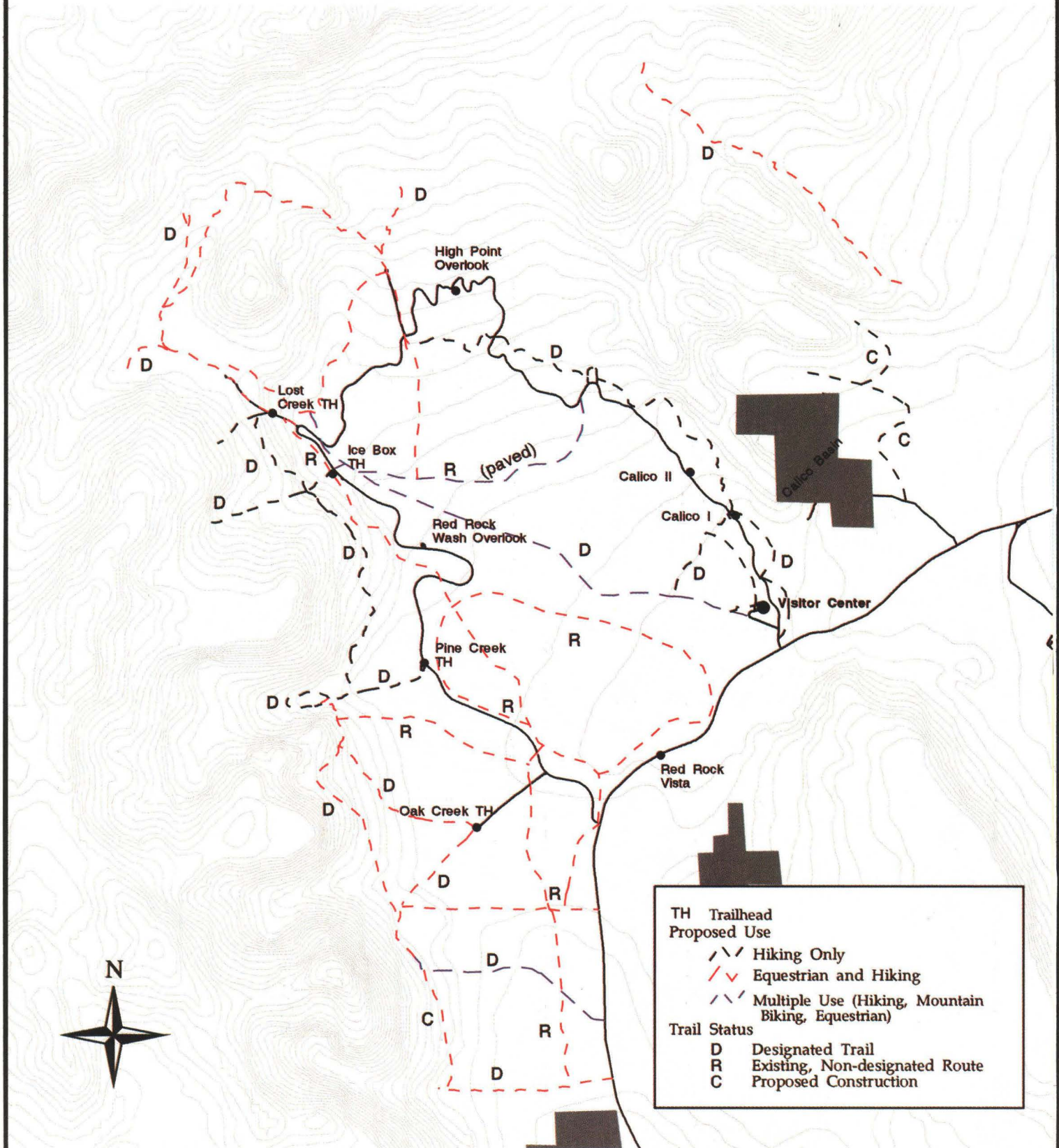
- the Blue Diamond to Jean route (portion within NCA) which has been used for an annual equestrian ride event;
- the existing equestrian route from First Creek to Lost Creek, out away from the base of the escarpment;
- the route (old road) that runs along a ridge top between the Oak Creek road/Scenic Drive intersection and Pine Creek Canyon;
- the section of the Arnight Trail from the upper Oak

Creek trailhead to the intersection with the ridge trail mentioned above;

- the White Rock loop, Keystone Thrust and La Madre trails;
- the route (old road) from the White Rock/Scenic Drive intersection, due south to where it meets the Sandstone to Willow route (old road);
- the route (old road) that accesses Oak Creek from SR 159 (direct east-west route);
- the loop route directly north of Red Rock Vista;
- the existing routes from the Scenic Drive exit lot to adjacent trails;
- the portion of the Escarpment Base Trail from Oak Creek to Juniper Canyon.

Organized events would not be allowed unless impacts to wild horses and burros could be mitigated. Organized events would not be allowed to pass within $\frac{1}{2}$ mile of waters except for equestrian events where the use would not conflict with normal watering times of the wild horses and burros. Typically, event use would not be allowed from 4 hours after sunrise and 4 hours before sunset.

Trails in Scenic Drive Vicinity Alternative 1

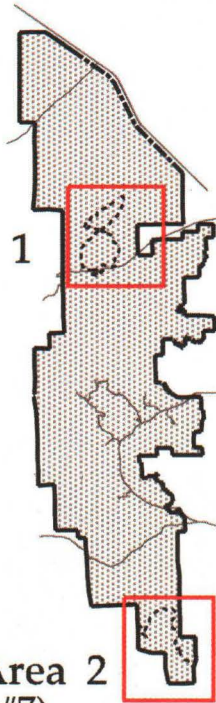


TH	Trailhead
Proposed Use	
	Hiking Only
	Equestrian and Hiking
	Multiple Use (Hiking, Mountain Biking, Equestrian)
Trail Status	
D	Designated Trail
R	Existing, Non-designated Route
C	Proposed Construction



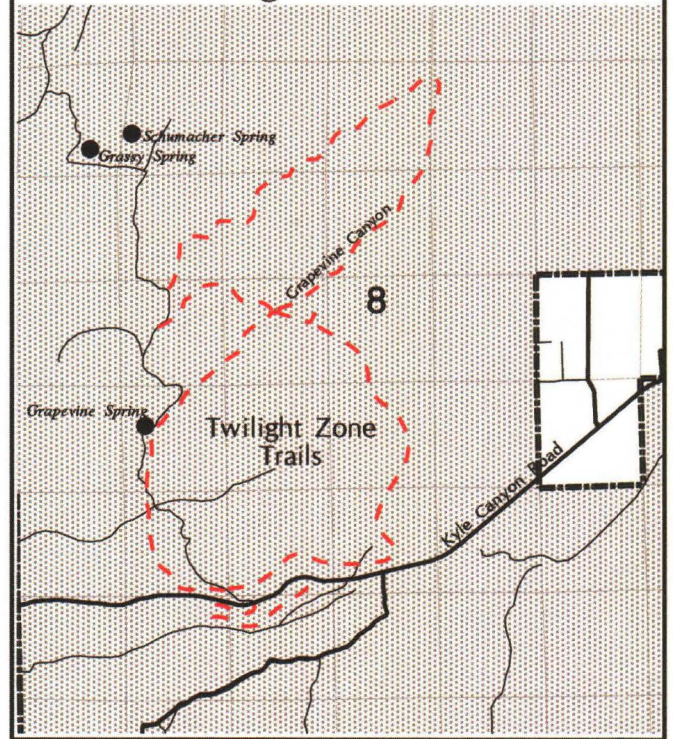
Blue Diamond to Jean and Twilight Zone Trails

Map Area 1
(Trail #8)

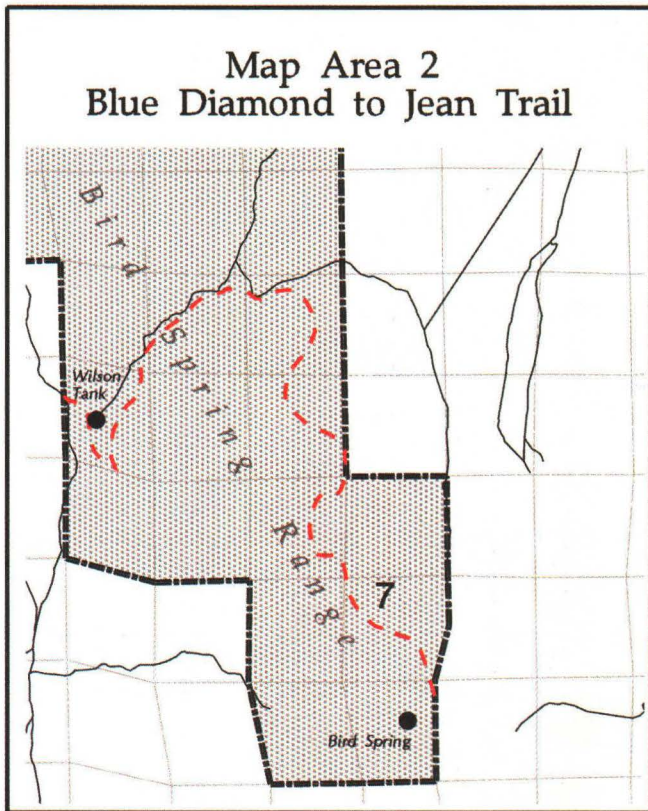


Map Area 2
(Trail #7)

Map Area 1
Twilight Zone Trails



Map Area 2
Blue Diamond to Jean Trail



Dirt Roads:

The following maps indicate which dirt roads are to be closed and which will be left open. The status of dirt roads from La Madre Mountain south through Cottonwood Valley is the same for all alternatives and can be seen under Management Common To All Alternatives. Minor dirt routes not indicated on the maps are to be closed and used only for administrative purposes or targeted for restoration to a natural state.

Paved Roads:

Construct a 2.65 mile return road from Sandstone Quarry to the Visitor Center (see map# M1 on page 29 in Plan section).

Because the Scenic Drive is a one-way road, when any of the washes (Sandstone, Red Rock or Pine Creek) are affected by a flash flood or winter ice is on the high points of the road, the entire Scenic Drive must be closed to use. This happens several times every year. The return road would allow at least a portion of the Scenic Drive, unaffected by floods or ice, to remain open at all times allowing use in the Calico Hills and Sandstone Quarry areas.

This would also provide a shortened loop for climbers and hikers recreating in the Calico Hills, over ambitious bike riders who discover the entire Scenic Drive is more than they bargained for, and road walkers and runners who occasionally prefer a shorter alternative. All of the above have been known to return against one-way traffic to avoid traveling the entire Scenic Drive. Many of those in motor vehicles who do drive the remaining portion of the Scenic Drive, do so at excessive speeds, causing unsafe conditions and detracting from the experience of others wishing to observe the scenery.

Additional Parking/Overlooks: (new construction)

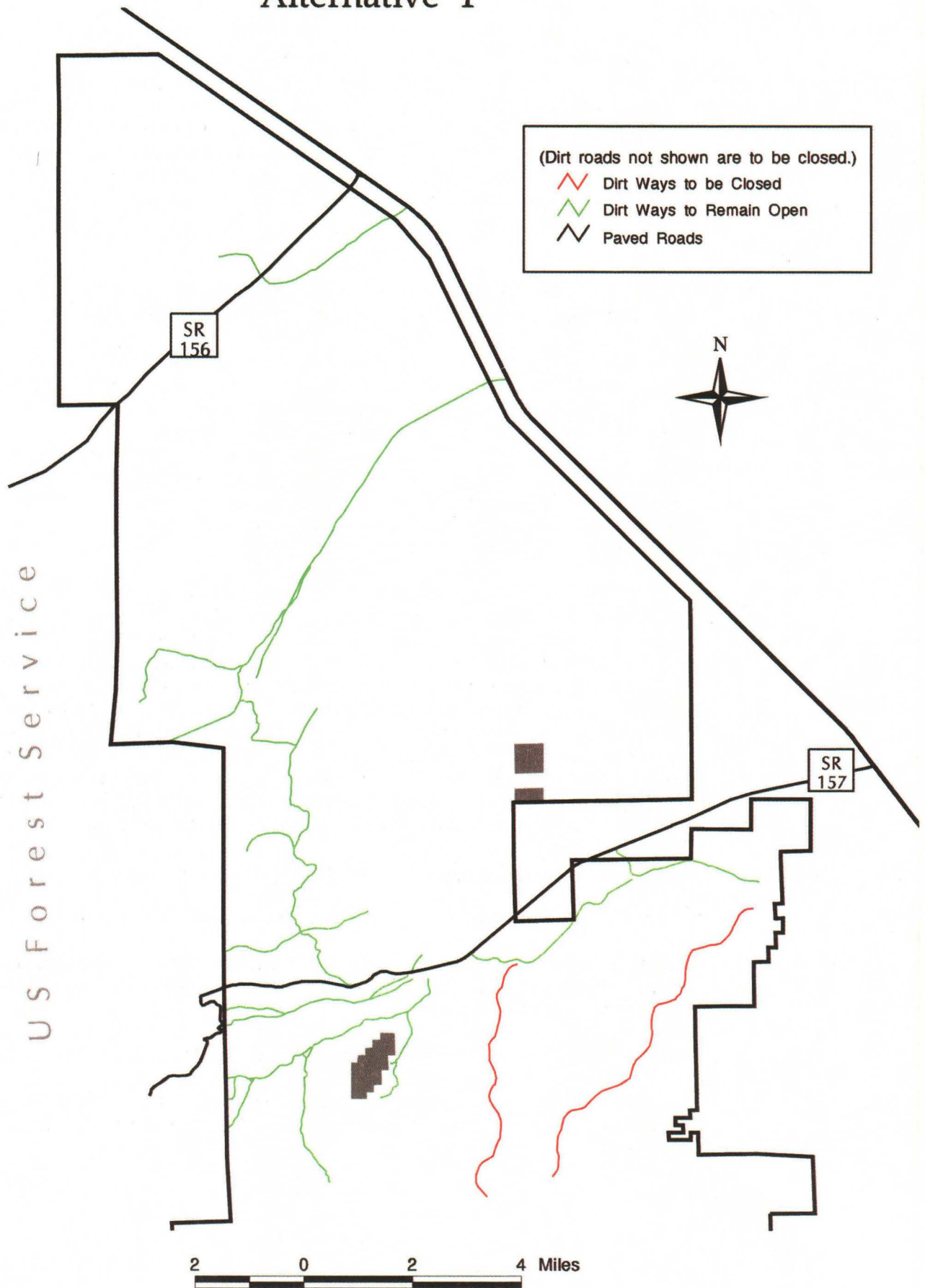
Sandstone/Turtlehead - 1.5 miles past Sandstone Quarry

Trailhead for Grand Circle Trail, Upper Sandstone Wash and Turtlehead Mt. Overflow parking for Sandstone Quarry. (.52 acres)

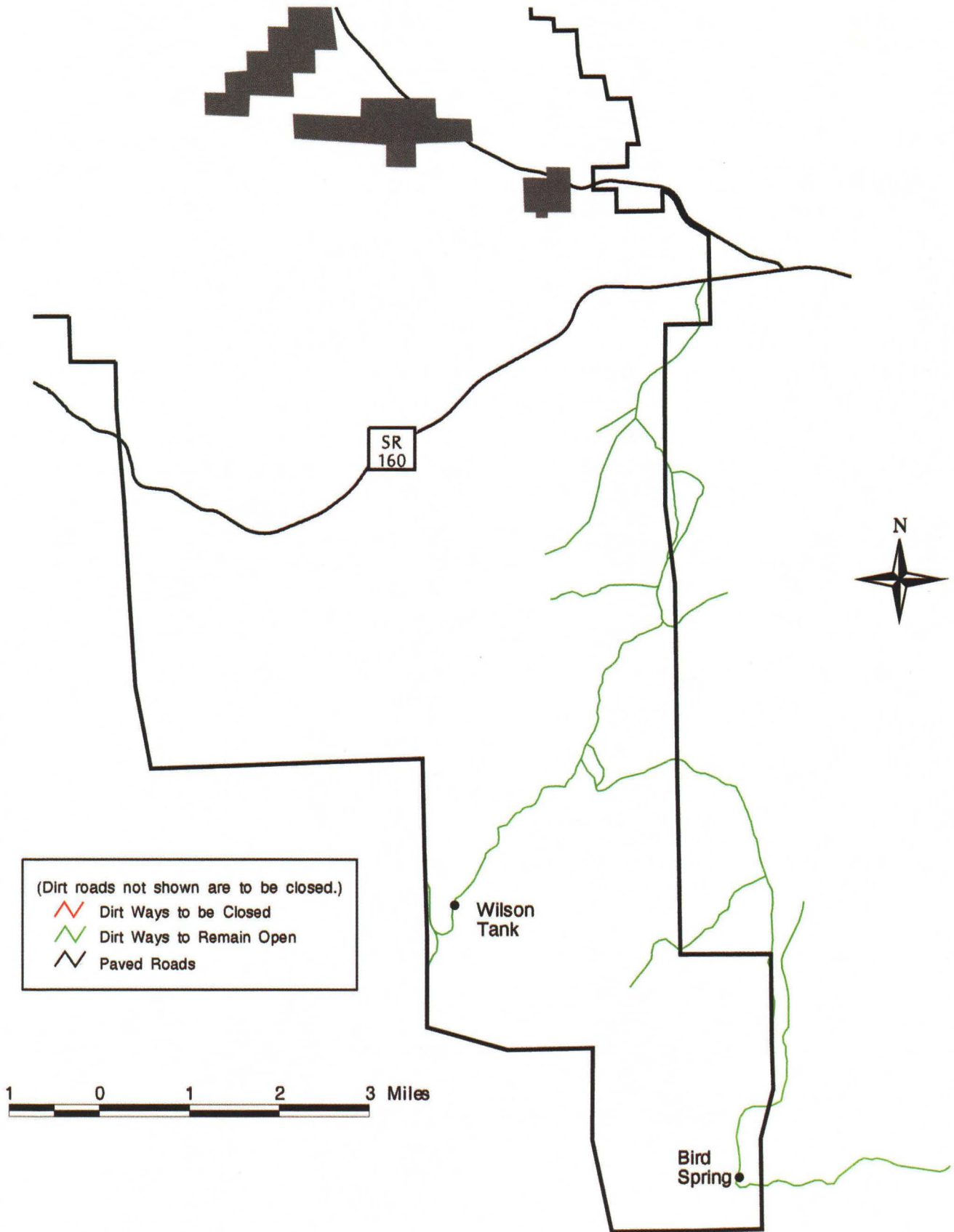
Ranger's Choice - 1 mile past Red Rock Wash Overlook

Picnic area and alternative trailhead for Pine Creek and Ice Box. Access to Base of Escarpment Trail. (.47 acres)

Roads in North Expansion Alternative 1



Roads in South Expansion Alternative 1



ALTERNATIVE 2

This is the "No Action" alternative, meaning that the NCA would continue to be managed under the existing situation. Presently, the governing document for the NCA is the Interim General Management Plan (IGMP). The original intent of the IGMP was to administer the NCA until the completion of a final plan after Congress increased the size of the NCA in 1994. The planning analysis for the IGMP did not include the expanded portions of the NCA since the expansion occurred after analysis had been completed. If this alternative were selected, issues which arise in the expansion lands would be dealt with on a case-by-case basis as necessary. This alternative provides for the management of wild horses and burros at a population level appropriate for the habitat. Existing developed waters would be available to wild horses and burros and riparian areas would be protected through fencing but new water developments would not be implemented unless approved in a future Herd Management Plan (HMA) and subsequent GMP amendment.

This alternative includes the actions listed in the Management Common To All Alternatives and the Standard Operating Procedures as well as the actions listed below.

Biodiversity - (same as Alternative 1) includes the issues concerning biodiversity, ecosystem management, and wild horses & burros

Biodiversity Preservation:

(See Management Common to All Alternatives)

Ecosystem Management:

(See Management Common to All Alternatives)

Wild Horse and Burro Management:

Wild horses would be managed within the Red Rock Herd Management Area (HMA) in their primary use area south of Bonnie Springs to south of Bird Spring and the town of Goodsprings. The remaining portion of the HMA including the area north of Bonnie Springs would be open to incidental horse use.

Burros would be managed in their primary use area from Bonnie Springs north and east to White Rock and the Red Spring area. The remainder of the HMA would be open to incidental burro use. Burros that become acclimated to tourists and beg for food along State Route 159, creating a nuisance and public hazard would be removed.

To accommodate the public interest in wild burros within the Red Rock HMA, burro viewing areas would be developed on SR 159 (after approval by the Nevada Department of Transportation (NDOT)). These areas would be fenced to keep the burros off the highway. Information signs will be placed at each viewing area giving the history of the Red Rock animals and the 1971 Wild Free-Roaming Horse and Burro Act. No viewing areas for wild horses in Red Rock HMA or horses or burros in the Wheeler Pass HMA are planned but may be needed at a later date.

During the foaling season of March thru May, organized biking, equestrian and hiking events would not be authorized, unless specific impacts to wild horses and burros can be mitigated. Incidental biking, riding or hiking would be permitted. Signs would be posted at all underpasses advising the public of wild horse and burro use, as well as warn them of the flood potential during storms.

Wild horse and burro numbers would be managed and maintained in a thriving natural ecological balance by conducting annual or regular herd removals. These removals would be conducted using corrals with water and/or feed as a bait to attract the animals. By doing this, only small numbers of animals would be removed at any one time.

Resolve the HMA boundary questions and determine the future status of the band that inhabits the Calico Basin area. The following factors have combined to reduce the range quality and cause habitat fragmentation in the Calico Basin area:

- habitat fragmentation due to fencing of State Route 159 and Calico Basin Road to eliminate off-road vehicle use;
- increased residential development in Calico Basin;
- rapid development of private lands on West Charleston Boulevard;
- and effective loss of the use of Red Spring, due to increased recreation use and fencing installed to aid in protection and recovery of the springsnail.

Proposed Water Developments; New, Maintenance and Re-construction

The following existing water developments currently used and maintained for wild horses and burros would be maintained (after site specific project design and environmental analysis if necessary) in the Red Rock HMA to provide additional water for wild horses and burros. No new water development projects would be implemented.

1. Mud Spring # 1 - Reconstruct the existing development

(spring box, pipeline and trough).

2. Lone Grapevine Spring - Reconstruction to capture more water and move it further off site for wild horses and burros (headbox, pipeline and trough).
3. Wilson Tank/Tunnel Spring - Complete redevelopment for improved reliability (excavation, headbox, pipeline and trough). Since this source is such a low producer and geographically critical to wildlife, water yield needs to be evaluated to determine if any water remains available after wildlife needs are satisfied.
4. Bird Spring - Install a pipeline to move water off site (away from road) to reduce human influence and improve wild horse and burros use.

The following projects may also be implemented (see Alternative 1) but they are outside of RRCNCA and would be considered in a future Herd Management Plan and RMP amendment.

5. Wells - Develop 2-3 wells with associated pipelines to distribute use and reduce pressure on natural water sources within the HMA. NOTE - All proposed locations are in the southern portion of the HMA south and east of the NCA so this proposal is not analyzed in this document. See future HMA management plan.
6. Potosi Spring and Pipeline - Develop the spring by installation of a pipeline system with multiple troughs. NOTE - This area is on private and Forest Service lands and is not analyzed in this document. See future HMA management plan.
7. Cave Spring - Complete development to move water off site for wild horses and burros (headbox, pipeline and trough). NOTE - This site is not within the NCA and is not analyzed in this document. See future HMA management plan.

Sequence of short term actions:









1. Evaluate existing and potential water sources maintenance needs, potentials and development costs. Investigate the potential for acquiring access to waters from private sources in the HMA outside of RRCNCA.
2. Maintain Tunnel (Wilson Tank) and Bird Spring developments to correct known maintenance needs, ensure more reliable water availability and move troughs away from roads.

3. Determine the carrying capacity or Appropriate Management Level (AML) for both wild horses and burros in the HMA using an interdisciplinary resource team.
4. Using the desired plant community objectives in the GMP (Chapter 3), establish the criteria (range condition, water availability, riparian health) to be monitored and analyzed.
5. Conduct a scientifically valid inventory of vegetation condition, trend and frequency to establish baseline data.
6. Complete a Herd Management Plan (HMP) for the entire HMA including both lands within and lands outside of RRCNCA.
7. Complete development of additional waters as proposed in the HMP.

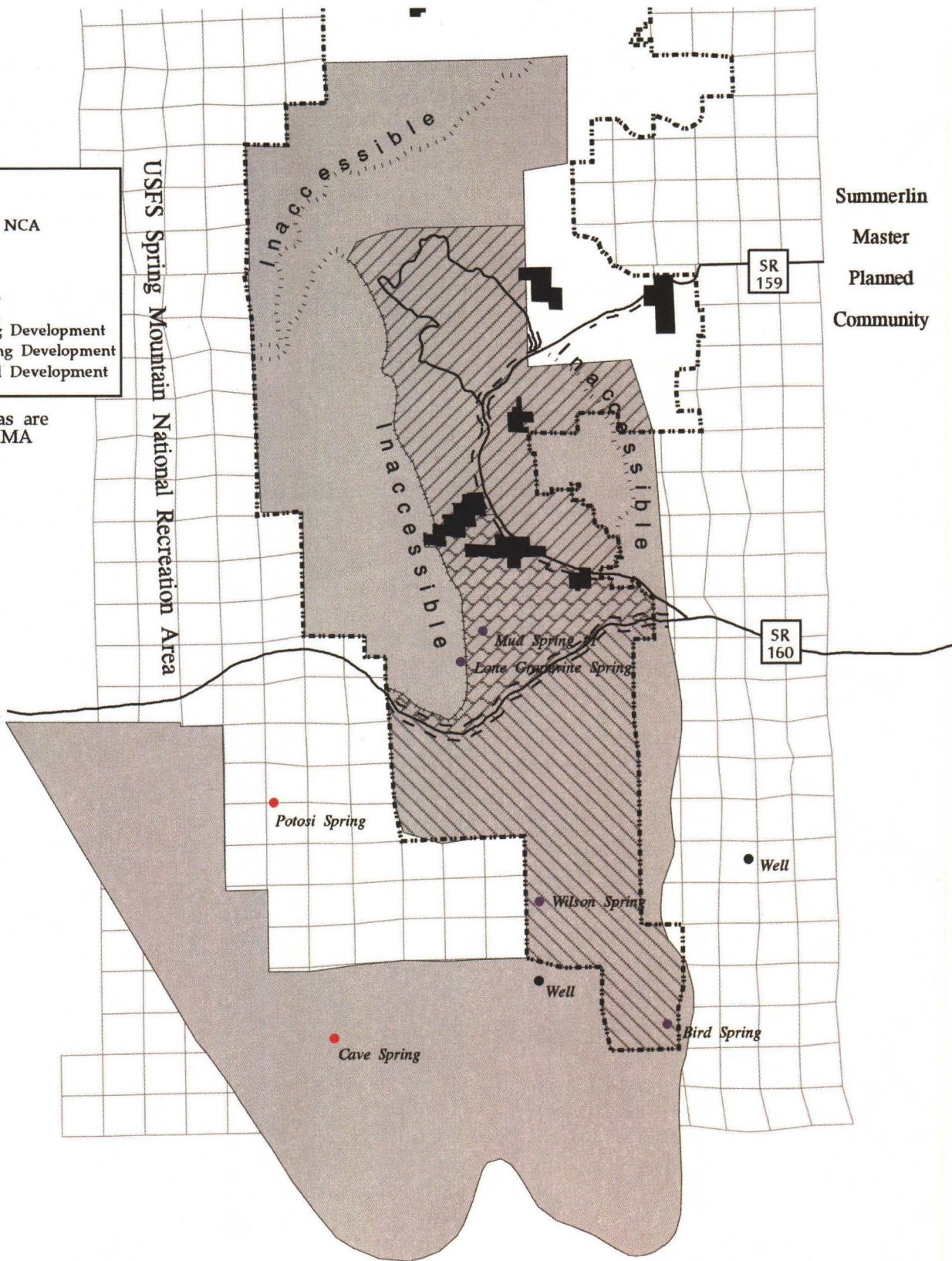
Sequence of long term actions:

8. Conduct annual trend studies to determine vegetative response and progress towards meeting desired plant community objectives.
9. Conduct annual utilization studies.
10. Monitor vegetation trend, condition and utilization to ensure that desired plant community objectives are maintained.
11. Adjust animal population as required.

Red Rock Herd Management Area (HMA) Alternative 2 - No Action

- | | |
|---|-----------------------------|
|  | Fence |
|  | Cliff |
| Primary Animal Use in NCA | |
|  | Burros |
|  | Horses |
|  | Joint Use |
| Water Developments | |
|  | Existing Spring Development |
|  | Proposed Spring Development |
|  | Proposed Well Development |

All gray-shaded areas are within designated HMA boundary.



2 0 2 4 Miles

Water, Air and Vegetative Resources - includes issues relating to riparian restoration, air quality and vegetation

Riparian Restoration:

(See Management Common to All Alternatives)

Air Quality:

(See Management Common to All Alternatives)

Vegetation:

(See Management Common to All Alternatives)

Recreation Opportunities - includes the issues concerning camping, rock climbing, target shooting, trails and dirt roads

Camping:

Dispersed camping would be allowed north of La Madre Mountain with a 14 day camping limit. (Current situation)

No camping would be allowed within 1/4 mile of any water source (natural or man made), spring, pond, or natural catchment basin with permanent water.

Target Shooting:

All of the NCA would be (is currently) closed to target shooting.

Trails:

Equestrian dispersed use is allowed.

The Oak Creek trails and the old dirt road between Willow and the Visitor Center are designated for mountain bike use as well as hiking and equestrian use.

The route (old road) that runs north-south between the Oak Creek legs is designated for equestrian use.

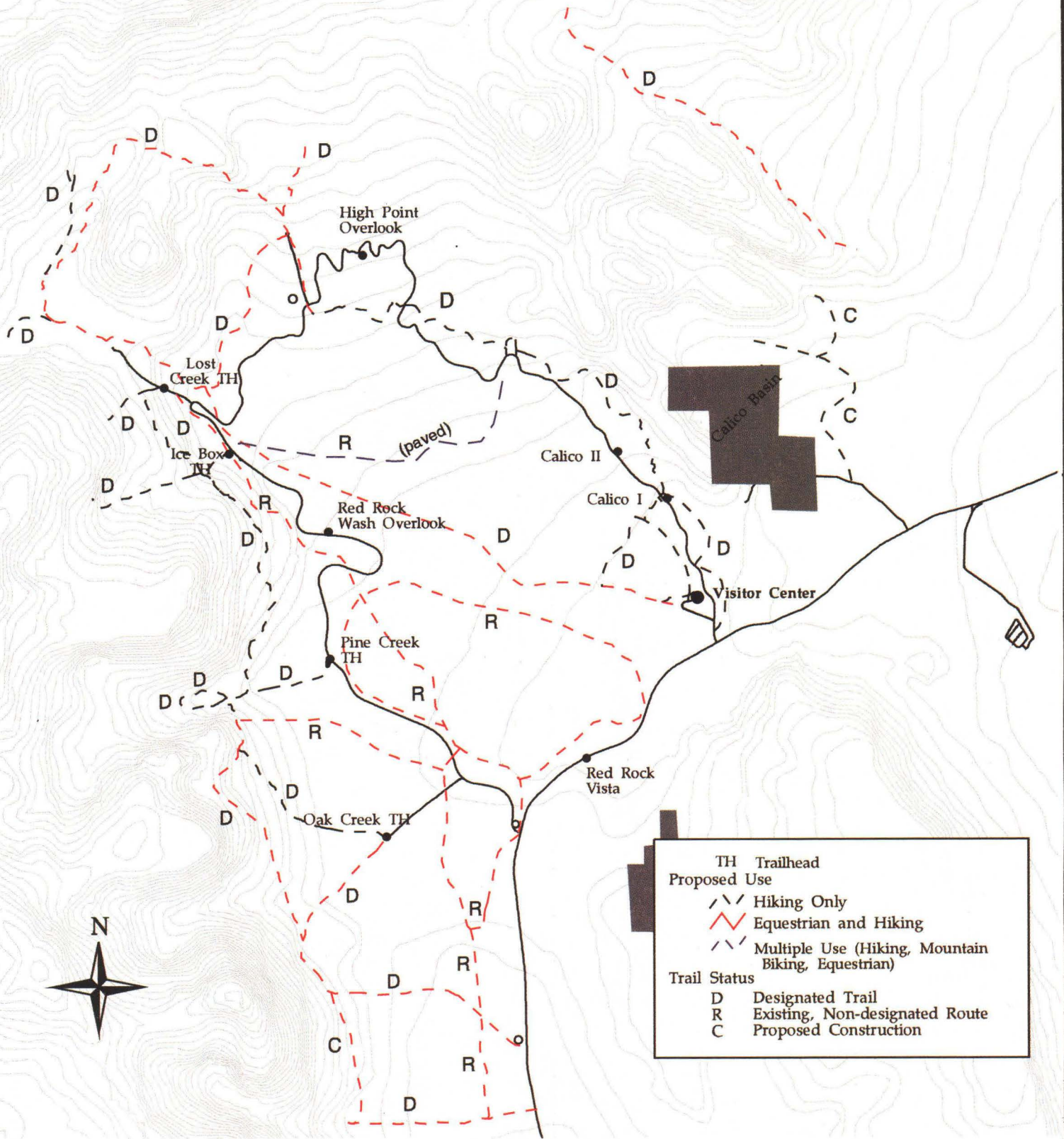
The trail between the Oak Creek Trailhead and Pine Creek (Arnight) and the trail between Oak Creek and Juniper Canyon are designated for hiking and equestrian use.

No trails are designated in the south expansion area (west of and including the Bird Springs Range) other than those included in the Cottonwood Valley Mountain Bike and Equestrian Trails EA.

No trails are designated north of La Madre Mountain.

The White Rock Loop, Keystone Thrust and La Madre trails are designated for hiking and equestrian use.

Trails in Scenic Drive Vicinity Alternative 2 - No Action

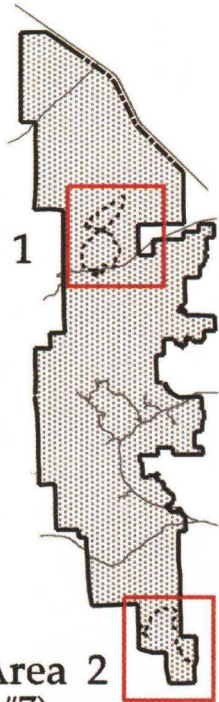


TH	Trailhead
Proposed Use	
	Hiking Only
	Equestrian and Hiking
	Multiple Use (Hiking, Mountain Biking, Equestrian)
Trail Status	
D	Designated Trail
R	Existing, Non-designated Route
C	Proposed Construction



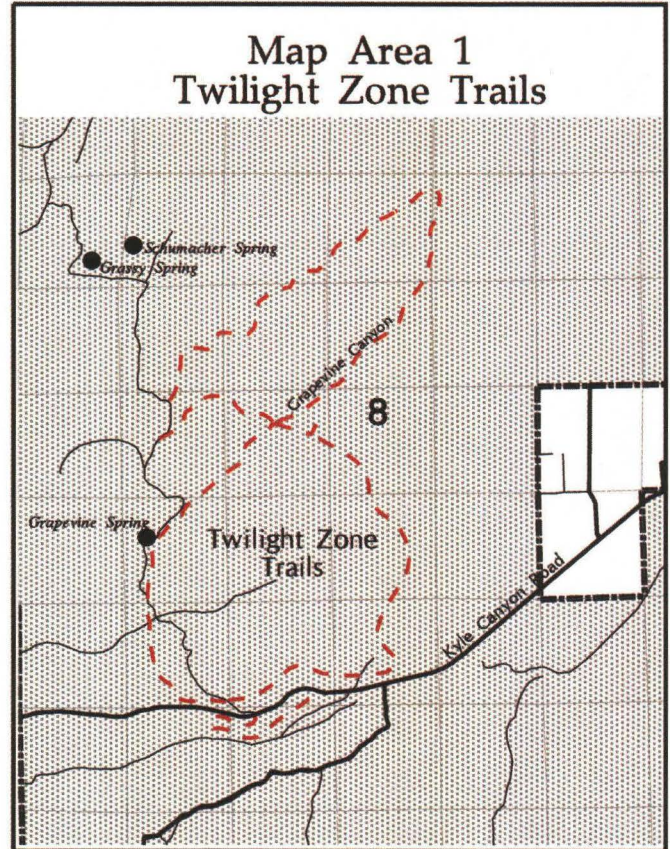
Blue Diamond to Jean and Twilight Zone Trails

Map Area 1
(Trail #8)

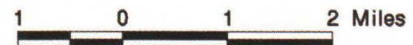
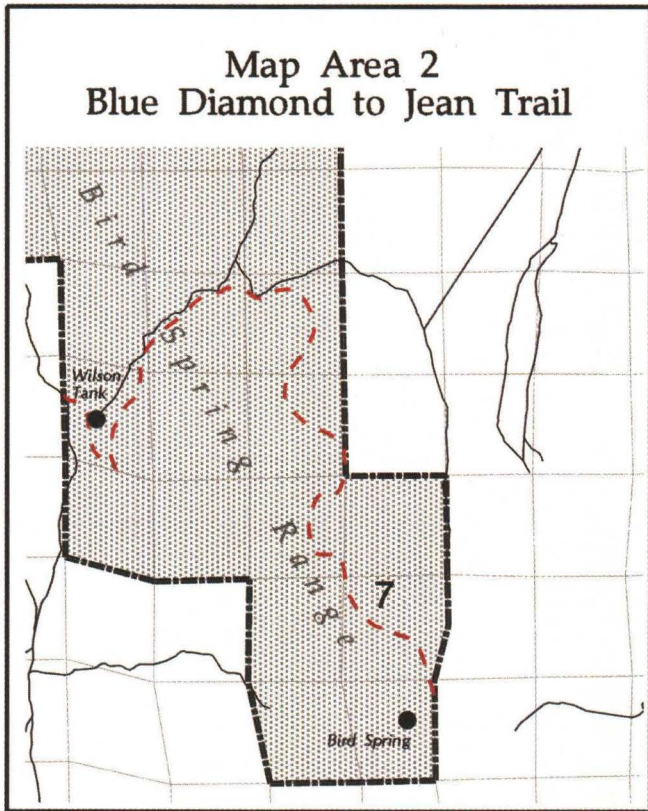


Map Area 2
(Trail #7)

Map Area 1
Twilight Zone Trails



Map Area 2
Blue Diamond to Jean Trail



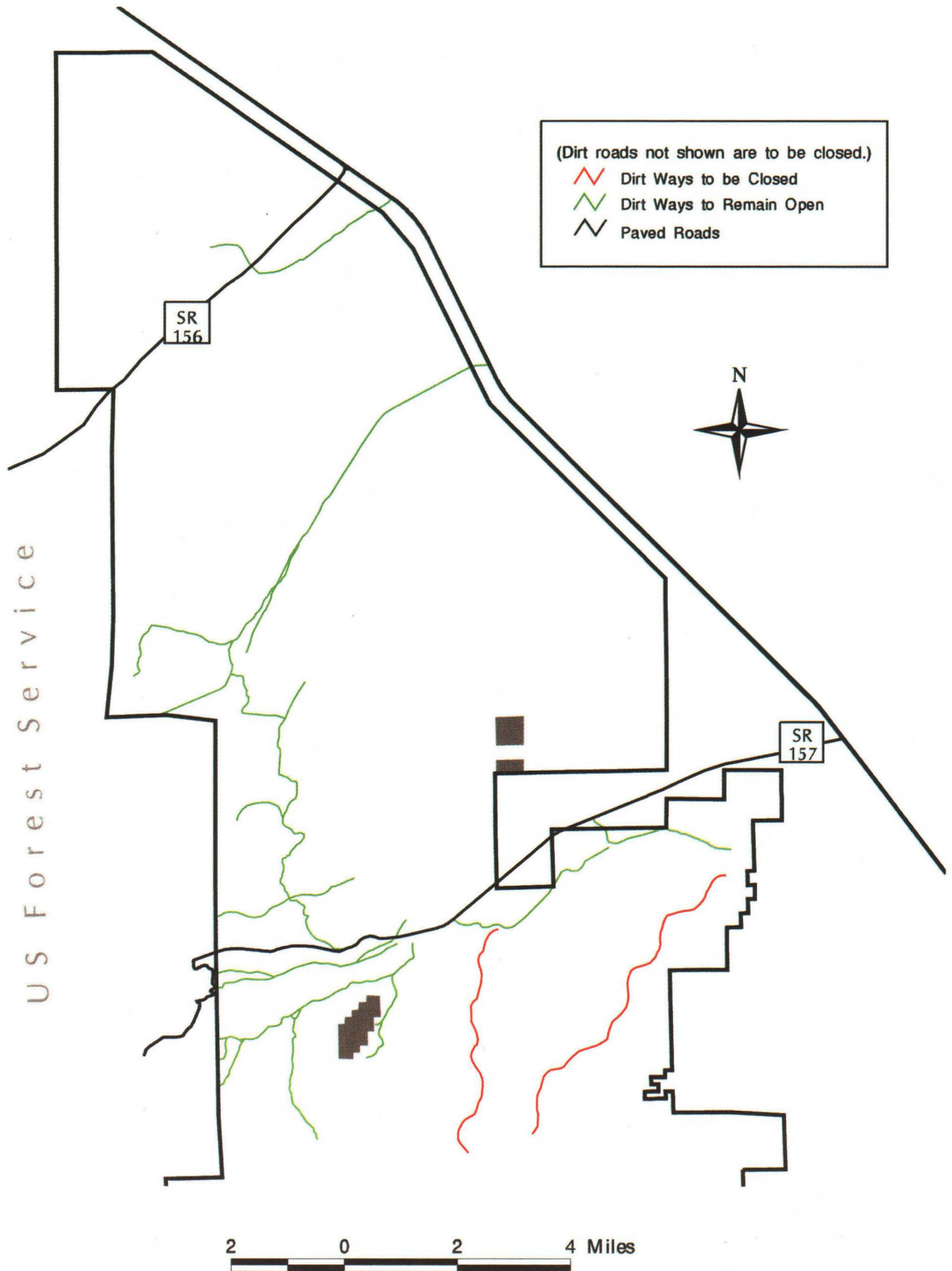
Dirt Roads:

The following maps indicate which dirt roads are to be closed and which will be left open. The status of dirt roads from La Madre Mountain south through Cottonwood Valley is the same for all alternatives and can be seen under Management Common To All Alternatives. Minor dirt routes not indicated on the maps are to be closed and used only for administrative purposes or targeted for restoration to a natural state.

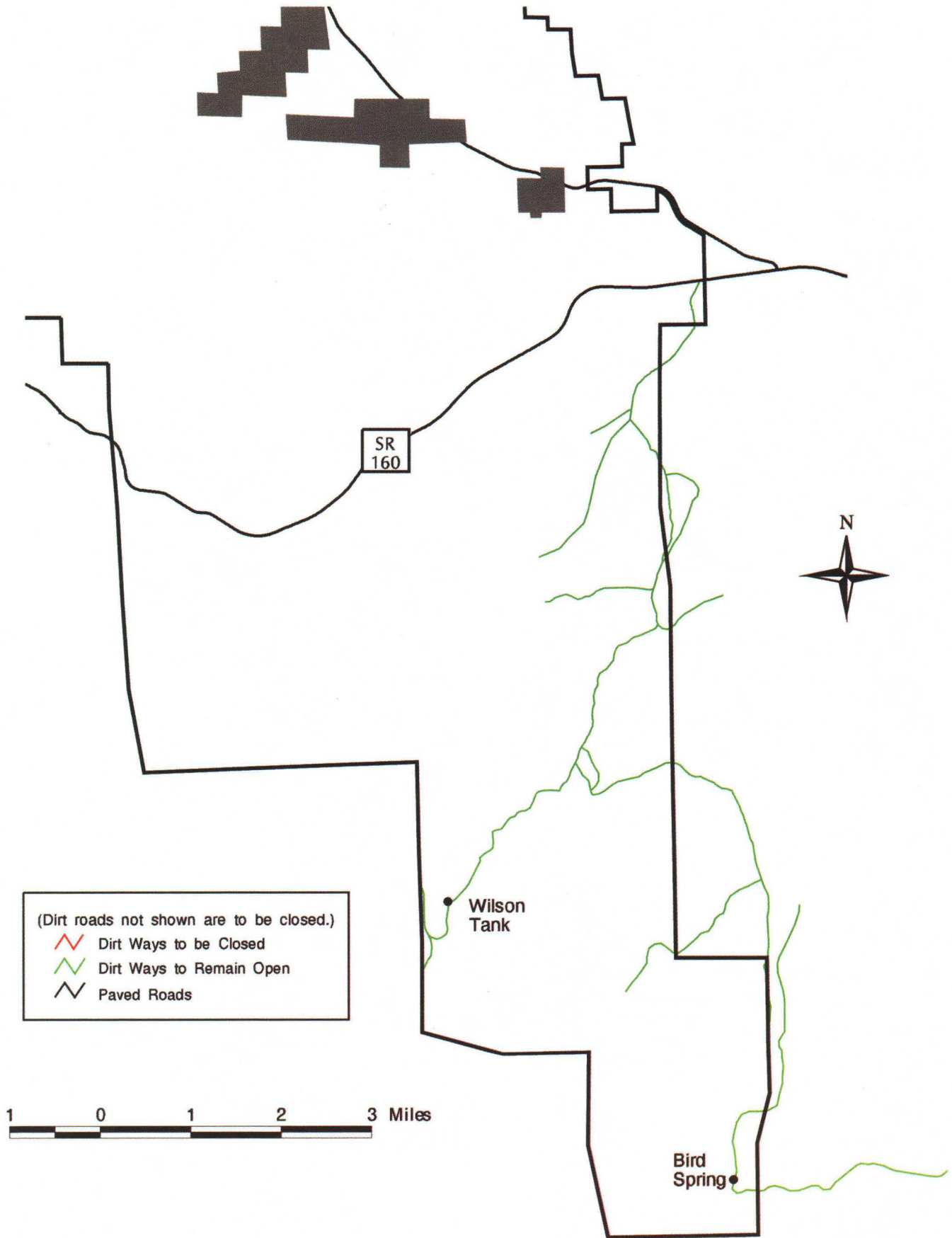
Paved Roads:

No new construction of roads.




Roads in North Expansion Alternative 2



Roads in South Expansion Alternative 2



(Dirt roads not shown are to be closed.)

-  Dirt Ways to be Closed
-  Dirt Ways to Remain Open
-  Paved Roads

1 0 1 2 3 Miles

ALTERNATIVE 3

Alternative 3 includes actions enhancing biodiversity, with some reduction in the miles of roads remaining open and moderate enhancement of the trails network. Existing developed waters would be available to wild horses and burros and riparian areas would be protected through fencing but new water developments would not be implemented unless approved in a future Herd Management Plan (HMA) and subsequent GMP amendment.

This alternative includes the actions listed in the Management Common To All Alternatives and the Standard Operating Procedures as well as the actions listed below.

Biodiversity - includes the issues concerning biodiversity, ecosystem management, and wild horses & burros

Biodiversity Preservation:

Conduct an ongoing program of population monitoring for T&E species, Candidate species (Blue Diamond cholla) and other Special Status Species (Angelica scabrida; Calochortus striatus; Astragalus mohavensis var. hemigyrous, (peregrine and springsnail). (App. 1, Special Status Species)

Re-introduce springsnails (Pyrgulopsis deaconi and P. turbatrix) into restored Willow Spring riparian habitat. (App. 2, Priority Management Areas)

Ecosystem Management:

Identify core habitat for the Bighorn sheep herd north of SR 160 and monitor for recreation impacts in coordination with the Nevada Division of Wildlife. Implement visitor use restrictions as needed. Utilize Bighorn as an umbrella species to monitor and evaluate habitat and the potential for fragmentation due to human use in the upper elevations of the Spring Range within the NCA.

Implement strategies to minimize type conversion fires stemming from invasive exotic annual grasses.

Implement prescribed natural fire program to restore fire ecology of montane chaparral communities in escarpment canyons.

Establish a minimum response fire suppression policy for pinyon-juniper uplands to promote mosaic habitats, in coordination with the U.S. Forest Service, Spring Mountain National Recreation Area.

Wild Horse and Burro Management:

This alternative is divided into short and long term actions. Short term actions would begin upon approval of the plan. The

transition from the short term actions to long term actions would occur when; 1) the ecological condition of the plant communities and riparian areas in the area between State Route 160 and the Spring Mountain Ranch State Park approaches the desired plant community objectives, and 2) necessary improvements are in place to insure appropriate protection and management of the animals, riparian resources and vegetative condition.

The Red Rock Herd Management Area (HMA) would be amended from the boundary decision of the Las Vegas Resource Management Plan (10/98) by: 1) deleting the area north of Cave Canyon on the east side of State Route 159; 2) deleting the area north of Spring Mountain Ranch State Park on the west side of State Route 159; and 3) implementing a temporary closure to wild horse and burro use for the area between State Route 160 north to Spring Mountain Ranch State Park and west of State Route 159. The amended HMA would be implemented according to the sequence of actions listed below.

A viable wild horse population would remain in the amended HMA and be managed in their primary use area south of Spring Mountain Ranch State Park.

A viable burro population would remain in the amended HMA and be managed primarily on Blue Diamond Hill east of State Route 159 with the potential of burros also being found south of State Route 160.

Burros in the area west of State Route 159 and north of State Route 160 would be removed. This removal includes approximately 10 to 15 burros in the Calico Basin area and 10 to 15 burros in the Bonnie Springs area. The areas primarily used by the Calico Basin band (Red Spring, Calico Basin and State Route 159), are outside the HMA as shown in the HMA map, Las Vegas RMP (10/98). Following completion of fencing of the east side of State Route 159 burros from the Blue Diamond Hill band that drift down to State Route 159 and become acclimated to tourists by begging for food along State Route 159 would be removed as necessary to eliminate this nuisance and public hazard.

In the long term the wild horse and burro use would occur on the east side of State Route 159 south of Cave Canyon and on the west side of State Route 159 south of Spring Mountain Ranch State Park as described above. Wild horse and burro use would be temporarily removed from the area between State Route 160 north to the Spring Mountain Ranch State Park and west of State route 159 and reinstated when ecological condition objectives have been met.

Rational: The following factors have combined to reduce the range quality and cause habitat fragmentation in the Calico Basin/Visitor Center area:

habitat fragmentation due to fencing of State Route 159 and

Calico Basin Road in response to illegal off-road vehicle use displaced from Summerlin lands now closed to use;

increased residential development in Calico Basin;

rapid development of private lands on West Charleston Boulevard which will soon prevent any movement of burros to the east, a historic foraging area;

and effective loss of the use of Red Spring, due to increased recreation use and fencing installed to aid in recovery of the springsnail.

The following factors have combined to reduce the range quality and create a significant public safety concern in the area between Blue Diamond and Spring Mountain Ranch State Park. The proposed fencing of the east side of State Route 159 would mitigate these factors:

increased traffic associated with entry areas for the State Park and Bonnie Springs;

increased speed of traffic on State Route 159;

increased use of State Route 159 by commercial truck traffic.

Prior to burro population reductions in 1997, at least one burro was killed monthly in this area as a result of burro/vehicle collisions.

Sequence of short term actions:

1. Evaluate existing and potential water sources south of State Route 160 for maintenance needs, potentials and development costs. Investigate the potential for acquiring access to private water sources in the HMA.
2. Maintain Tunnel (Wilson Tank) and Bird Spring developments to correct known maintenance needs, ensure more reliable water availability and move troughs away from roads.
3. If possible pipe water from Lone Grapevine Spring 1.5 miles southeast under State Route 160 to provide a water source immediately south of State Route 160 eliminating the need for horses to travel north of the highway for water. This would also provide the ability to install off-site water troughs away from Lone Grapevine Spring when horses are able to be reintroduced in this area.
4. Determine the carrying capacity or Appropriate Management Level (AML) for both wild horses and burros in the HMA using an interdisciplinary resource team.

5. Remove burros located in the area west of State Route 159 and north of Spring Mt. Ranch State Park.
6. Using the desired plant community objectives in the GMP (Chapter 3), establish the criteria (range condition, water availability, riparian health) that must be monitored and analyzed in the process of determining when to allow reintroduction of wild horses and/or burros into the area north of State Route 160 and south of Spring Mountain Ranch.
7. Establish a minimum of one ten acre enclosure (660' x 660') in each identified habitat type to act as control plots for vegetation monitoring.
8. Conduct a scientifically valid inventory of vegetation condition, trend and frequency to establish baseline data.
9. Complete the fencing of the east side of State Route 159 by connecting the discontinuous existing sections of fence.
10. Develop at least two water sources for burro use in the area east of State Route 159 (Blue Diamond Hill) to reduce the desire of burros to access waters to the west and to facilitate viewing of animals by the visiting public.
11. Develop, with the Nevada Dept. of Transportation (NDOT), a fencing design capable of preventing animals from passing through the State Route 160 underpasses while not restricting flood waters. Initiate fencing.
12. Remove wild horses and any remaining burros from the area west of State Route 159 and north of State Route 160.
13. Complete a Herd Management Plan for the entire HMA including both lands within and lands outside of RRCNCA.
14. Complete development of additional waters as proposed outside of RRCNCA.

Sequence of long term actions:

15. Conduct annual trend studies to determine vegetative response, progress towards meeting desired plant community objectives and the amount of forage that would be available for wild horse use upon re-introduction.

The desired plant community objective for perennial grasses is 5 % basal cover. However, since grass

response is an unknown and meeting this objective absolutely may be difficult, or very long term, wild horse re-introduction consideration may begin when the following interim target is attained;

- 1) Two consecutive years where 80 % of the trend plots show 3 % or greater basal coverage by native perennial grasses.
16. Conduct annual utilization studies in areas still occupied by wild horses and burros.
17. When criteria relative to desired plant community objectives have been met, reintroduce wild horses and/or burros into the area between Spring Mountain Ranch and State Route 160 and continue protection and maintenance of fully functioning springs and riparian areas.
18. Monitor vegetation trend, condition and utilization to ensure that desired plant community objectives are maintained. In order for wild horses and/or burros to remain in this area, the percent basal coverage of perennial grasses may not drop below 3 % and continued progress towards the final objective of 5 % should be indicated in annual trend studies.
19. Adjust animal population as necessary to maintain progress towards desired plant community objectives and to maintain a viable animal population.

Proposed Water Developments; New Maintenance and Re-construction

The following existing range improvements would be maintained (after site specific project design and environmental analysis if necessary) to provide, as appropriate, reliable water for wild horses and burros, wildlife and riparian purposes.

1. Mud Spring # 1 - Maintain water for wildlife use, adjust fencing if water source is not fully included and move water trough further to the east away from fenced area and mountain bike trail.
2. Lone Grapevine Spring - Following the (short term) removal of wild horses and burros, maintain the enclosure fence but provide openings for wildlife and human (foot) access. Extend existing pipeline 1.5 miles southeast under State Route 160 to provide water for wild horse use south of State Route 160 .
3. Wilson Tank/Tunnel Spring - Complete redevelopment for improved reliability (excavation, headbox, pipeline and trough). Since this source is such a low producer and

geographically critical to wildlife, water yield needs to be evaluated to determine if any water remains available after wildlife needs are satisfied.

4. Bird Spring - Install a pipeline to move water off site (away from road) to reduce human influence and improve wild horse and burros use.

The following projects may also be implemented (see Alternative 1) but they are outside of RRCNCA and would be considered in a future Herd Management Plan and RMP amendment.

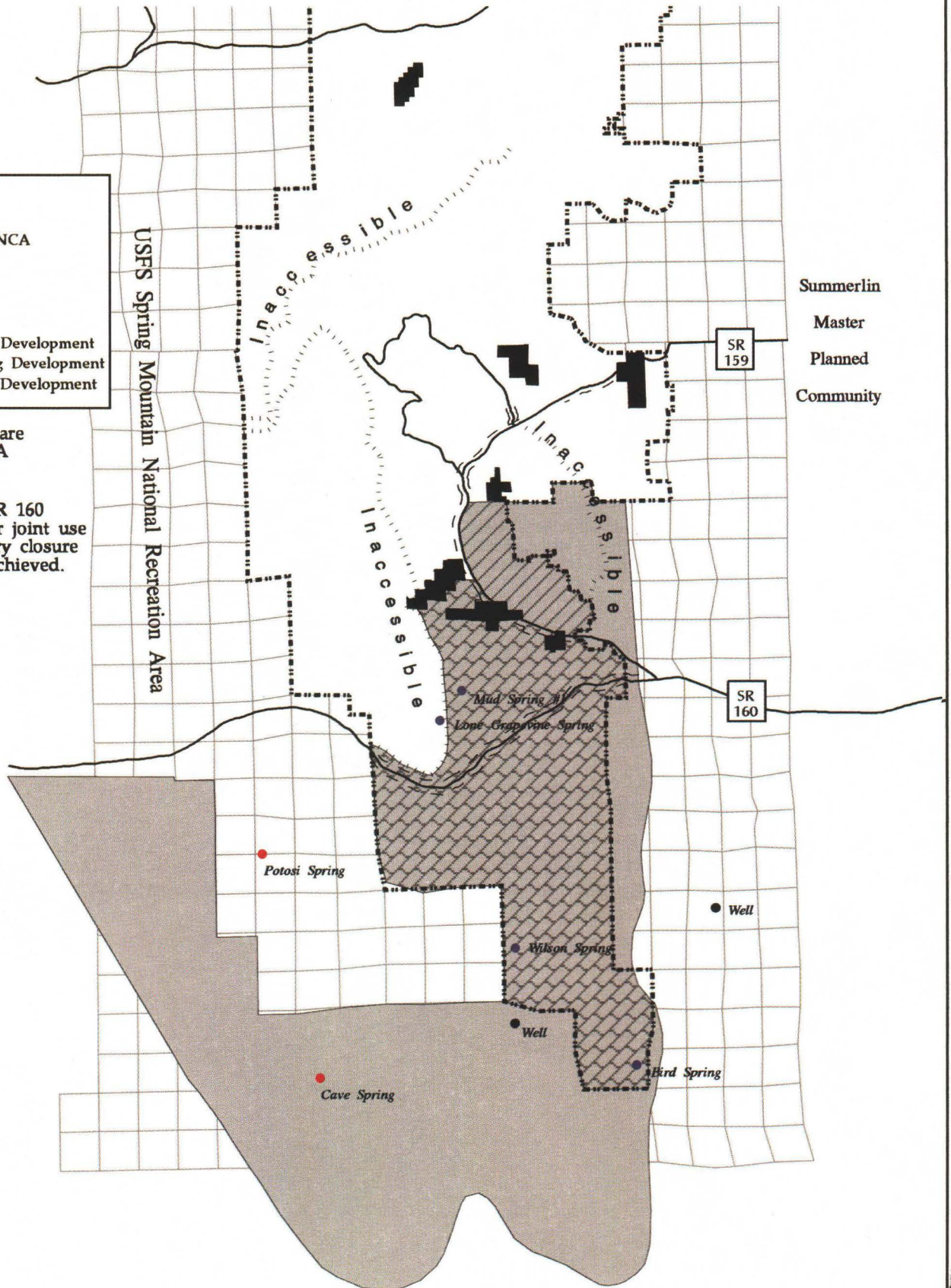
5. Wells - Develop 2-3 wells with associated pipelines to distribute use and reduce pressure on natural water sources within the HMA. NOTE - All proposed locations are in the southern portion of the HMA south and east of the NCA so this proposal is not analyzed in this document. See future HMA management plan.
6. Potosi Spring and Pipeline - Develop the spring by installation of a pipeline system with multiple troughs. NOTE - This area is on private and Forest Service lands and is not analyzed in this document. See future HMA management plan.
7. Cave Spring - Complete development to move water off site for wild horses and burros (headbox, pipeline and trough). NOTE - This site is not within the NCA and is not analyzed in this document. See future HMA management plan.
8. Water Hauls - Water hauls may be used to accelerate the process of plan implementation and to act as temporary water sources while permanent sources such as wells and pipelines are under design and development.
9. Ninety-nine Spring - Coordinate with USFS to develop and pipe water 2 ½ miles east into southern Cottonwood Valley. NOTE - This site is not within the NCA and is not analyzed in this document. See future HMA management plan.

Red Rock Herd Management Area (HMA) Alternative 3

- | | |
|----------------------------------|-----------------------------|
| | Fence |
| | Cliff |
| Primary Animal Use in NCA | |
| | Burros |
| | Horses |
| | Joint Use |
| Water Developments | |
| | Existing Spring Development |
| | Proposed Spring Development |
| | Proposed Well Development |

All gray-shaded areas are within designated HMA boundary.

* The area north of SR 160 which is designated for joint use will be under temporary closure until desired PNC is achieved.



Water, Air and Vegetative Resources

Riparian Restoration:

Camouflage and close trail spurs and braids (Oak Creek; First Creek; Pine Creek; Lost Creek; Red Spring; Bootleg; Rainbow; Wheeler Camp Spring; Mud Spring #1).

Adopt a policy of discouraging recreation use in riparian habitats:

- Evaluate and rehabilitate present high use areas and minimize future promotion; deflect use to non-riparian areas.

Air Quality:

(See Management Common to All Alternatives)

Vegetation:

(See Management Common to All Alternatives)

Recreation Opportunities - includes the issues concerning camping, rock climbing, target shooting, trails and dirt roads

Camping:

Dispersed camping would be allowed north of La Madre Mountain on existing disturbed areas. If monitoring shows that additional impacts occur as a result, camping would be limited to specific designated sites.

All camping, whether dispersed or in the designated campground, would be limited to a 14 day maximum stay. (Current situation)

Dispersed camping would be allowed within 200 feet of designated roads east of the Bird Spring Range on existing disturbed areas.

No camping would be allowed within 1/4 mile of any water source (natural or man made), spring, pond, or natural catchment basin with permanent water.

Target Shooting:

The NCA would be (is currently) closed to target shooting.

Trails:

Mountain Bikes:

The Oak Creek trails would not be designated for mountain bike use.

Designate the Blue Diamond to Jean route (portion within NCA) that has been used annually for a group ride event.

Designate the "Twilight Zone" trails north of the Kyle Canyon road.

Road bikes:

Pave the old road between Sandstone Quarry and Willow Spring to provide an alternative to the Scenic Drive between these two points. This will eliminate the most dangerous sections of the Scenic Drive and reduce the number of riders who turn around and ride the wrong way after being defeated by the steep hills beyond Sandstone Quarry.

Equestrian:

Restrict equestrian use to designated trails within the original NCA boundary (south of La Madre Mountain to the USFS/BLM common boundary 3 miles south of SR 160).

Designate the following routes and trails to include equestrian use:

- White Rock loop and Keystone Thrust trails - provide a water trough near the intersection of Rocky Gap Road and the La Madre trailhead;
- the Oak Creek trails;
- the trail between Oak Creek and Juniper Canyon (the Knoll Trail);
- the trail between Juniper Canyon and Pine Creek (a portion of the Arnight Trail);
- the old road from Willow to the Visitor Center;
- the old road beginning at the Scenic Drive/Oak Creek Road junction and following the ridge just south of Pine Creek;
- the Blue Diamond to Jean route (portion within NCA) which has been used for an annual equestrian ride event;
- the existing equestrian route from First Creek to Lost Creek, out away from the base of the escarpment;
- the loop route directly north of Red Rock Vista;

- the existing routes from the Scenic Drive exit lot to adjacent trails;

Designate equestrian staging areas at the Scenic Drive exit lot and the Oak Creek Campground location (when the campground is relocated).

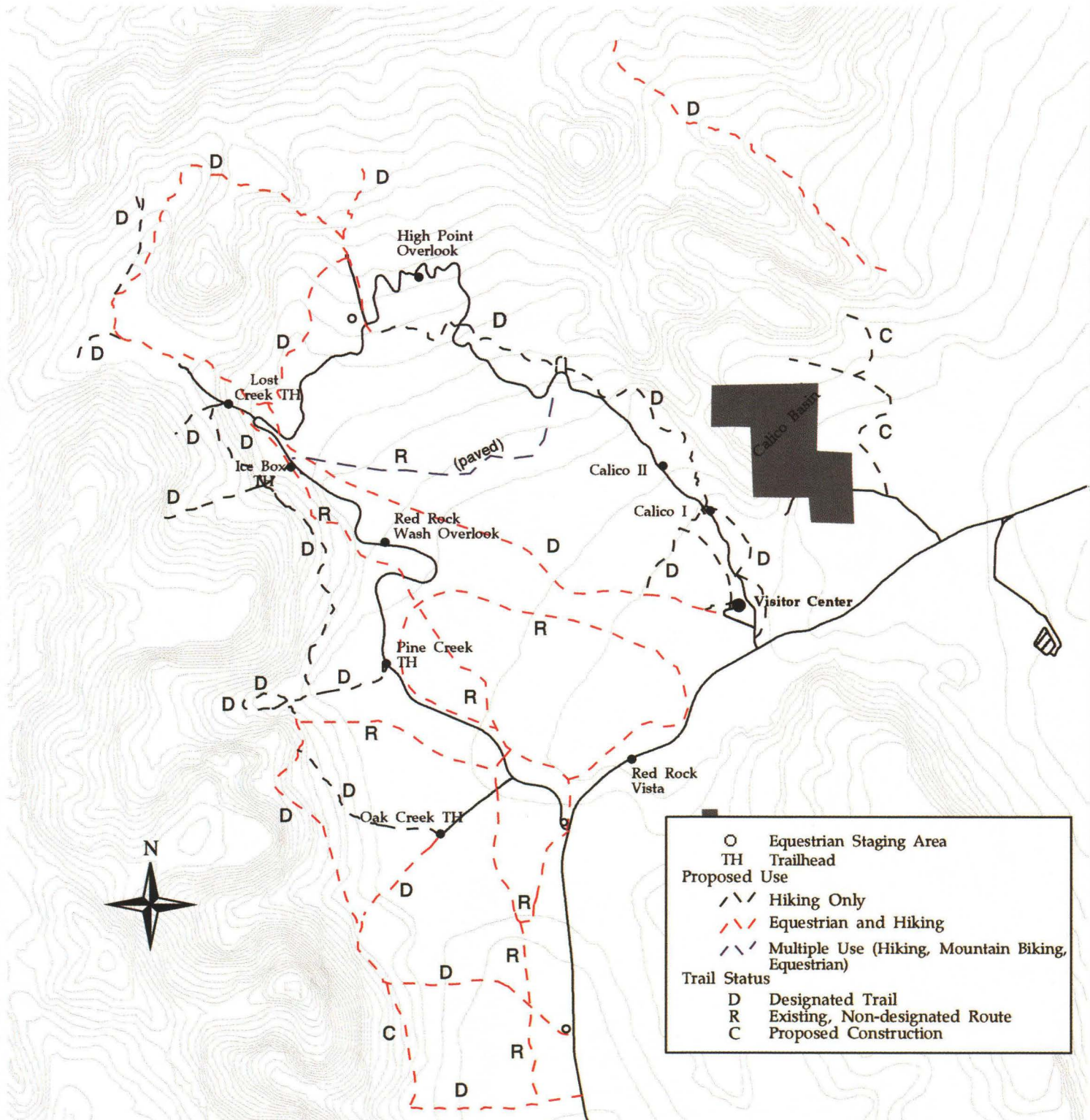
Construct a separate parallel Red Valley trail specified for equestrian use to separate mountain bikes and horse users in this narrow valley.

Hike Only:

Designate the following trails for hiking use only:

- the La Madre Spring (spur) Trail north of the intersection with the White Rock Loop Trail;
- the Arnicht Trail from the North Oak Creek trailhead to the intersection with the Knoll Trail;
- the trail between Pine Creek and Ice Box (the Dale Trail);
- the trail between Ice Box and Lost Creek (the SMYC Trail).

Trails in Scenic Drive Vicinity Alternative 3

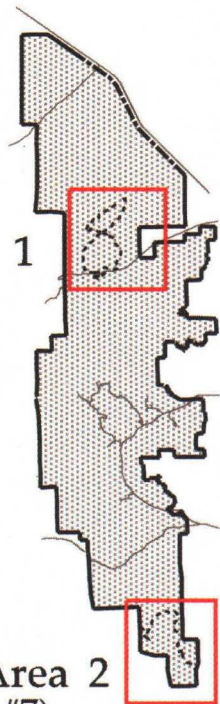


○	Equestrian Staging Area
TH	Trailhead
Proposed Use	
— / — / —	Hiking Only
- - - / - - -	Equestrian and Hiking
- - - / - - - / - - -	Multiple Use (Hiking, Mountain Biking, Equestrian)
Trail Status	
D	Designated Trail
R	Existing, Non-designated Route
C	Proposed Construction



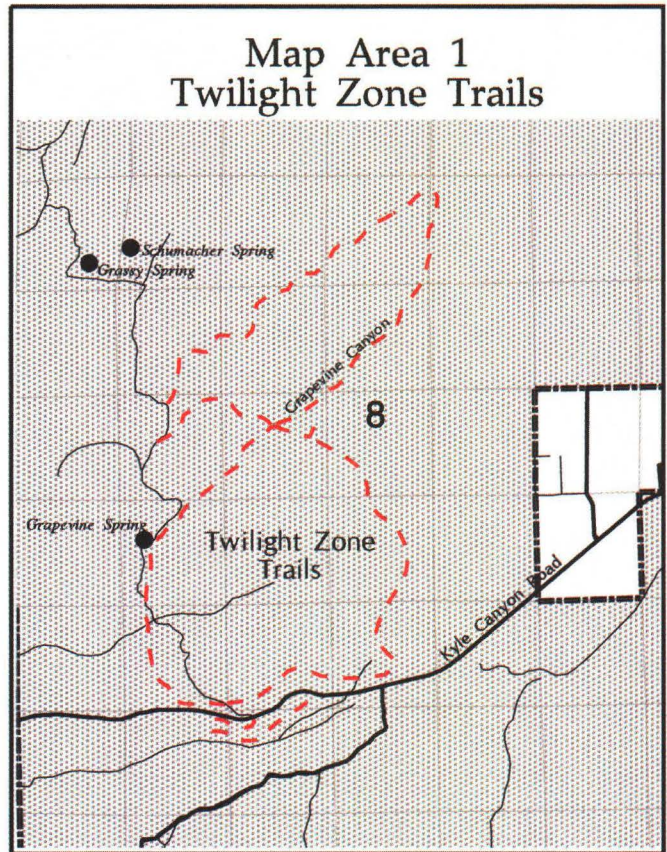
Blue Diamond to Jean and Twilight Zone Trails

Map Area 1
(Trail #8)

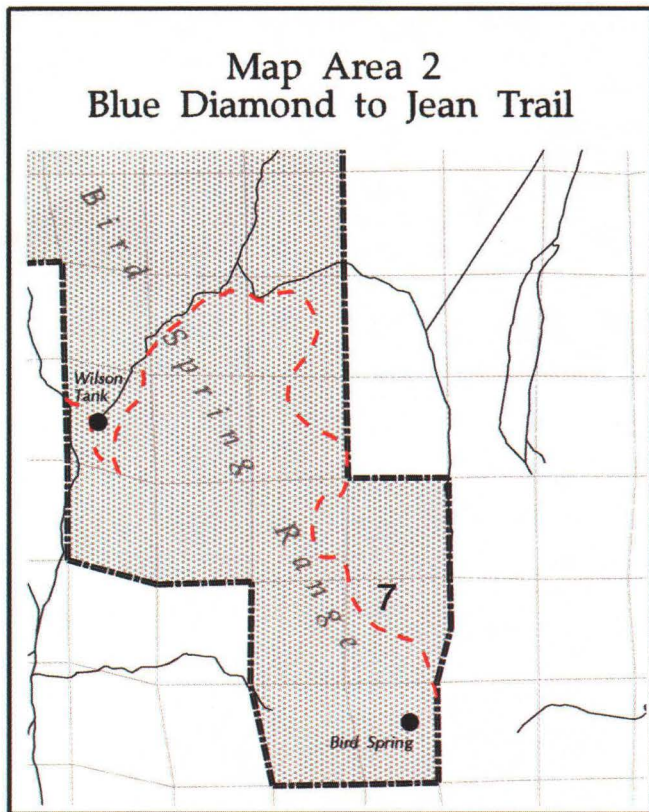


Map Area 2
(Trail #7)

Map Area 1
Twilight Zone Trails



Map Area 2
Blue Diamond to Jean Trail



Dirt Roads:

The following maps indicate which dirt roads are to be closed and which will be left open. The status of dirt roads from La Madre Mountain south through Cottonwood Valley is the same for all alternatives and can be seen under Management Common To All Alternatives. Minor dirt routes not indicated on the maps are to be closed and used only for administrative purposes or targeted for restoration to a natural state.

The access road to Cottontail will remain open to that location and closed beyond.

Paved Roads:

Construct a 2.65 mile return road from Sandstone Quarry to the Visitor Center (see map# M1 on page 29 in Plan section).




Because the Scenic Drive is a one-way road, when any of the washes (Sandstone, Red Rock or Pine Creek) are affected by a flash flood or winter ice is on the high points of the road, the entire Scenic Drive must be closed to use. This happens several times every year. The return road would allow at least a portion of the Scenic Drive, unaffected by floods or ice, to remain open at all times allowing use in the Calico Hills and Sandstone Quarry areas.

This would also provide a shortened loop for climbers and hikers recreating in the Calico Hills, over ambitious bike riders who discover the entire Scenic Drive is more than they bargained for, and road walkers and runners who occasionally prefer a shorter alternative. All of the above have been known to return against one-way traffic to avoid traveling the entire Scenic Drive. Many of those in motor vehicles who do drive the remaining portion of the Scenic Drive, do so at excessive speeds, causing unsafe conditions and detracting from the experience of others wishing to observe the scenery.

Roads in North Expansion Alternative 3

U S Forest Service

(Dirt roads not shown are to be closed.)

-  Dirt Ways to be Closed
-  Dirt Ways to Remain Open
-  Paved Roads

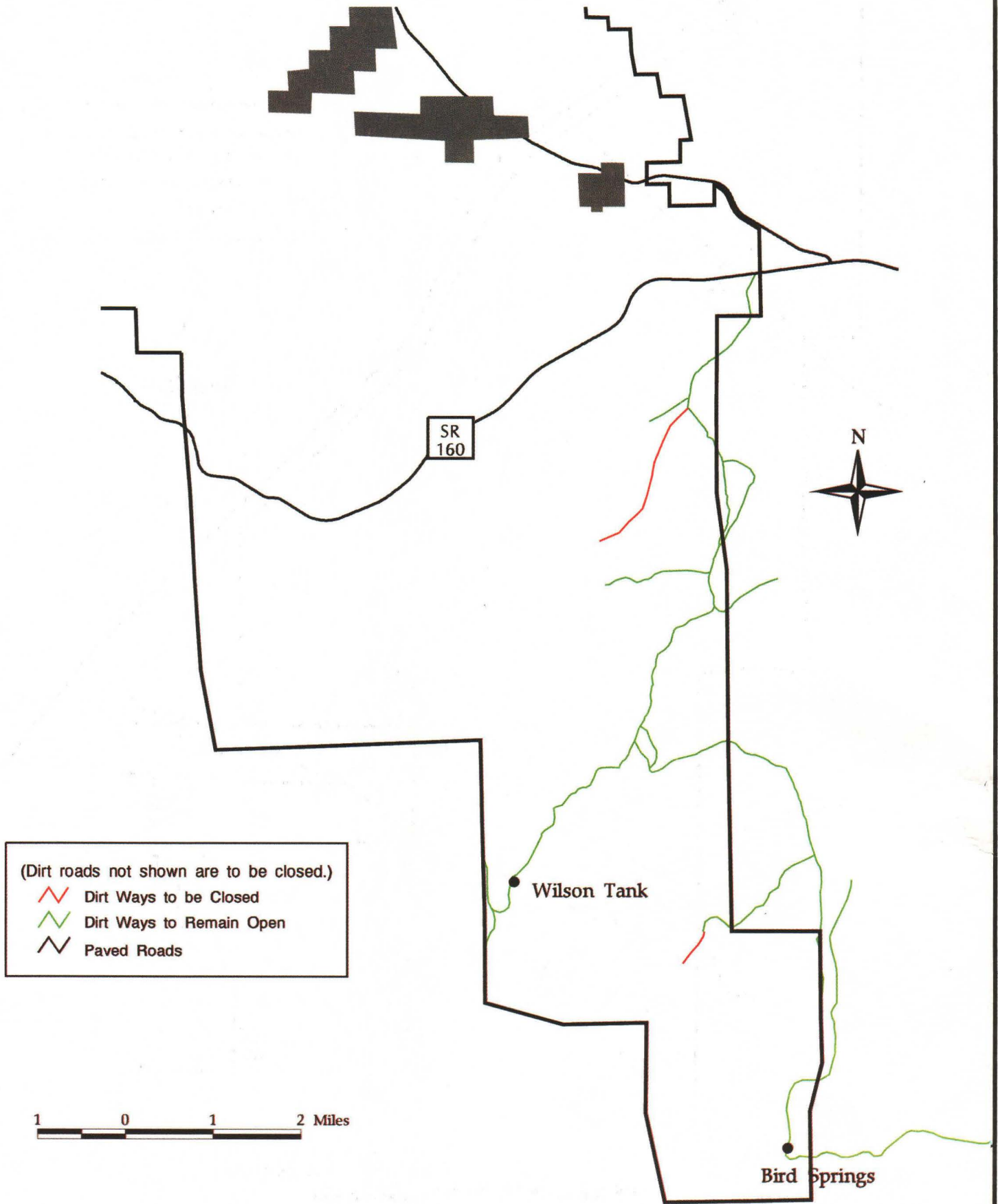


SR 156

SR 157



Roads in South Expansion Alternative 3



ALTERNATIVE 4

This alternative emphasizes biodiversity, including riparian restoration, biological preservation, and ecosystem management. Emphasis would be placed on rehabilitating and ensuring proper functioning condition for riparian areas and providing adequate water for native wildlife. Less emphasis would be placed on maintaining water developments for wild horse and burro use. The miles of roads left open is lower than in any other alternative and the fewest recreation enhancements are proposed.

This alternative includes the actions listed in the Management Common To All Alternatives and the Standard Operating Procedures as well as the actions listed below.

Biodiversity - includes the issues concerning biodiversity, ecosystem management, and wild horses & burros

Biodiversity Preservation:

Conduct an ongoing program of population monitoring for T&E species, Candidate species (Blue Diamond cholla) and other Special Status Species (Angelica scabrida; Calochortus striatus; Astragalus mohavensis var. hemigyrous, (peregrine and springsnail). (App. 1, Special Status Species)

Re-introduce springsnails (Pyrgulopsis deaconi and P. turbatrix) into restored Willow Spring riparian habitat. (App. 2, Priority Management Areas)

Ecosystem Management:

Identify core habitat for the Bighorn sheep herd north of SR 160 and monitor for recreation impacts in coordination with the Nevada Division of Wildlife. Implement visitor use restrictions as needed. Utilize Bighorn as an umbrella species to monitor and evaluate habitat and the potential for fragmentation due to human use in the upper elevations of the Spring Range within the NCA.

Implement strategies to minimize type conversion fires stemming from invasive exotic annual grasses.

Implement prescribed natural fire program to restore fire ecology of montane chaparral communities in escarpment canyons.

Establish a minimum response fire suppression policy for pinyon-juniper uplands to promote mosaic habitats, in coordination with the U.S. Forest Service, Spring Mountain National Recreation Area.

Wild Horse and Burro Management:

The Red Rock Herd Management Area (HMA) would be amended from

the boundary decision of the Las Vegas Resource Management Plan (10/98) by the deletion of the area north of State Route 160. The State Route 160 control fences create a physical boundary to wild horse and burro movement and use.

A viable wild horse population would remain in the HMA and be managed within the portion of their existing primary use area south of State Route 160.

A viable burro population would remain and be managed within the HMA south of State Route 160.

All burros and horses north of State Route 160 would be removed.

An exception to the removal may be made for the four wild horses that live in and have been unofficially "adopted" by Blue Diamond if forage studies show that these animals can survive and thrive within the narrow Blue Diamond/Wheeler Camp Spring/Oliver Ranch corridor along State Route 159 that they occupy. Should the residents of Blue Diamond decide that they no longer want these horses living on/in community areas, they would be removed since the ball field grass appears to be a major food source for these animals.

Rational: The following factors have combined to reduce the range quality and habitat available in the Calico Basin/Visitor Center area:

- habitat fracturing due to fencing of State Route 159 and Calico Basin Road in response to illegal off-highway vehicle use displaced from Summerlin private lands now closed off;
- increased residential development in Calico Basin;
- rapid development of private lands on West Charleston Boulevard which will soon prevent any movement of burros to the east, an area historically used for foraging;
- and effective loss of the use of Red Spring, due to increased recreation use and fencing installed to aid in recovery of the Spring Snail.

The following factors have combined to reduce the range quality and create a significant public safety concern in the area between Blue Diamond and Spring Mountain Ranch State Park:

- increase traffic associated with entry areas for the State Park and Bonnie Springs;

- increased speed of traffic on State Route 159;
- increased use of State Route 159 by commercial truck traffic.

Prior to population reductions in 1997, at least one burro was killed monthly as a result of burro/vehicle collisions.

Proposed Water Developments; New, Maintenance or Re-construction

The following existing water developments currently used and maintained for wild horses and burros would be maintained (after site specific project design and environmental analysis if necessary) to provide reliable water for wild horses and burros. No new water project development would occur.

1. Wilson Tank/Tunnel Spring - Complete redevelopment for improved reliability (excavation, headbox, pipeline and trough). Since this source is such a low producer and geographically critical to wildlife, water yield needs to be evaluated to determine if any water remains available after wildlife needs are satisfied.
2. Bird Spring - Install a pipeline to move water off site (away from road) to reduce human influence and improve wild horse and burros use.

The following projects may also be implemented (see Alternative 1) but they are outside of RRCNCA and would be considered in a future Herd Management Plan and RMP amendment.

3. Wells - Develop 2-3 wells with associated pipelines to distribute use and reduce pressure on natural water sources within the HMA. NOTE - All proposed locations are in the southern portion of the HMA south and east of the NCA so this proposal is not analyzed in this document. See future HMA management plan.
4. Potosi Spring and Pipeline - Develop the spring by installation of a pipeline system with multiple troughs. NOTE - This area is on private and Forest Service lands and is not analyzed in this document. See future HMA management plan.
5. Cave Spring - Complete development to move water off site for wild horses and burros (headbox, pipeline and trough). NOTE - This site is not within the NCA and is not analyzed in this document. See future HMA management plan.

Sequence of short term actions:

1. Evaluate existing and potential water sources south of State Route 160 for maintenance needs, potentials and development costs. Investigate the potential for acquiring access to waters from private sources in the HMA outside of RRCNCA.
2. Maintain Tunnel (Wilson Tank) and Bird Spring developments to correct known maintenance needs, ensure more reliable water availability and move troughs away from roads.
3. If technically feasible, extend the existing Lone Grapevine Spring pipeline 1.5 miles southeast under State Route 160 to provide a water source immediately south of State Route 160 eliminating the need for horses to travel north of the highway for water.
4. Determine the carrying capacity or Appropriate Management Level (AML) for both wild horses and burros in the HMA using an interdisciplinary resource team.
5. Remove wild horses and burros located north of State Route 160.
6. Using the desired plant community objectives in the GMP (Chapter 3), establish the criteria (range condition, water availability, riparian health) to be monitored and analyzed.
7. Establish a minimum of one ten acre enclosure (660' x 660') in each identified habitat type to act as control plots for vegetation monitoring.
8. Conduct a scientifically valid inventory of vegetation condition, trend and frequency to establish baseline data.
9. Complete a Herd Management Plan (HMP) for the entire HMA including both lands within and lands outside of RRCNCA.
10. Complete development of additional waters as proposed in the HMP.









Sequence of long term actions:

11. Conduct annual trend studies to determine vegetative response and progress towards meeting desired plant community objectives.
12. Conduct annual utilization studies in areas still occupied by wild horses and burros.

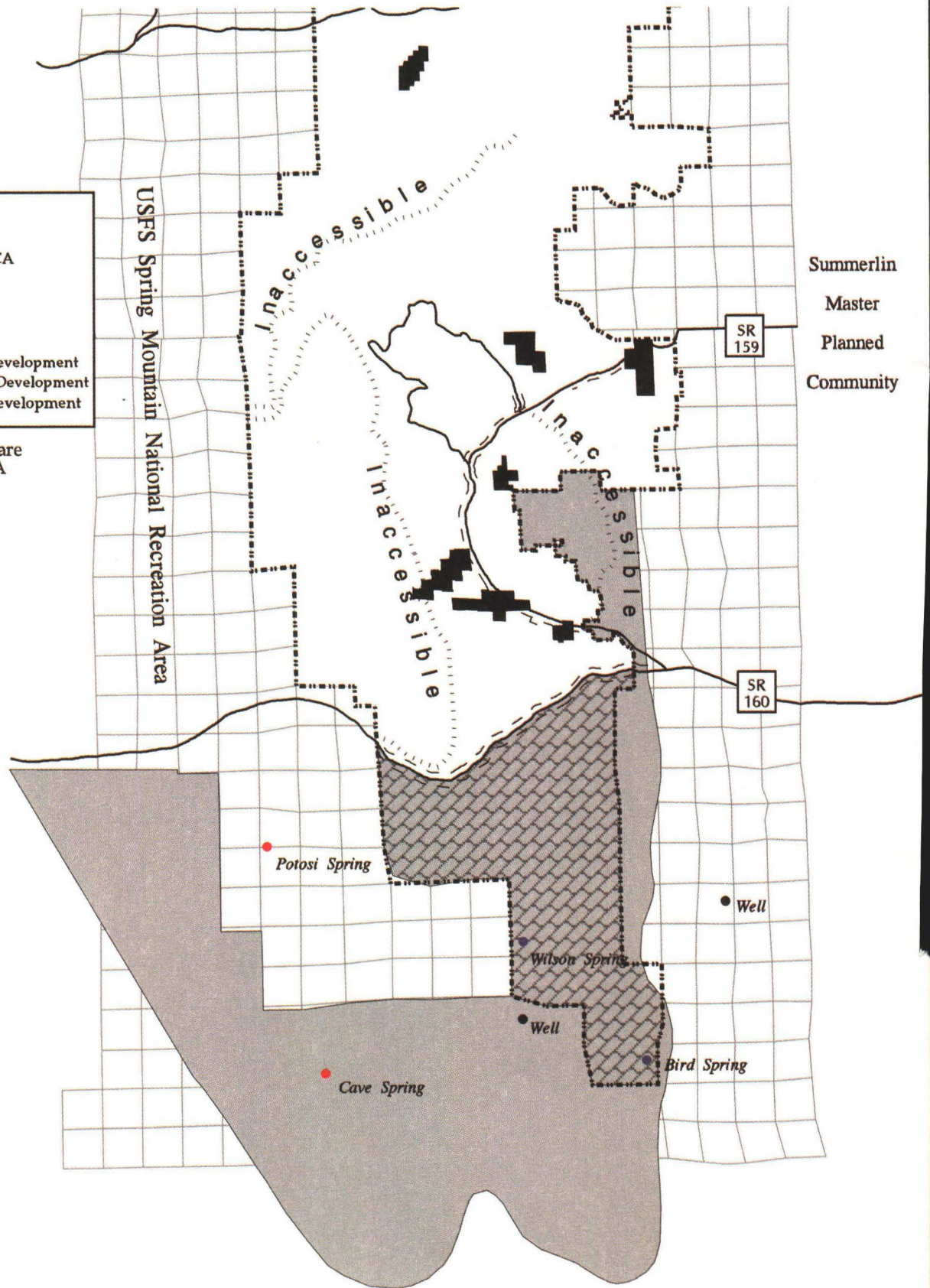
13. Monitor vegetation trend, condition and utilization to ensure that desired plant community objectives are maintained.

14. Adjust animal population as required.

Red Rock Herd Management Area (HMA) Alternative 4

	Fence
	Cliff
Primary Animal Use in NCA	
	Burros
	Horses
	Joint Use
Water Developments	
	Existing Spring Development
	Proposed Spring Development
	Proposed Well Development

All gray-shaded areas are within designated HMA boundary.



1 0 1 2 3 4 5 Miles

Water, Air and Vegetative Resources

Riparian Restoration:

Camouflage and close trail spurs and braids (Oak Creek; First Creek; Pine Creek; Lost Creek; Red Spring; Bootleg; Rainbow; Wheeler Camp Spring; Mud Spring #1).

Adopt a policy of discouraging recreation use in riparian habitats:

- Evaluate and rehabilitate present high use areas and minimize future promotion; deflect use to non-riparian areas.

Air Quality:

(See Management Common to All Alternatives)

Vegetation:

(See Management Common to All Alternatives)

Recreation Opportunities - includes the issues concerning camping, rock climbing, target shooting, trails and dirt roads

Camping:

No camping would be allowed south of SR 160.

Dispersed camping would be allowed north of La Madre Mountain on existing disturbed areas. If monitoring shows that additional impacts occur as a result, camping would be limited to specific designated sites.

Dispersed camping would be limited to a maximum of 7 days and a maximum group size of 10 people. Groups of more than 10 people would be required to use the Mile 13 Campground.

No camping would be allowed within 1/4 mile of any water source (natural or man made), spring, pond, or natural catchment basin with permanent water.

Target Shooting:

The NCA would be (is currently) closed to target shooting.

Trails:

Mountain Bikes:

Mountain bikes would not be allowed on any trails between Spring Mountain Ranch State Park and La Madre Mountain.

Designate the Blue Diamond to Jean route (portion within NCA) that has been used annually for a group ride event.

Designate the "Twilight Zone" trails north of the Kyle Canyon road.

Modify existing and proposed trails to avoid springs and riparian areas.

Equestrian:

Restrict equestrian use to designated trails within the area south of La Madre Mountain to the USFS/BLM common boundary 3 miles south of SR 160.

Designate the following routes and trails to include equestrian use:

- the Oak Creek trails;
- the Blue Diamond to Jean route (portion within NCA) which has been used for an annual equestrian ride event;
- the existing equestrian route from First Creek to Lost Creek, out away from the base of the escarpment;
- the loop route directly north of Red Rock Vista;
- the existing routes from the Scenic Drive exit lot to adjacent trails;

Designate equestrian staging areas at the Scenic Drive exit lot and the Oak Creek Campground location (when the campground is relocated).

Construct a separate paralleling Red Valley trail specified for equestrian use to separate mountain bikes and horses in this narrow valley.

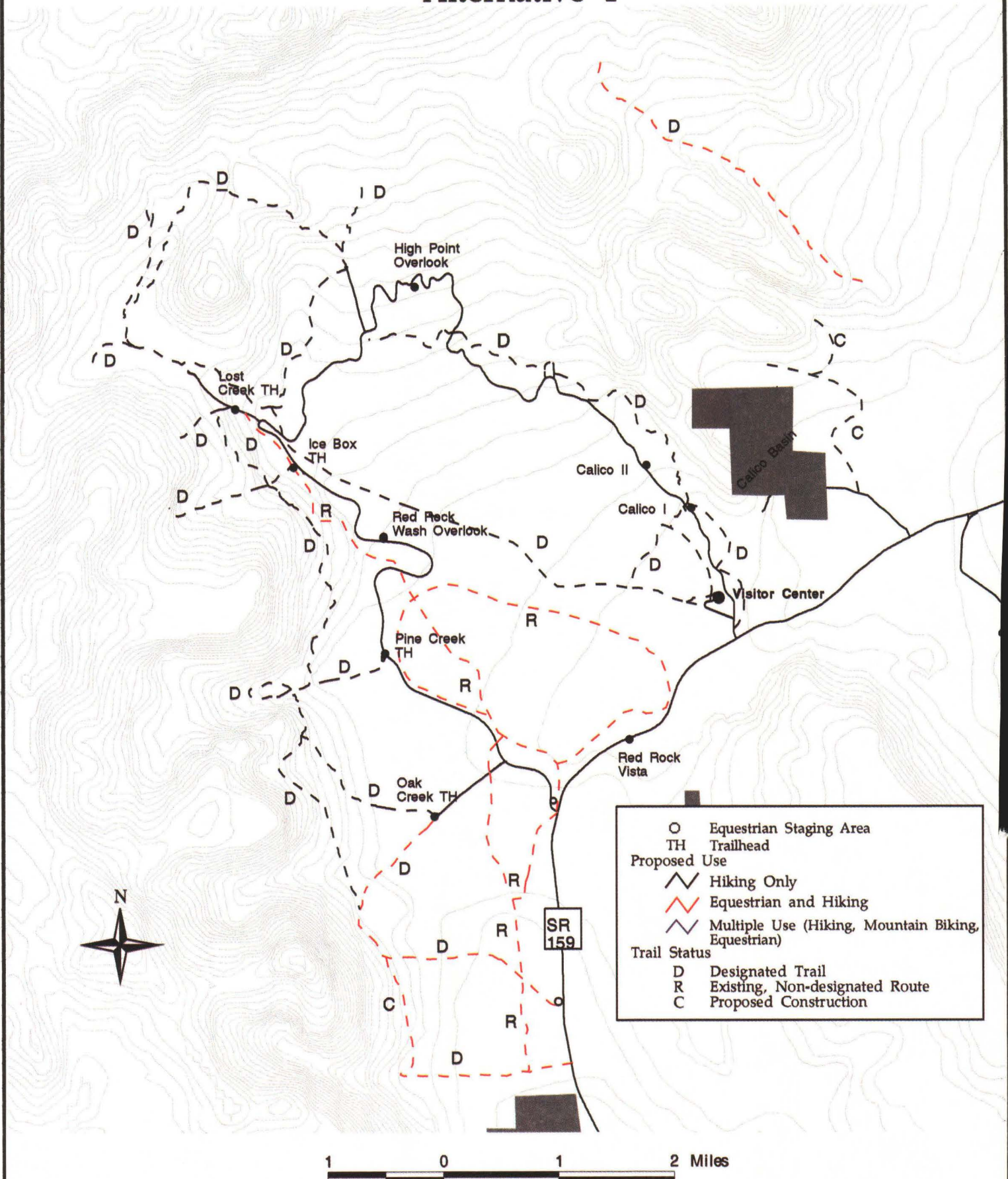
Hike Only:

Designate the following trails for hiking use only:

- the White Rock Loop Trail (except road portion);
- the La Madre and Keystone Thrust trails;
- the Arnight Trail from the North Oak Creek trailhead to Pine Creek;

- The Base of the Escarpment Trail System composed of the following:
 - the trail between Oak Creek and Juniper Canyon (Knoll Trail);
 - the trail between Juniper Canyon and Pine Creek (a portion of the Arnight Trail);
 - the trail between Pine Creek and Ice Box (Dale Trail);
 - the trail between Ice Box and Lost Creek (SMYC Trail).

Trails in Scenic Drive Vicinity Alternative 4

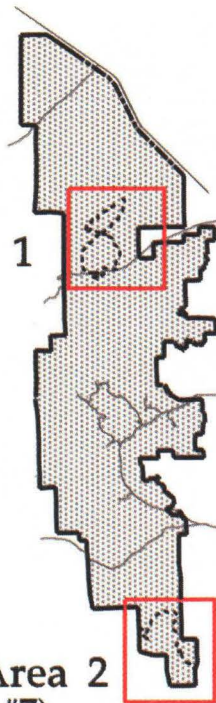


○	Equestrian Staging Area
TH	Trailhead
Proposed Use	
—	Hiking Only
- - -	Equestrian and Hiking
- · - · -	Multiple Use (Hiking, Mountain Biking, Equestrian)
Trail Status	
D	Designated Trail
R	Existing, Non-designated Route
C	Proposed Construction



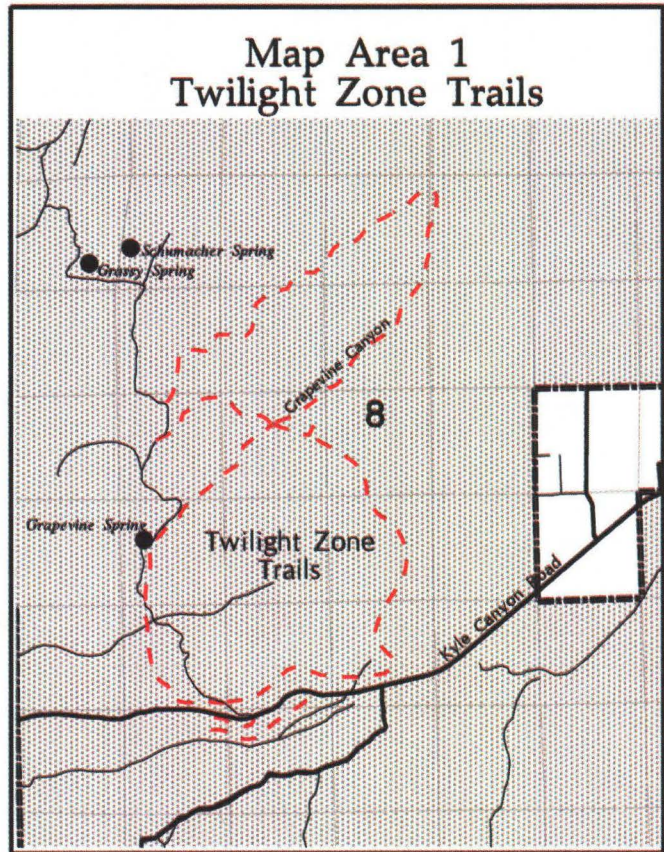
Blue Diamond to Jean and Twilight Zone Trails

Map Area 1
(Trail #8)

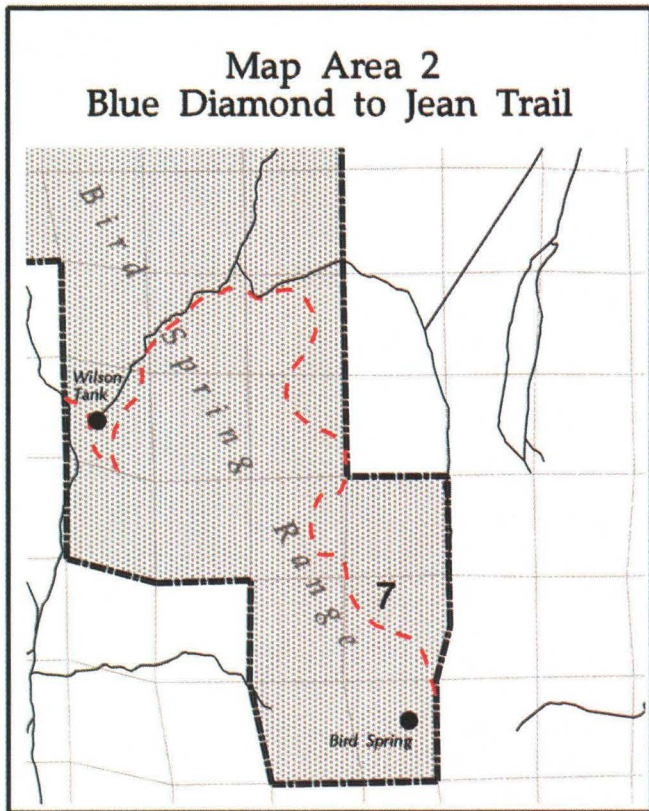


Map Area 2
(Trail #7)

Map Area 1
Twilight Zone Trails



Map Area 2
Blue Diamond to Jean Trail



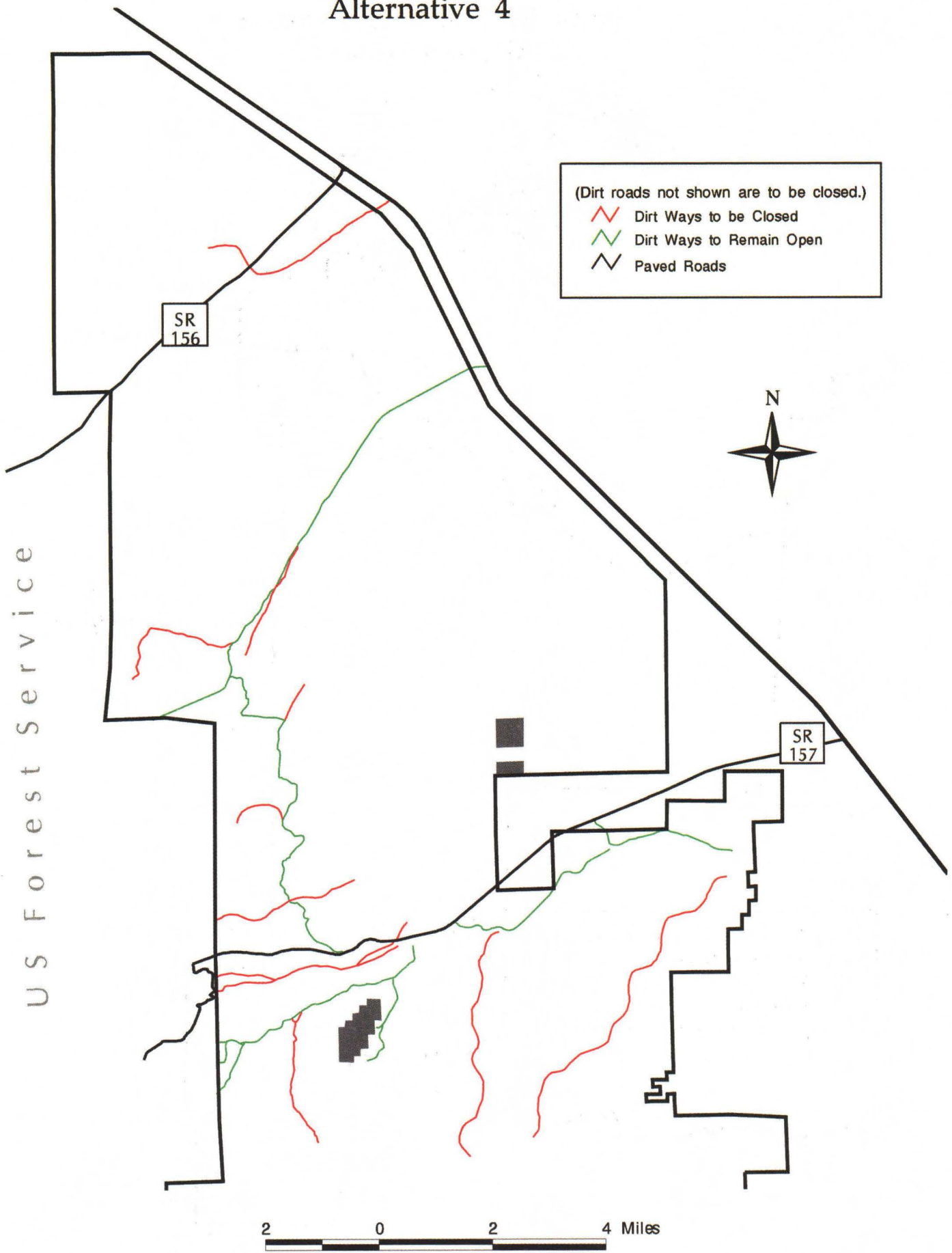
Dirt Roads:

The following maps indicate which dirt roads are to be closed and which will be left open. The status of dirt roads from La Madre Mountain south through Cottonwood Valley is the same for all alternatives and can be seen under Management Common To All Alternatives. Minor dirt routes not indicated on the maps are to be closed and used only for administrative purposes or targeted for restoration to a natural state.

Paved Roads:

No new construction of paved roads.

Roads in North Expansion Alternative 4



US Forest Service

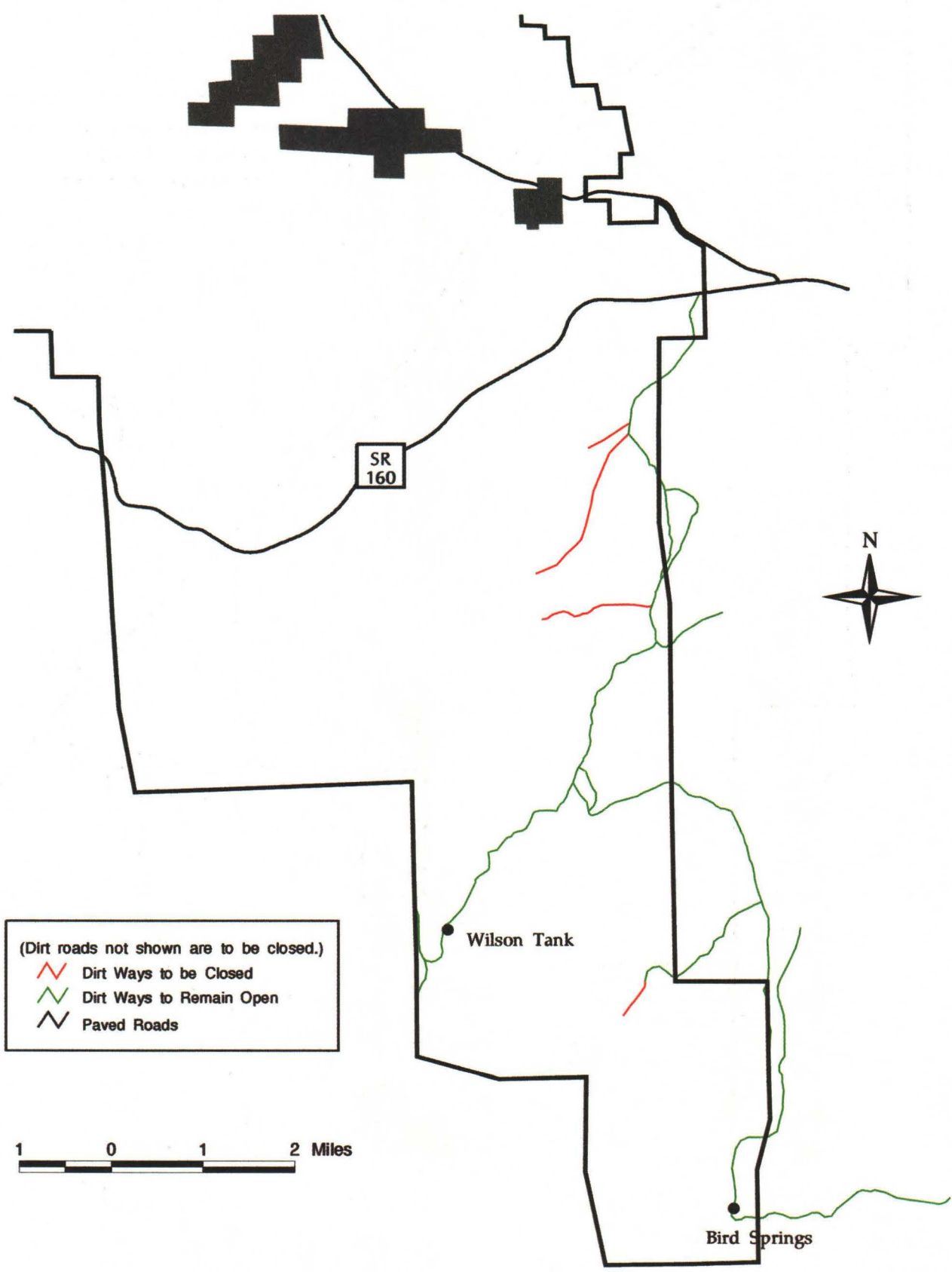
SR
156

SR
157

2 0 2 4 Miles

M37

Roads in South Expansion Alternative 4



(Dirt roads not shown are to be closed.)
-/- Dirt Ways to be Closed
-/- Dirt Ways to Remain Open
-/- Paved Roads

1 0 1 2 Miles

ALTERNATIVE 5

This alternative emphasizes biodiversity enhancement. Included are specific actions designed to enhance riparian restoration, biological preservation, and ecosystem management. Emphasis would be placed on rehabilitating and ensuring proper functioning condition for riparian areas and providing adequate water for native wildlife. Recreational access and proposed facilities are concentrated within the developed Scenic Drive area. The miles of roads remaining open, while still substantial, is reduced to a minimum and limited recreation enhancements and developments are proposed.

This alternative includes the actions listed in the Management Common To All Alternatives and the Standard Operating Procedures as well as the actions listed below.

Biodiversity - includes the issues concerning biodiversity, ecosystem management, and wild horses & burros

Biodiversity Preservation:

Conduct an ongoing program of population monitoring for T&E species, Candidate species (Blue Diamond cholla) and other Special Status Species (Angelica scabrida; Calochortus striatus; Astragalus mohavensis var. hemigyrous, (peregrine and springsnail). (App. 1, Special Status Species)

Re-introduce springsnails (Pyrgulopsis deaconi and P. turbatrix) into restored Willow Spring riparian habitat. (App. 2, Priority Management Areas)

Ecosystem Management:

Identify core habitat for the Bighorn sheep herd north of SR 160 and monitor for recreation impacts in coordination with the Nevada Division of Wildlife. Implement visitor use restrictions as needed. Utilize Bighorn as an umbrella species to monitor and evaluate habitat and the potential for fragmentation due to human use in the upper elevations of the Spring Range within the NCA.

Implement strategies to minimize type conversion fires stemming from invasive exotic annual grasses.

Implement prescribed natural fire program to restore fire ecology to montane chaparral communities in the escarpment canyons.

Establish a minimum response fire suppression policy for pinyon-juniper uplands to promote mosaic habitats, in coordination with the U.S. Forest Service, Spring Mountain National Recreation Area.

Wild Horse and Burro Management:

The Red Rock Herd Management Area (HMA) would be amended from the boundary decision of the Las Vegas Resource Management Plan (10/98) by the deletion of the lands within the NCA from the HMA.

A viable wild horse population could remain in the amended HMA but the proposed well developments would be critical to this since there are no significant water sources in the (non-NCA) southern portion of the HMA.

A viable burro population could be maintained in the amended HMA but this is not currently a primary or often used burro use area.

Remove all wild horses and burros from the area which would no longer be a part of the Red Rock Herd Management Area.

Rational for recommendation: The viability of maintaining wild horse and burros populations in the NCA has been seriously compromised by the following factors which are described in more detail in Chapter 3:

1. Reduced range quality and habitat fragmentation due to fencing and development (see Map * HMA Fragmentation);

The NCA portion of the HMA which in 1971 was relatively undeveloped and open to access is now subdivided into numerous small pieces due to the fencing of State Highways and County roads to improve public safety and/or limit off-road vehicle use. Only the area (south) between State Route 160 and Goodsprings remains free of barriers to horse and burro movement.

The band of burros which concentrate in the Calico Basin/Gateway Canyon area may be the most affected by this situation. This band regularly used private lands several miles east of the NCA for foraging (they had been seen as far away as the junction of Sahara and Durango). However, this area is now undergoing rapid residential development. Construction in Summerlin adjacent to the NCA's eastern boundary will soon prevent any movement of these animals to the east. Development of Summerlin has also had a secondary effect on the burros as desert access is reduced and off-highway vehicle users have moved into the NCA. This use is illegal in the NCA but the only way to control it is to fence State Route 159 to prevent vehicles from leaving it. This has already been necessary in some areas and will further restrict burro movement and access to forage.

2. Natural water sources are unreliable and do not produce sufficient water to maintain a viable population;

In the area used by wild horses, four springs, Tunnel (Wilson Tank), Shovel and Mud #1 & 2, all go dry periodically and are unreliable. Water has been hauled to Tunnel Spring (Wilson Tank) in 1991/92 and 1998 and to Mud #1 in 1998 when they went dry. (App. 11, Spring Discharge Measurements)

Lone Grapevine Spring north of State Route 160 and Bird Spring in the very southeastern corner of the NCA are the only two springs in the area used by wild horses that have reliable flows.

3. Wild horse use has caused significant and substantial damage to springs and riparian areas.

Field monitoring in 1996 and 1997 showed substantial damage to the riparian areas at Lone Grapevine and Shovel Springs. The riparian vegetation around the spring sources was completely disturbed and soil stability damaged by hoof action. Both springs and their riparian areas were fenced in September of 1997. Lone Grapevine has shown significant recovery while Shovel Spring is responding less quickly due to greater damage and loss of vegetation. (App. 15, Part C., Disturbed Habitat Areas, Feral Horse and Burro Impacts). If this alternative is implemented, these fences could be removed as the impact source, wild horses and burros, would have been removed. This would return the area to a more natural state and be more consistent with the IMP.

Bird and Tunnel Spring are examples of indirect wild horse and burro impacts. Both springs have been fenced and the water production has been entirely piped to tanks and troughs. Consequently, there is no riparian area at either spring.

Proposed Water Developments; New, Maintenance or Re-construction

The following existing water developments currently used and maintained for wild horses and burros would be re-constructed (after site specific project design and environmental analysis if necessary) to provide reliable water for wildlife and riparian purposes:

1. Wilson Tank/Tunnel Spring - Complete redevelopment for improved reliability (excavation, headbox, pipeline and trough).
2. Bird Spring - Install a pipeline to move water off site

(away from road) to reduce human influence.

The following projects may also be implemented (see Alternative 1) but they are outside of RRCNCA and would be considered in a future Herd Management Plan and RMP amendment.

3. Wells - Develop 2-3 wells with associated pipelines to distribute use and reduce pressure on natural water sources within the HMA. NOTE - All proposed locations are in the southern portion of the HMA south and east of the NCA so this proposal is not analyzed in this document. See future HMA management plan.
4. Potosi Spring and Pipeline - Develop the spring by installation of a pipeline system with multiple troughs. NOTE - This area is on private and Forest Service lands and is not analyzed in this document. See future HMA management plan.
5. Cave Spring - Complete development to move water off site for wild horses and burros (headbox, pipeline and trough). NOTE - This site is not within the NCA and is not analyzed in this document. See future HMA management plan.

Sequence of short term actions:









1. Maintain Tunnel (Wilson Tank) and Bird Spring developments for wildlife and riparian purposes to correct known maintenance needs, ensure more reliable water availability and move troughs away from roads. Assume that some use by wild horses and/or burros drifting up from the HMA to the south would occur.
2. Remove wild horses and burros located in the area north of State Route 160.
3. Using the desired plant community objectives in the GMP (Chapter 3), establish the criteria (range condition, water availability, riparian health) to be monitored and analyzed.
4. Establish a minimum of one ten acre enclosure (660' x 660') in each identified habitat type to act as control plots for vegetation monitoring.
5. Conduct a scientifically valid inventory of vegetation condition, trend and frequency to establish baseline data.
6. Remove wild horses and burros from RRCNCA north of Cottonwood Pass.

7. Complete development of additional waters as proposed outside of RRCNCA.

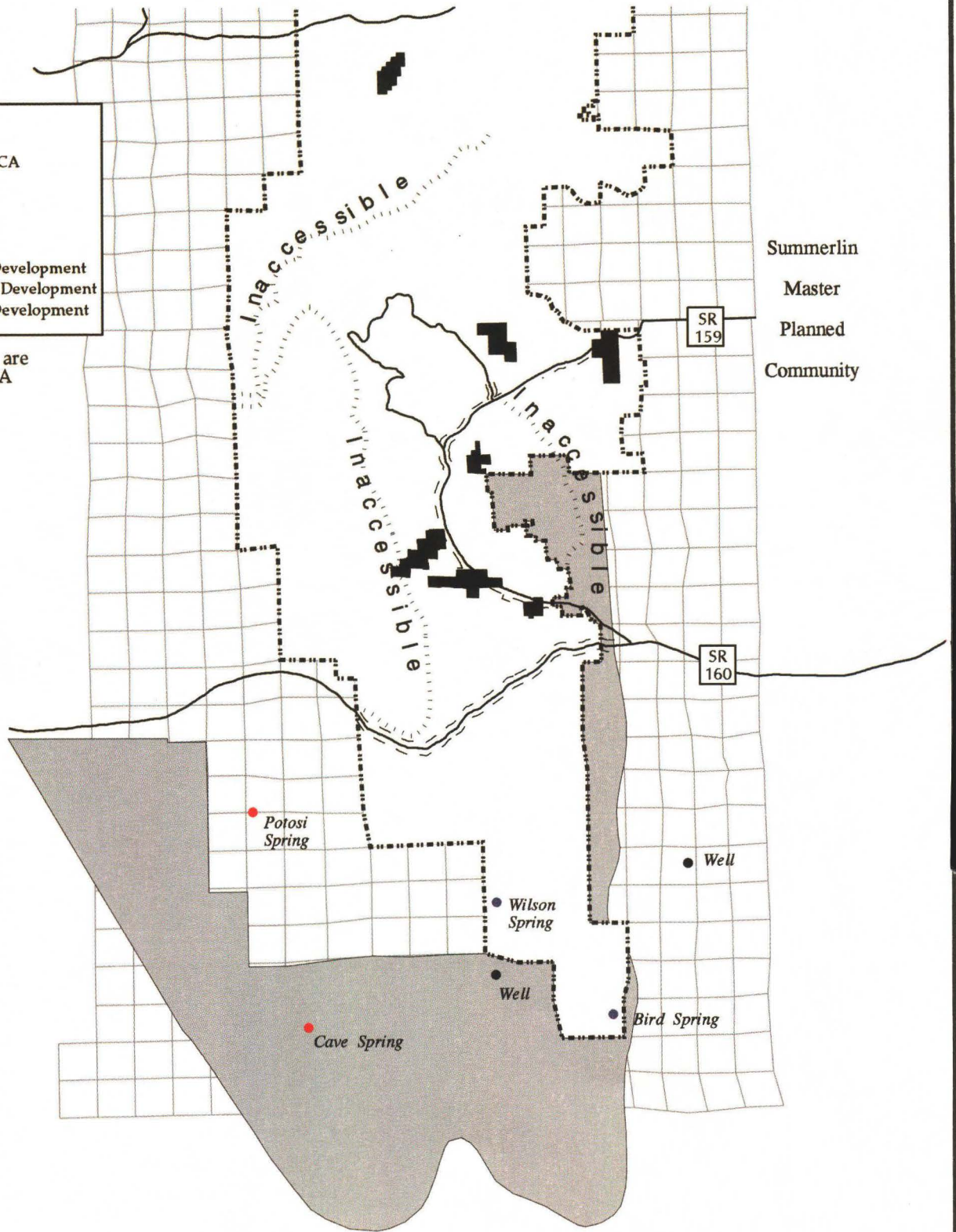
Sequence of long term actions:

8. Conduct annual trend studies to determine vegetative response and progress towards meeting desired plant community objectives.
9. Conduct annual utilization studies.
10. Monitor vegetation trend, condition and utilization to ensure that desired plant community objectives are maintained.

Red Rock Herd Management Area (HMA) Alternative 5

	Fence
	Cliff
Primary Animal Use in NCA	
	Burros
	Horses
	Joint Use
Water Developments	
	Existing Spring Development
	Proposed Spring Development
	Proposed Well Development

All gray-shaded areas are within designated HMA boundary.



1 0 1 2 3 4 5 Miles

Water, Air and Vegetative Resources - includes issues relating to riparian restoration, air quality and vegetation

Riparian Restoration:

Camouflage and close trail spurs and braids (Oak Creek; First Creek; Pine Creek; Lost Creek; Red Spring; Bootleg; Rainbow; Mormon Green #1; Wheeler Camp Spring; Mud Spring #1).

Adopt a policy of discouraging recreation use in riparian habitats:

- Evaluate and rehabilitate present high use areas and minimize future promotion; deflect use to non-riparian areas.

Air Quality:

(See Management Common to All Alternatives)

Vegetation:

(See Management Common to All Alternatives)

Recreation Opportunities - includes the issues concerning camping, rock climbing, target shooting, trails and dirt roads

Camping:

Dispersed camping would be allowed north of La Madre Mountain on existing disturbed areas. If monitoring shows that additional impacts occur as a result, camping would be limited to specific designated sites.

All camping, whether dispersed or in the designated campground, is limited to a 14 day maximum stay. (Current policy)

East of the Bird Spring Range dispersed camping would be limited to existing disturbed areas within 200 feet of designated roads.

No camping would be allowed within 1/4 mile of any water source (natural or man made), spring, pond, or natural catchment basin with permanent water.

Target Shooting:

The NCA would be closed to target shooting (present policy).

Trails:

Mountain Bikes:

Mountain bikes would not be allowed on any trails between Spring Mountain Ranch State Park and La Madre Mountain.

Designate for mountain bike use the Blue Diamond to Jean trail (portion within NCA) that has been used annually for a group ride event.

Designate the "Twilight Zone" mountain bike trails north of the Kyle Canyon road.

Modify existing and proposed trails to avoid springs and riparian areas.

Road bikes:

Pave the old road between Sandstone Quarry and Willow Spring to provide an alternative to the Scenic Drive between these two points. This will eliminate the most dangerous sections of the Scenic Drive and reduce the number of riders who turn around and ride the wrong way after being defeated by the steep hills beyond Sandstone Quarry.

Equestrian:

Restrict equestrian use to designated trails between La Madre Mountain south to the USFS/BLM common boundary 3 miles south of SR 160.

Designate the following routes and trails to include equestrian use:

- White Rock loop and Keystone Thrust trails - provide a water trough near the intersection of Rocky Gap Road and the La Madre trailhead;
- the Oak Creek trails;
- the old road from Willow to the Visitor Center;
- the old road beginning at the Scenic Drive/Oak Creek Road junction and following the ridge just south of Pine Creek;
- the Escarpment Base Trail between Pine Creek and Oak Creek;
- the Blue Diamond to Jean route (portion within NCA) which has been used for an annual equestrian ride event;
- the existing equestrian route from First Creek to Lost Creek, out away from the base of the escarpment;

- the loop trail route directly north of Red Rock Vista;
- the existing trails from the Scenic Drive exit lot to adjacent trails;

Designate horse trailhead/staging areas at the Scenic Drive exit lot, the lower White Rock parking lot and the Oak Creek Campground location (when the campground is relocated).

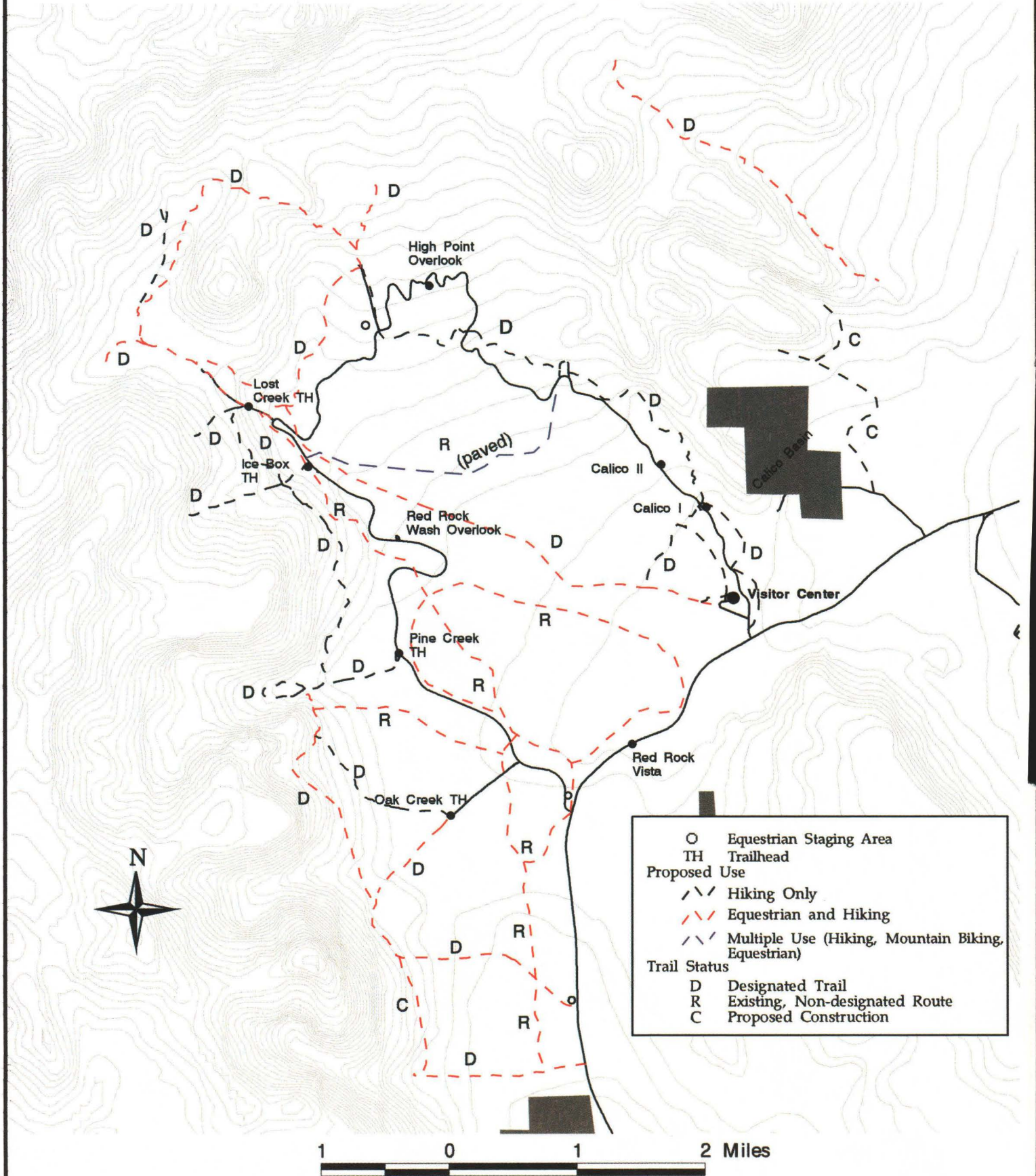
Construct a separate paralleling Red Valley trail for equestrian use (no mountain bikes) to separate horses and mountain bikes in this narrow corridor.

Hike Only:

Designate the following trails for hiking use only:

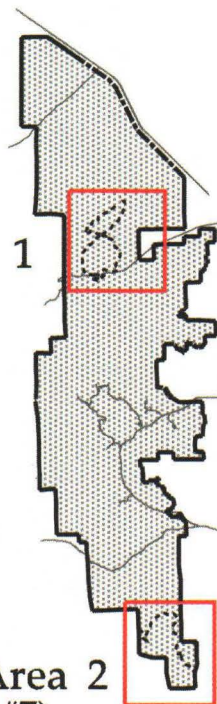
- the Arnight Trail from the North Oak Creek trailhead to Pine Creek;
- the La Madre Trail Spring (spur) Trail north of the intersection with the White Rock Loop Trail;
- the trail between Pine Creek and Ice Box (Dale Trail);
- between Ice Box and Lost Creek (SMYC Trail).

Trails in Scenic Drive Vicinity Alternative 5

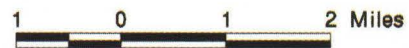
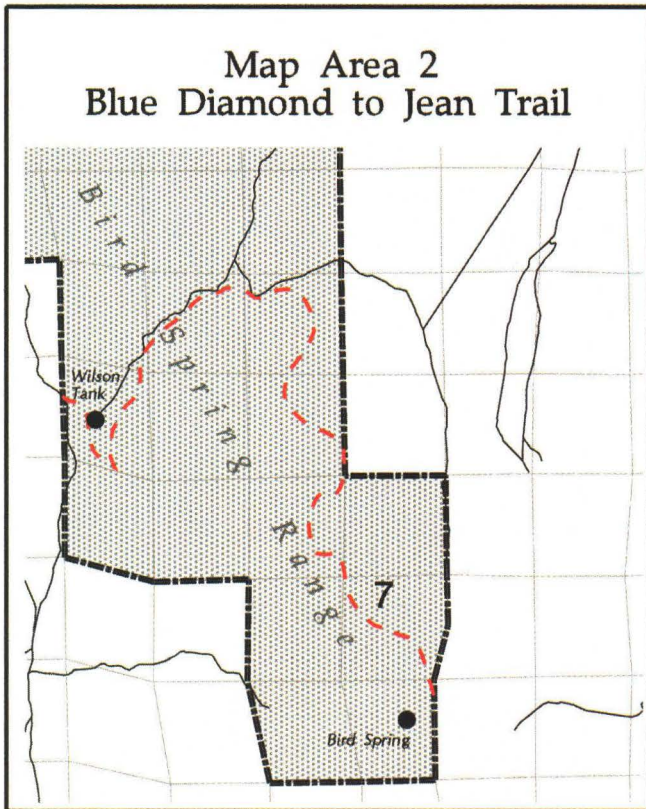
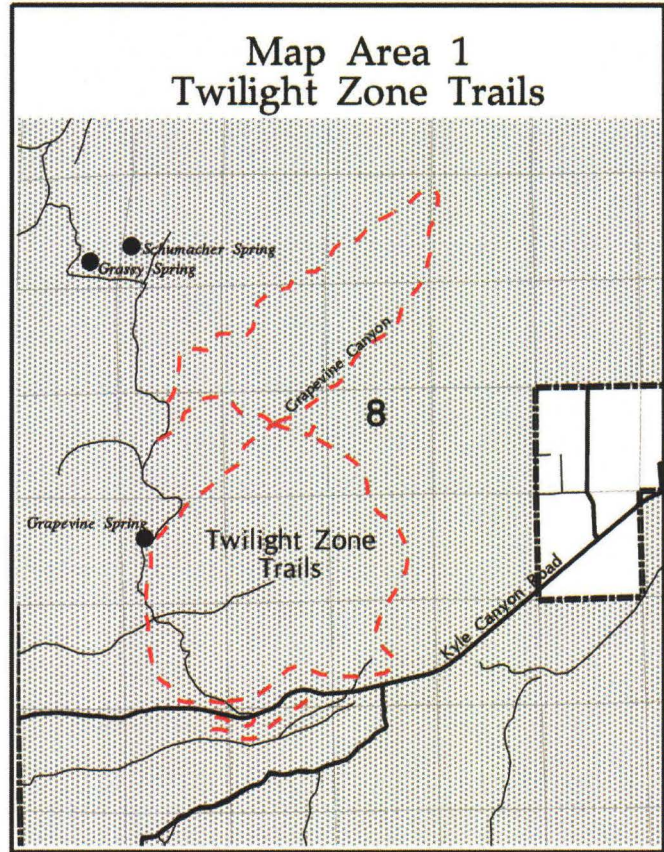


Blue Diamond to Jean and Twilight Zone Trails

Map Area 1
(Trail #8)



Map Area 2
(Trail #7)



Dirt Roads:

The following maps indicate which dirt roads are to be closed and which will be left open. The status of dirt roads from La Madre Mountain south through Cottonwood Valley is the same for all alternatives and can be seen under Management Common To All Alternatives. Short minor routes not indicated on the maps are to be closed and used only for administrative purposes or restored to a natural state.

The access road to the Cottontail area will remain open to that location and closed beyond.

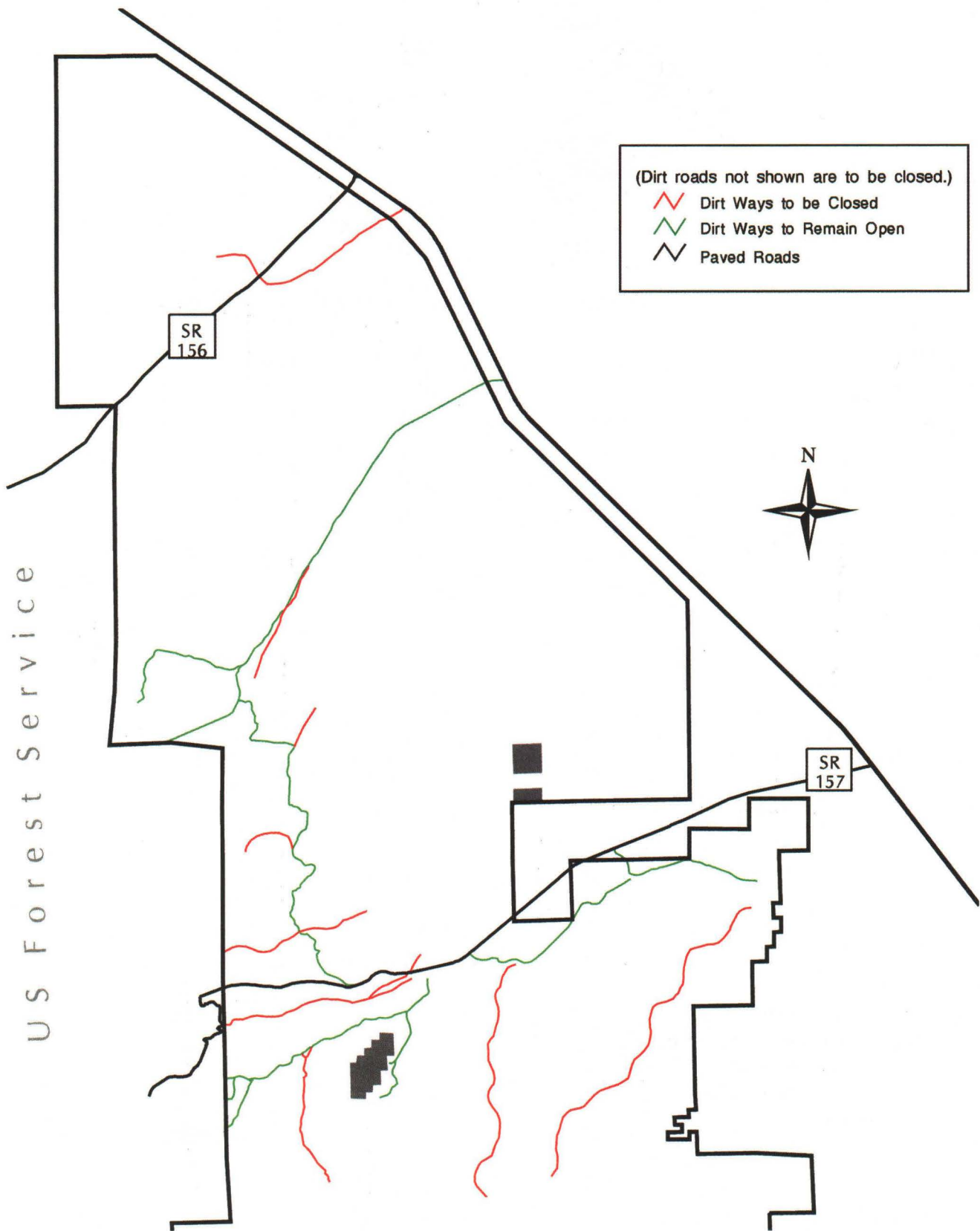
Paved Roads:

Construct a 2.65 mile return road from Sandstone Quarry to the Visitor Center (see map# M1 on page 29 in Plan section).

Because the Scenic Drive is a one-way road, when any of the washes (Sandstone, Red Rock or Pine Creek) are affected by a flash flood or winter ice is on the high points of the road, the entire Scenic Drive must be closed to use. This happens several times every year. The return road would allow at least a portion of the Scenic Drive, unaffected by floods or ice, to remain open at all times allowing use in the Calico Hills and Sandstone Quarry areas.

This would also provide a shortened loop for climbers and hikers recreating in the Calico Hills, over-ambitious bike riders who discover the entire Scenic Drive is more than they bargained for, and road walkers and runners who occasionally prefer a shorter alternative. All of the above have been known to return against one-way traffic to avoid traveling the entire Scenic Drive. Many of those in motor vehicles who do drive the remaining portion of the Scenic Drive, do so at excessive speeds, causing unsafe conditions and detracting from the experience of others wishing to observe the scenery.

Roads in North Expansion Alternative 5



(Dirt roads not shown are to be closed.)

- ∧ Dirt Ways to be Closed
- ∧ Dirt Ways to Remain Open
- ∧ Paved Roads

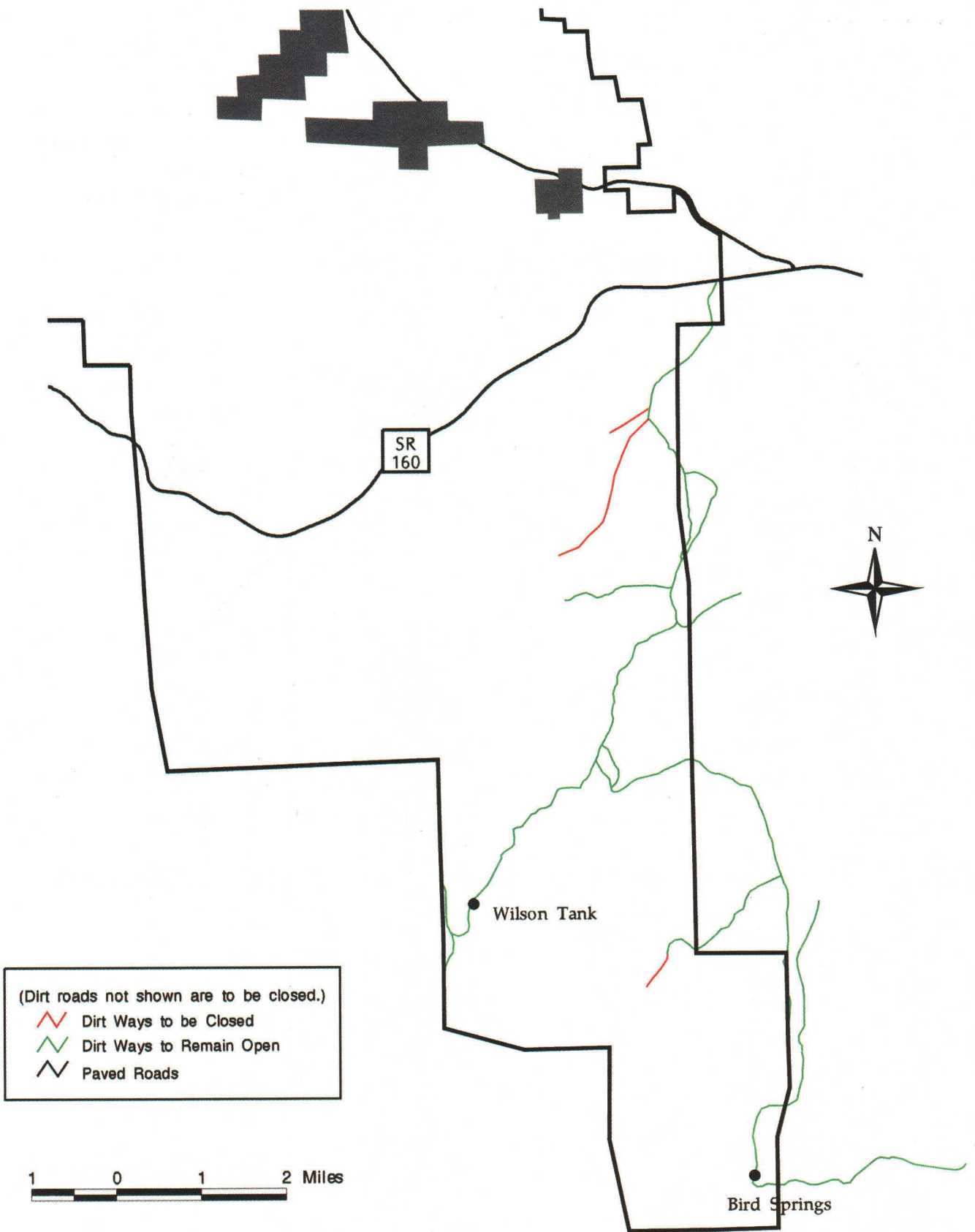
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M42

Roads in South Expansion Alternative 5



CHAPTER 3

DESCRIPTION OF THE EXISTING ENVIRONMENT

Land Status

Red Rock Canyon presently consists of approximately 196,000 acres. Private and State of Nevada inholdings located within the legal boundary of RRCNCA include Spring Mountain Ranch State Park, the town of Blue Diamond, the community of Calico Basin, Bonnie Springs/Old Nevada, part of the James Hardie Gypsum mine, the Desert Sportsman's shooting range, and several parcels along the Kyle Canyon Road including the "Williams" property. The Oliver Ranch near Blue Diamond, was acquired by the BLM in 1993 and increased the acreage of the NCA by an additional 300 acres (already included in the above acreage).

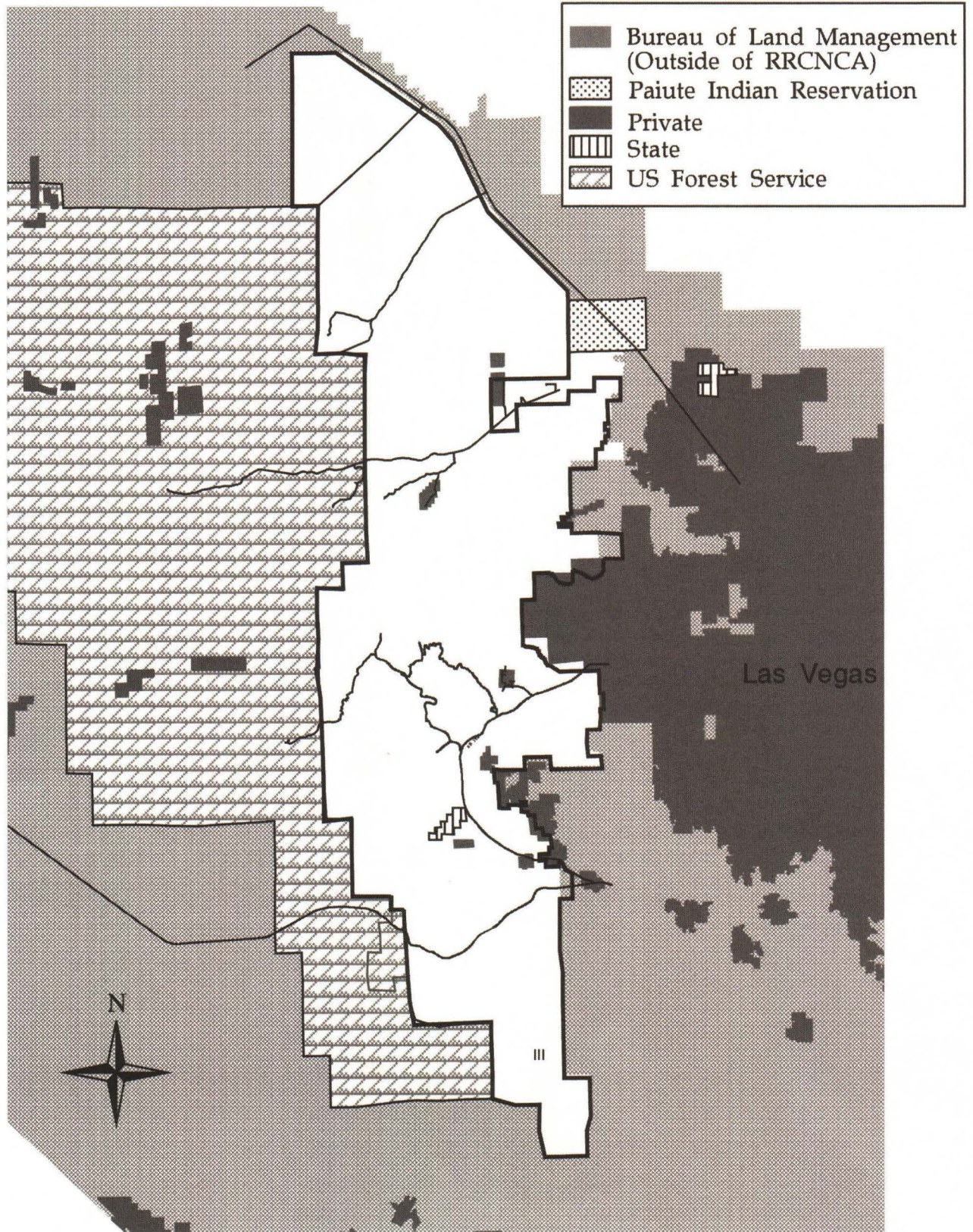
In 1990, when RRC became a National Conservation Area (NCA), all included lands were withdrawn from all forms of entry, appropriation or disposal under the public land laws; from location, entry, and patent under the mining laws; and from operation under the mineral leasing and geothermal leasing laws. An exception is valid existing rights, (claims and rights-of-way established prior to NCA designation). The table below lists the mining claims that are still valid and remain active.

Mining Claims Located within the Red Rock Canyon NCA

LOCATION	NMC NUMBER	NAME	TYPE	DATE FILED
T22S, R58E, SEC 18	125396	Copper Hill #5	Lode	07/01/43
T22S, R58E, Sec 18	125396	Copper Hill #6	Lode	07/01/43

Lands added through exchange or Congressional action following the initial designation of the NCA are immediately subject to the above limitations. Exchanges involving lands in Calico Basin, James Hardie Gypsum Mine, Summerlin and the Williams property are either on-going or have been preliminarily discussed.

Land Status



FACILITIES - BUILDINGS, ROADS AND TRAILS

Buildings and Sites

Visitor Center

The RRC Visitor Center is a 7,600 square foot facility offering information and interpretation about recreation opportunities, wildlife, wild horses and burros, vegetation, geology, cultural resources and much more. The facility also offers a bookstore operated by "Red Rock Canyon Interpretive Association" (RRCIA), a non-profit organization with the mission of researching and sharing interpretive information about RRCNCA and assisting the BLM with endeavors related to interpretation.

In the same location as the Visitor Center is the "Red Rock Canyon Bicycle Pavilion". The pavilion offers a rest stop/destination location, with water and a restroom, for bicycle enthusiasts. It also includes benches and picnic tables providing opportunities for day use picnicking and group gatherings.

After fourteen years of use and increasing visitation, the Visitor Center is too small to handle current visitor loads, suffers from aging facilities and exhibits and does not provide adequate space for staff and volunteer needs. Space compromises and minor redesigns over the years have tried to meet needs, but they are just not enough to compensate for the needs created by increased staff, volunteers and the success of the RRCIA bookstore.

No provision was made for a bookstore in the original design and the current bookstore is a major part of the visitor services being offered. Storage space for materials and supplies is both inadequate and hard to access. Staff has to crawl through displays to get to some areas and the stage above the pit was sacrificed to provide storage for RRCIA's books and materials.

The exhibits still receive favorable comments from the public, but they are badly aged and out of date. Some of the principal problems are: none of the maps have been updated with the 1994 NCA boundary, the waterfall exhibit does not work, signs are cracked and peeling, the recreation exhibit is dated and an inefficient use of space, the wand system uses the original tape player and has no foreign language capability, and the new mural cannot be easily viewed by handicap persons or persons who cannot climb stairs. Exhibit upgrading has been accomplished by the Interpretive Association, not BLM.

On a positive note, the completion of the office expansion has improved working conditions for BLM staff, volunteers and RRCIA.

A proposal developed and approved in 1996 is to pursue an addition to the current Visitor Center providing for additional restrooms, a small auditorium, meeting room(s), increased office space and increased storage. Actions taken to date to implement the proposed action and alleviate some of the problems listed above are -

- 1) A long-range concept plan has been prepared by the BLM's National Applied Research and Sciences Center in Denver. A multi-disciplinary team of engineers, architects and space planners conducted a need's analysis by observing current uses of the visitor Center and interviewing staff, RRCIA, FORRC and other users. The concept plan recommends the addition of a three building complex adding 12,000 square feet of space to the building site. The buildings would be - 1) restrooms and offices, 2) auditorium and 3) meeting rooms and environmental education.
- 2) Congress has allocated \$ 540,000 in Fiscal Year 1997 for the remodeling and upgrading of the existing Visitor Center to allow it to meet immediate needs until the concept plan can be implemented.
- 3) With the assistance of a \$ 25,000 grant from FORRC, a 600 square foot meeting room addition has been built on the west side of the Visitor Center.
- 4) RRCIA has moved its sales area into the remodeled center of the building providing expanded and secured space for sales items. RRCIA funded the cost of remodeling this area to suit their needs. This will provide security for sales items and allow more flexible use of the Visitor Center after hours.
- 5) The wand system has been replaced by a new more flexible system. The wands now carry the message and the visitor does not have to stand within radio loops to hear messages. The wands are able to be used outside the Visitor Center and carry several languages.
- 6) A contract has been awarded for construction of a new restroom facility to be located in the parking lot. This will reduce pressure on the aging Visitor Center facilities.

Oliver Ranch

In August 1993, BLM acquired the 300 acre Oliver Ranch through a land exchange. Current plans call for the ranch to be used for NCA administrative functions such as wild horse corrals, a fire station, employee and volunteer housing, and equipment storage. The ranch would also be developed as an environmental training

and conference center after upgrading some of the facilities to better meet user and safety needs. The original house is actually a small dwelling with a large attached enclosed porch, which makes an excellent meeting room(s). The ranch offers a unique opportunity for outdoor classroom activities.

The ranch house is structurally sound, but needs a lot of time consuming cosmetic work (painting, caulking, floor levelling, window repairs). A heating unit needs to be added as the only current heat is a wood stove and small electric space heater.

There is also room for the construction of some bunkhouses and/or small apartments to be used by BLM staff and/or volunteers. College interns and volunteers (Student Conservation Association) could offer needed assistance to the NCA staff, but these programs require that housing be provided. Additional housing would also allow BLM to have a Law Enforcement Ranger on-site within the NCA.

Red Spring Picnic Area

While sustaining heavy visitor use without significant resource damage, this area has some serious problems that need attention. Parking space is inadequate. The restrooms were placed in a way that does not allow access by physically challenged visitors. A new restroom was added in the lower parking area in 1998 using entrance fee revenues. The road is a continual maintenance problem because of its inadequate design, steepness and the location of a seep at the top just as the road begins its descent.

Oak Creek Campground

The Oak Creek Campground has been closed and replaced by the 13 Mile Campground.

Wheeler Camp Spring Natural Area

Approximately 20 acres around Wheeler Camp Spring were fenced through a cooperative project with the Red Rock Audubon Society. The project was initiated to protect wet meadows which were being damaged by off-road vehicle use and to allow overused riparian areas to repair themselves. Increased vegetation growth is already evident. Eradication of tamarisk within the spring area should be pursued if success in preventing regrowth can be expected. As part of National Public Lands Day in 1996 two check dams were constructed to slow flash flooding and rebuild streambed soils. The dams have already shown significant impacts through the slowing of flows and the deposition of materials in the streambed.

Scenic Drive Sites

A continuing problem along the Scenic Drive is parking. Not all of the planned parking areas and overlooks were constructed, and those that were built were seriously under designed. This has resulted in the public's creating parking areas and pulling off to take photos at desired locations. Most of these locations coincide with sites originally planned for a pull-off. Calico I developed this way, and the highest point overlook was developed on a hairpin curve at a point where many visitors stopped along the road to take photos.

Calico I Overlook and Trailhead

A very large percentage of visitors stop at this overlook because of its location and spectacular scenery. After re-construction in 1993 to correct original construction deficiencies, this site is adequate on most days. However, when both climbing and flower viewing activities are going on in the spring, the parking area is too small. Additional parking spaces were added on the right side of the road just beyond the bus parking area in 1998 accommodating 10-15 more cars. The overlook area next to the parking lot has not been completed with a hard surface and interpretive signing. The trail, which has developed down the ridge from the overlook, is heavily used, but provides a hazard due to its slope and the natural gravel surface. A series of steps is needed to reduce the hazard on the lower half of this trail. Additional benches are planned for the site.

Calico II Overlook and Trailhead

This site has a significant parking problem due to its close proximity to the Gallery, a favorite climbing site. On many spring and fall days, the parking area is full of all day climber vehicles by 10:00 AM. This leaves no space for short visit sightseers and hikers. There is no potential to increase the size of the site, because it was built on the crest of the ridge and the ground falls away quickly on both sides. A permanent restroom was installed in 1998 using entrance fee revenues.

Sandstone Quarry Parking Area and Trailhead

This site is heavily used by visitors on hikes up the wash and to the top of the Calico Hills. In 1998, using entrance fee revenues and other funding, the parking area was re-designed and paved increasing capacity by about 50 %. Part of the exit road will be blocked off to move vehicles away from the historic townsite foundations along the road.

Highest Point Overlook

This site, planned in the original Scenic Drive design, was not completed until 1994 and was not paved until 1998. It solves a safety problem from visitors parking along the road curve at the highest point to take photos. The site is heavily used.

White Rock Road and Trailhead

This site provides access to the Keystone Thrust, Great Circle and Willow Spring/La Madre trails. The road requires constant maintenance due to the rocky soil and should be paved as soon as possible. This location could provide an alternative to the crowded areas like Sandstone Quarry, Lost Creek and Willow Spring if it had a better access road and good signing making it more attractive to users. Several trail loops can be accessed from this trailhead including loops to Sandstone Quarry and La Madre Spring/Willow Spring/Lost Creek. A permanent restroom was installed at the end of the road in 1998 using entrance fee revenues.

Lost Creek Trailhead

This site provides access to the Lost Creek, Children's Discovery, Willow Spring Interpretive and White Rock trails. It is heavily used by individuals and school groups and barely meets the needs for parking space and school bus access. A permanent restroom was installed in 1998 using entrance fee revenues.

Willow Spring Picnic Area

This is the oldest developed site in the NCA. Originally constructed with covered tables and picnic grills, this site had deteriorated through vandalism and neglect to a point in 1992 where it was an embarrassment to BLM. By 1992, all picnic shelters were gone, most tables damaged and the toilet a stinking embarrassment. Through a combined effort with many volunteers, including Eagle Scouts, major improvements have been made in the last two years. New tables have been purchased, the spring water lines repaired and extensive landscaping installed. The venting system on the toilet has been reworked and a handicapped toilet was added in 1995. Future work includes rehabilitation of additional picnic sites and installation of replacement shelters.

La Madre Spring Trail and Dam

In 1995 the road to La Madre Spring was blocked at the junction with the Rocky Gap road. This was necessary due to the damages associated with increasing vehicle use on the road. While in the past most users confined their vehicles to existing roads, in the last two years there have been an increasing number of problems with vehicles pioneering new or expanded roads. There have been two instances where vehicles simply drove by the impoundment dam

and kept going up the drainage where there is no road. Both got stuck and had to be towed out. The dam is in good condition. Repairs by volunteers solved leakage problems at the old outlet pipe.

Ice Box Canyon Parking Area and Trailhead

With the parking expansion completed in 1993, this site is adequate. Paving of the dirt portion of the parking area and installation of a permanent restroom was accomplished in 1998.

Red Rock Wash Overlook

This site is the most under utilized site on the Scenic Drive. There is no particular reason for visitors to pull off here because no facilities are evident (or provided). There really is not much to see in Red Rock Wash and most visitors have already stopped several times so it takes more than just a sign to get them to stop. The best use of this site may be as a picnic area as an alternative to Willow Spring. The addition of some tables with shade shelters would significantly increase the appeal of this site.

Pine Creek Overlook and Trailhead

This site has probably received the most damage from users due to serious under-design in capacity. The parking area is at best 1/3 the size needed which has resulted in significant vegetation loss as vehicles are parked wherever space was available. Recent parking controls to prevent further damage have resulted in vehicles parked along the Scenic Drive. Expansion of this area was planned in 1991 but never completed. This should be a priority project when funding becomes available.

Oak Creek Trailhead

This site replaced the access to Oak Creek through the campground. Use has increased as visitors learn of the easy access to Oak Creek. A permanent restroom was installed in 1998.

Red Rock Vista

Red Rock Vista, which is also referred to as the Dedication Site, was recently remodeled and expanded. It now accommodates 75 vehicles and facilities include toilets, picnic tables, and a short hike to an overview area.

The location is not actually along the Scenic Drive, but on the north side of State Route 159, midway between the entrance and exit of the Scenic Drive.

OVERLOOKS & PARKING			
Name	Use	Capacity	Capacity on Scenic Drive
Calico I	Scenic view of Calico Hills/ Access to hiking, technical climbing, and rock scrambling	35 spaces designated	294 spaces
Calico II	Same as Calico I	Approximately 25 spaces	
Sandstone Quarry	Restrooms/ Access to hiking and scenic viewing in historical area	Approximately 30 spaces	
Escarpment View	Scenic view of valley floor, Calicos, and escarpment from highest point on Scenic Drive	Approximately 30 spaces	
White Rock	Hiking access	Approximately 24 spaces	
Willow Spring/Lost Cr	Restrooms/ Hiking and picnicking/ Cultural resource interests	Approximately 69 spaces	
Ice Box Canyon	Scenic view of escarpment/ Trailhead	Approximately 34 spaces	
Red Rock Wash	Viewing point for Red Rock Wash	7 spaces designated	
Pine Creek Canyon	Restrooms/ View of escarpment/ Trailhead	15 spaces - most designated	
North Oak Creek Canyon Access	Trailhead to access Oak Creek Canyon from north	Approximately 25 spaces	
Red Rock Vista	Scenic view of RRC north of Red Rock Vista/ Interpretation and dedication site of RRC	Approximately 75 spaces	
Red Spring	Picnicking/ Cultural resource interests	Approximately 39 spaces	

Roads

Scenic Drive

The 13 mile Scenic Drive was completed in two phases - 1972 and 1978. It was designated a one-way road upon completion of the second phase in 1978. The road surface is in good condition, but district maintenance staff has noted that the increased number of cracks in the 1972 section indicates the need to consider a resurfacing (or lift) in the next few years. Because vehicle use is primarily passenger cars, the road does not exhibit the typical rutting of two lane roads used by heavy trucks. Uncontrolled Desert willow and cliff rose growth along the edge of the road caused minor damage in several locations due to root growth.

The increasing number of motor vehicles and bicycles on the Scenic Drive has created several safety concerns. There has been a significant increase in recreational bicyclists as compared to bicyclists working on racing skills or conditioning. Drivers get distracted by the scenery and may not notice bicyclists riding two and three abreast or bike riders who overestimate their conditioning and turn around and ride back to the entrance against one-way traffic. The two lane width of the road offers some solution to the competition for space, but is probably not a long-term solution. A separate bike lane paralleling the Scenic Drive was included in the original Master Plan, but not constructed. There are differing opinions on whether this would solve or create problems if ever built. Use of an old road between Sandstone Quarry and Willow Spring as a bike trail, possibly paved, was reviewed and approved in 1993. This could provide a safer and less physically challenging route for the typical family bicyclist looking for a good ride, but not ready to challenge the Scenic Drive hills beyond Sandstone Quarry. This route would be expected to divert a significant number of riders from the section of road with the most hills and dangerous curves.

Major roads in addition to the Scenic Drive include State Highway 159 (Charleston Blvd. to Blue Diamond), State Highway 160 to Pahrump, the Rocky Gap Road over the escarpment to Lovell Canyon, the Cottonwood Valley Road to Goodsprings, the Kyle Canyon Road and the Lee Canyon Road.

Numerous dirt and gravel roads exist within the NCA. Some of these are used regularly while some are used rarely. Many of the older dirt roads in the vicinity of the Scenic Drive and along Highway 159 were closed when the Scenic Drive was constructed as the primary travel route in the area. Others like the First Creek, Cave Canyon and Oak Creek roads were closed when the amount of vehicle use began impacting the natural resources at unacceptable levels. These roads have been converted to hiking, horseback and mountain bike trails. Additional roads were listed for closure in the Interim GMP.

Many of the dirt roads in the NCA have been claimed by Clark County as Revised Statute (R.S.) 2477 Rights-of-Way. RS 2477 was a Federal law (now replaced by the provisions of the Federal Land Policy and Management Act - FLPMA) which granted public highway rights of way based upon the act of construction by a public entity rather than through prior application as is the practice today. Most of these rights-of-way were not formally documented until after the passage of FLPMA in 1976 which required the States/Countries to submit a listing of RS 2477 right of way claims. Clark County submitted its list of RS 2477 roads in 1979. This issue clouds long term management of vehicle use in the NCA, because many of the now abandoned or closed roads are

claimed as county roads on the 1979 list. Discussions have been held with county officials about relinquishment of RS 2477 claims, within RRCNCA, not needed for county purposes. Final resolution has not been reached.

MAJOR ROADS			
Name	Type	Length	Length Totals
State Highway 159	Paved	11.9 miles	40.4 miles
State Highway 160	Paved	4.3 miles	
Scenic Drive	Paved	13.0 miles	
Lee Canyon	Paved	5.6 miles	
Kyle Canyon	Paved	5.6 miles	
Lucky Strike Canyon	Dirt	8.8 miles	19.1 miles
Rocky Gap	Dirt	6.0 miles	
White Rock	Dirt	.6 miles	
North Oak Creek	Dirt	.7 miles	
Cottonwood Valley	Dirt	3.0 miles	

TRAILS

While the 1974 Master Plan laid out a system of trails, the system was never implemented. Instead, a number of individual trails to specific locations evolved primarily through casual visitor use without effort to link them together. This resulted in numerous user created paths, particularly in the Calico Hills, which were beginning to cause serious erosion and visual problems.

In 1994 Public Lands Appreciation Day (PLAD) was used to kick off the implementation of a unified trail system. By Sept. 1995 (PLAD 1995) the major portion of the system had been completed. The core of the system is a loop trail, the Grand Circle, which leaves the Visitor Center and roughly parallels the Scenic Drive to Lost Creek and then returns to the Visitor Center via the old Willow Spring Road. This trail passes through Calico I & II overlooks, the Gallery, Sandstone Quarry and White Rock and provides connections with trails to the Moenkopi Loop trail, Calico Tanks, Keystone Thrust, La Madre Spring, Lost Creek and Willow Spring. A connector trail, south from Lost Creek, tying the core system with the Ice Box Canyon, Pine Creek and Oak Creek trails was completed in June of 1997. This connector terminates at the Oak Creek Trailhead.

Mountain Bike Trails

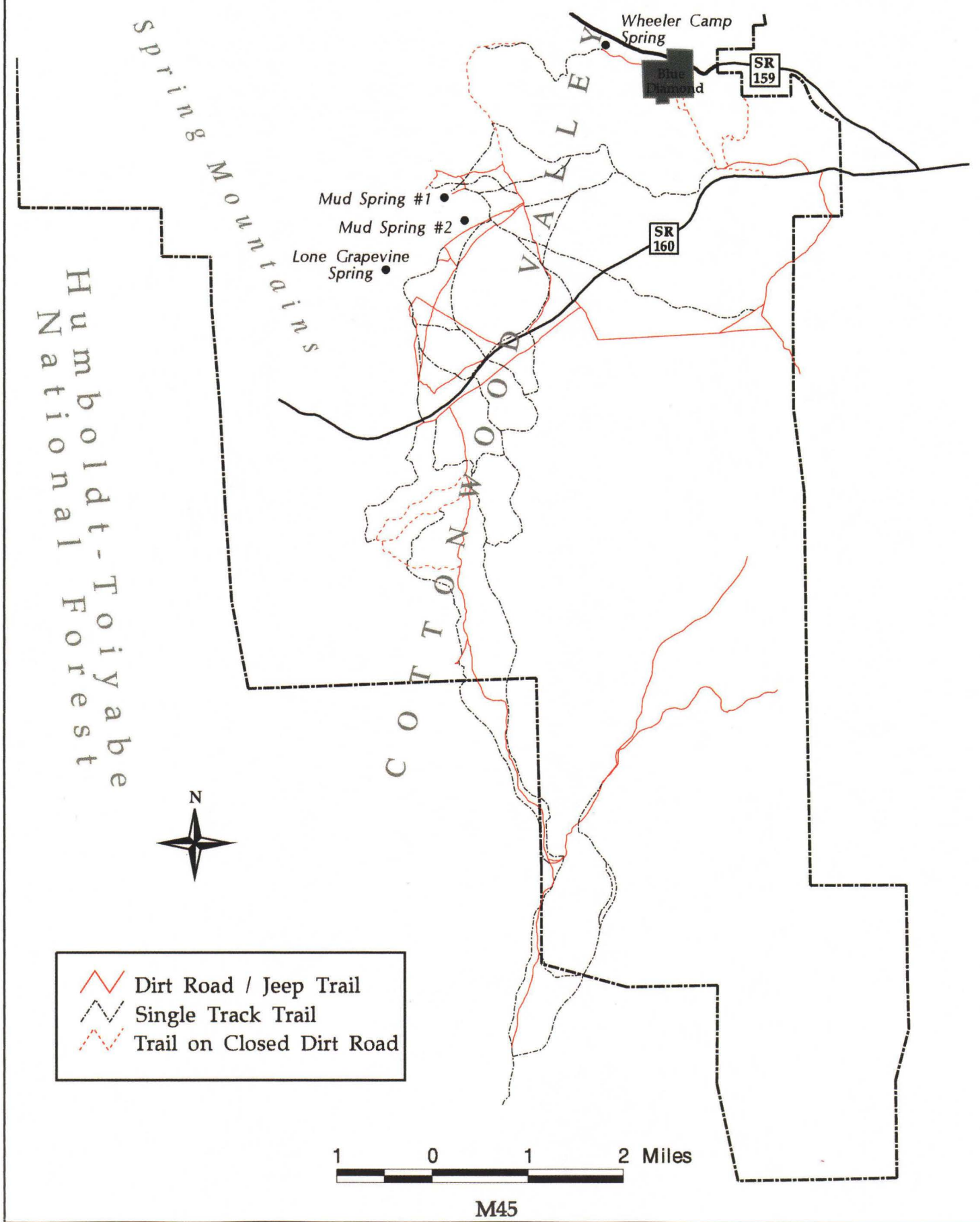
Mountain bikes are permitted on any of the paved or dirt roads in the NCA. Other than roads, mountain bikes are not allowed off designated trails. The main trails being designated for mountain bike use are those composing the Cottonwood Valley network. An EA for these trails was completed in May of 1996 and they have been officially designated (signed and marked) in the field. The following table is an inventory of the trails composing the network, with information supplied by Suzanne Shelp. There are a few changes, but the trails are basically as follows.




TRAIL NAME	LENGTH (miles)	CHALLENGE LEVEL
Land Line Loop	8.1	intermediate
Loop du Jour	33.0	advanced
Cottonwood Valley Race Course	5.7	intermediate
Dead Horse Loop - 2 versions		
short version	14.0	intermediate
long version (w/Raven Spur)	18.0	intermediate
Original Horse Trail	17.6	intermediate
Badger Pass	14.8	intermediate
Late Night	7.1	intermediate
The New 33	32.9	advanced
The Mam Man	11.1	intermediate

The above trails fall into the intermediate and advanced levels because of length and technical aspects included. Riders at the beginner level should start with the dirt roads and gradually work into the intermediate trails as their skills improve.

Additional bike trail possibilities will be considered in the north expansion area as the GMP planning process continues. 48 miles of trail, including opportunities for all challenge levels, have been scoped out by Suzanne, and reconnaissance continues for other potential rides.

Cottonwood Valley Mountain Bike/Equestrian Trails



-  Dirt Road / Jeep Trail
-  Single Track Trail
-  Trail on Closed Dirt Road

1 0 1 2 Miles

M45

Hiking and Equestrian Trails

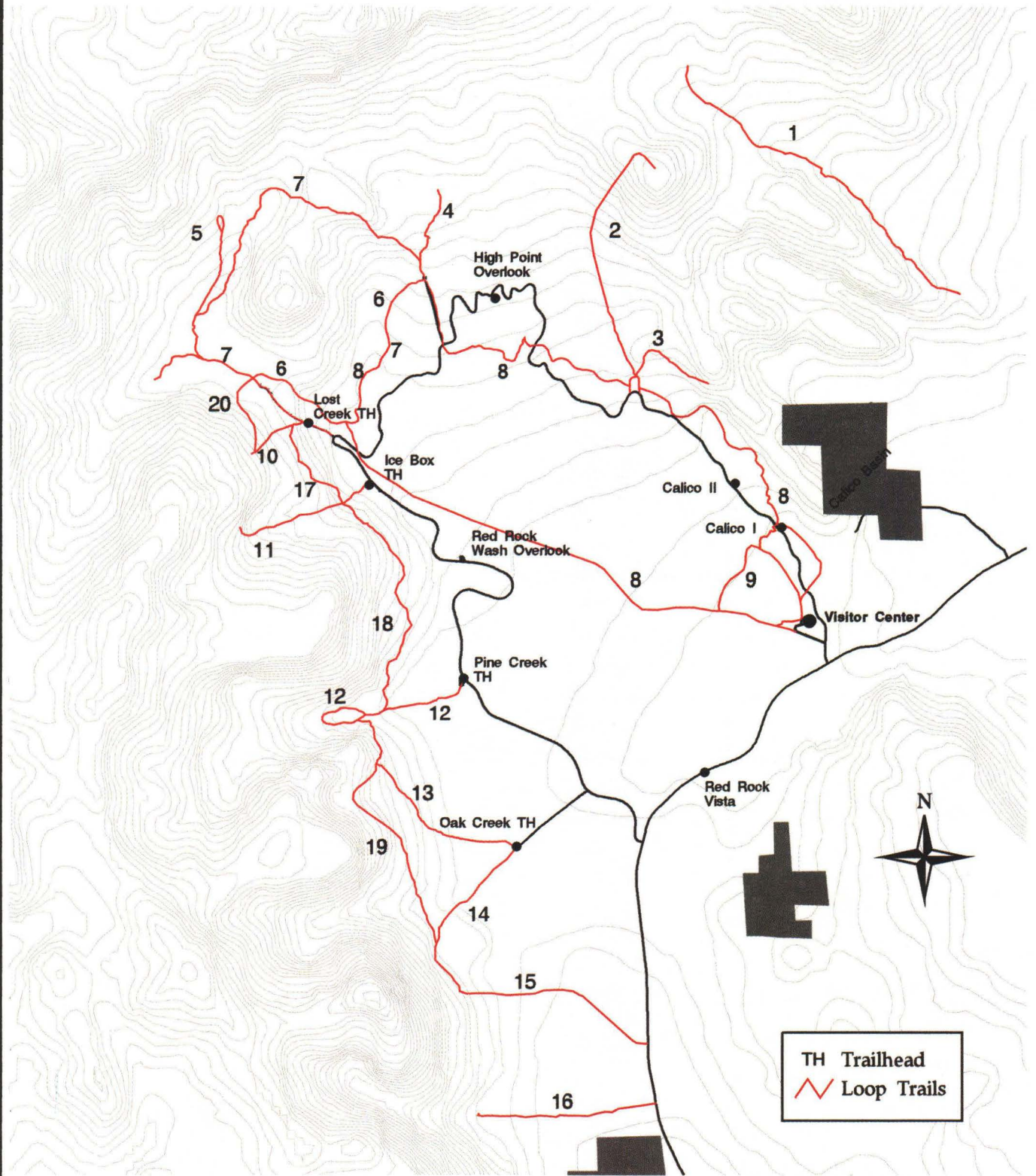
Existing and planned hiking and equestrian trails are in the IGMP, which includes the core NCA only. No inventory of trails has been compiled or proposed for the expansion portions of the NCA, other than the mountain bike trails included in the Cottonwood Valley network and a few proposed in the Grassy and Grapevine Springs area. These trails would also be open to hiking and horse riding, although few people would prefer to hike them over the other opportunities available.

Some of the trails in the Scenic Drive area are designated for hiking only, due to the amount of use they receive and the congestion that would be created with mixed use. Other trails are being reviewed in regards to use designation and compatibility of the different trail user groups.

A BLM trails brochure is distributed to hiking enthusiasts at the RRC Visitor Center. It includes popular hikes in the Scenic Drive vicinity and south as far as First Creek. However, many of the hikes are destinations and are not actually accessed by developed trails.

The following is a table of RRC hiking trails. The "loop" trails are hikes that end where they begin without retracing portions of the trail.

Existing Trails - Scenic Drive Vicinity



1 0 1 Miles

M46

NAME & NUMBER	MILES one way	REMARKS & CHALLENGE LEVEL (E) - easy (M) - moderate (S) - strenuous
1 Brownstone	1.7	Hike begins at gate on road, and occurs mostly in wash. (M)
2 Turtlehead	2.5	Destination (no constructed trail). A strenuous climb gaining 1,700 feet in elevation. Provides a most excellent view from summit. (S)
3 Calico Tanks	1.2	Destination, which consists of a large tinaja (natural water catchment). Requires some rock scrambling. (M-S)
4 Keystone Thrust	1.0	Area of geological interest. (E-M)
5 La Madre	1.5	Follows old road to small dam. (M)
6 White Rock - Willow Spring	2.0	Easy pleasant hike though ground level vegetation. (E)
7 White Rock Loop	6.0	Encircles White Rock Hills & includes trail 6 & portions of 4 & 5. Offers interesting diverse scenery. (M)
8 Grand Circle Loop	11.0	Connects sites throughout 1st half of Scenic Drive, then returns to Visitor Center from Willow Spring on old road. (M)
9 Moenkopi Loop	2.0	Interpretive trail beginning and ending at Visitor Center (E)
10 Children's Discovery Trail/Lost Creek	.7	Interpretive hike featuring year round creek, seasonal waterfall and a great diversity of plant life. (E)
11 Ice Box Canyon	1.0	A really cool hike which may involve some rock scrambling to view interesting features. (M)
12 Pine Creek	1.0 + .9 loop	Offers a diversity of features including an old homestead site, perennial creek and unique flora. 2nd half of trail is a loop. (M)
13 Arnigh	1.6	Begins at the N Oak Creek parking lot and enters the Pine Creek homestead site from the back. (M)
14 N Oak Creek	1.0	An easy hike into Oak Creek and an opportunity to take a 3.5 mile loop by including the Knoll and Arnigh trails. (E)
15 S Oak Creek	2.5	Follows old road from campground site off SR 159 to the mouth of Oak Creek Canyon. (M)
16 First Creek	1.5	The southern most trail in this network of trails leads you to the mouth of First Creek Canyon. (E-M)
<u>Escarpment Base Trail</u> - composed of trails 17, 18 & 19 and provides a nice scenic adventure. A good way to enjoy this trail is to hike with a friend and stage a vehicle back at your choice of several locations.		
17 SMYC	1.1	Section between Lost Creek and Ice Box. (M)
18 Dale	2.2	Very scenic section between Ice Box and Pine Creek. (M)
19 Knoll	1.9	Lower section running from Pine Creek to Oak Creek (will eventually continue to First Creek). (E-M)
20 Willow Spring Loop	1.3	Interprets cultural resources in the Willow Spring vicinity. (E)

VISITOR DEMOGRAPHICS

The following information is from the "Customer" survey completed in 1992 by the Outdoor Recreation and Wilderness Assessment Group (ORWAG), a research unit of the USDA Forest Service, Southeastern Forest Experiment Station. Assessments were made through on site interviews at RRC and written surveys distributed by mail.

Gender - Out of 908 interviews, approximately 55% were male and 45% female

Age - 40% were from 25-44 years of age
25% from 45-64
Approximately 10% in each remaining age group
11 and younger
12-14
65 and older

Race/Ethnic - 87% white
8% Hispanic
The remainder composed of other minorities

Education - Highest level completed
14% bachelor's degree or equivalent
46% some college
26% high school diploma
14% did not receive high school diploma

Employment - 44% work full time (40 hour week)
16% retired
Other groups each around 7-10%
Not employed, student, self employed,
Part-time, homemaker

Annual Household Income - 35% from \$25,000 - \$50,000
Other groups each around 10%
Less than \$10,000
\$10,000 - \$24,000
\$50,000 - \$75,000
More than \$75,000
Would not disclose

Impairment - Slightly over 2% had some type of impairment, with half involving mobility and the other half including hearing, visual and mental

Instate-Outstate - 55% of visitors from instate and most residing in Clark County.
45% of visitors from outside of Nevada

(For visitor use numbers, see **Recreation** in Chapter 3)

WILDERNESS

Red Rock Canyon National Conservation Area (RRCNCA) includes portions of two areas which have been studied for consideration as designated wilderness areas. The La Madre Mountain Wilderness Study Area (WSA) includes the northern portion of the core (original) NCA and into the northern NCA expansion to the Harris Springs Road and the Kyle Canyon Road east of the Harris Springs Road. It is bordered to the southeast by the RRC Scenic Drive area and to the southwest by the Pine Creek WSA. The two WSAs are separated only by the Red Rock Summit Road (Rocky Gap Road) and included corridor. The Pine Creek WSA, within the NCA, continues south along the west boundary to State Route 160, and runs along the base of the Red Rock Escarpment as the east border (see map at end of this section).

The WSAs were studied under Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) and were included in the Clark County Wilderness Recommendations/Environmental Impact Statement (EIS). The Final Wilderness EIS was filed in April, 1987.

The WSAs, encompassing 32% of the RRCNCA, will continue to be managed in compliance with the Interim Management Policy for Lands Under Wilderness Review (IMP), H-8550-1, until acted upon by Congress. If designated as wilderness, they will be managed under the provisions of BLM Manual 8560, Management of Designated Wilderness Areas, and under the regulations at 43 CFR 8560. If released from wilderness study they will no longer be subject to the IMP, and will be managed under the provisions of this management plan.

La Madre Mountain WSA

The La Madre Mountain Wilderness Study Area (WSA) (NV-050-412) encompasses approximately 61,630 acres of public land on the east side of the Spring Mountains, approximately 12 miles west of Las Vegas, Nevada. A large part of the south central portion of the WSA (41,918 acres) is contained within the RRCNCA.

The northern boundary of the WSA is identified by a dirt road and the Humbolt-Toiyabe National Forest boundary as it existed prior to 1990. The eastern boundary extends generally along section lines for approximately six and one-half miles to where it intersects private lands and then borders private lands adjacent to Brownstone Basin. The southern boundary is the Red Rock scenic loop drive, Willow Spring road and Red Rock Summit road between the Pine Creek and La Madre WSAs. The southwest boundary is generally identified by the Lovell Canyon road and utility line extending to private property in Lovell Canyon, the private property boundary around the Sky Mountain Preserve, and the

Lovell Summit road between Lovell Canyon and Trout Canyon. The west boundary is the quarter section line in sections 15, 22, and 27, T. 20 S., R. 58 E., slightly east of the private property in Trout Canyon.

The National Forest and Public Lands of Nevada Enhancement Act of 1988, adjusted administrative boundaries, placing approximately 20,324 acres, 33 percent, of the WSA within the Humbolt-Toiyabe National Forest. Approximately 18,955 acres (45 percent) of the area recommended for wilderness designation will be under Forest Service administration and 23,050 acres (55%) will be under BLM Management. The remainder of the area is recommended for uses other than wilderness.

The recommendation for this WSA, as identified in the Nevada BLM Statewide Wilderness Report (1991), is to designate approximately 42,005 acres of public land as wilderness because of its high quality values, its outstanding opportunities for both solitude and primitive and unconfined recreation, the lack of conflicts with uses of the area, and the overwhelming public support for designation of this area. Approximately 19,625 acres would be released for uses other than wilderness.

The recommendation differs from the proposed action in the Final EIS due to changed land status. The western end (west of Lovell Canyon) is now contiguous with designated wilderness (Mt. Charleston) and is a natural link between the existing wilderness and the area proposed for wilderness. Alternative A (with revised acreage figures) was then selected to replace the original proposed action and now is the recommendation.

The area is manageable as wilderness, due primarily to the extreme rugged terrain, dense vegetation and its relative inaccessibility to motorized vehicles. Much of the area recommended for wilderness designation is within the RRCNCA where off-highway vehicle (OHV) use is limited to existing roads and trails.

Areas of the WSA not recommended for wilderness designation includes the northern portion where there are conflicts with mining claim development, increased pressures from urban development, and increased OHV activity on an existing way. The western portion surrounds private lands within Lovell Canyon, where management of the area as wilderness would be difficult due to the sights and sounds of resort activity. The recommendation emphasizes maintaining access to the northern portion, for mineral exploration and development, and to the western portion for recreation development.

The entire WSA is predominately natural. La Madre Mountain and the other mountains, hills and valleys which comprise the area

recommended for designation, are essentially untouched by man. Most OHV activity is concentrated outside this area on the northern and southeastern portion with the majority occurring outside of the WSA.

The area recommended for uses other than wilderness is primarily in a natural condition, however, the influence of external activities decreases the quality of the experience. Mining claims, OHV activity, and future proposed development of private lands combine to reduce the natural qualities of the area.

Within the area recommended for wilderness designation, outstanding opportunities for solitude exist. The rugged complex of deep canyons, draws, summits, ridges and the pinyon-juniper cover provides excellent screening and secluded areas. In the portions recommended for uses other than wilderness, the influence of urban development, mineral activity, and sounds of OHV activity significantly diminish the quality of solitude.

Primitive and unconfined recreation opportunities are outstanding in the area recommended for wilderness because of the variety, quality, and accessibility of the activities. Day hiking, backpacking, rock climbing and scrambling, nature study and photography are all outstanding due to the unique special features of the area and the variety of destinations and levels of challenge. Access to the area is outstanding from all directions, primarily from locations within the RRCNCA.

Primitive recreational opportunities exist in the portions of the WSA recommended for uses other than wilderness, however, the quality and diversity of that opportunity is significantly less than in the area recommended for wilderness.

Red and buff colored sandstone formations in the Calico Hills, White Rock Hills, Brownstone Basin, and Little Red Rock area are of geological, ecological and scenic interest. The cross-bedded sandstone demonstrates their origin as former sand dunes. The brightly colored sandstone contrasts sharply with the rugged, spectacular limestone cliffs that backdrop them. La Madre Mountain and its sheer cliffs on the southeast side are the single most dominant feature within the area recommended for wilderness. The Keystone Thrust of the older limestone of the La Madre Range, that have been pushed over the younger sandstone, is dramatically evident above Brownstone Basin. This particular site is internationally regarded as the single finest example of a thrust fault and is of significant geologic and scientific interest.

The large variation in elevation (6,000 feet) allows for a variety of plant communities from Southern Mohave desert shrub to sub-alpine environments of white fir and ponderosa pine. Natural

water impoundments in the sandstone provide near perennial water sources that support a variety of wildlife. The area provides crucial summer habitat for a sizeable herd of bighorn sheep and a small herd of elk.

Prehistoric sites occur throughout the area recommended for wilderness. Site types include rock art panels (both pictographs and petroglyphs), agave roasting pits, rock shelters, camp sites, milling sites, and lithic and ceramic scatters. Brownstone Canyon has been listed on the National Register of Historic Places because of the concentration and diversity of cultural site types, the occurrence of rare polychrome pictographs.

The area recommended for wilderness can reasonably be managed as wilderness. The area is a solid block of public land with no private inholdings, State lands, split estate lands or rights-of-way. No valid rights currently exist. Most of the area is in the RRCNCA and closed to mineral entry. Mineral resource potential has been identified as low and development of minerals is not expected.

Within the area not recommended for wilderness, a lack of natural and physical impediments to OHV access, and known sand and gravel and nonmetallic mineral resources make this area unsuitable for wilderness management.

Assessment of the mineral potential for that portion of the La Madre Mountain WSA recommended for wilderness found that stream sediments delineated a zone of slight silver, lead and zinc anomalies. However, the report judged the area to have low mineral resource potential for silver, lead, and zinc. No known deposits of nonmetallic minerals occur within the area, and discovery of significant near-surface deposits is unlikely. Sand and gravel and limestone suitable for construction materials are abundant within the area, but, because similar materials are available closer to major markets, occurrences were not classified as resources. The potential for petroleum resources is rated as low.

Pine Creek WSA

The Pine Creek Wilderness Study Area (WSA), (NV-050-414), is located approximately 15 miles west of Las Vegas, Nevada. It contains 24,618 acres of public lands, with no split estate or private inholdings. The majority of the WSA (19,952 acres) is inside the Red Rock Canyon National Conservation Area (RRCNCA), in the southern portion of the Spring Mountain Range. The west boundary of the WSA is identified by a utility line right-of-way and the Lovell Canyon road. Private land in the Mountain Springs area and a utility line right-of-way mark the southern boundary. The Red Rock Summit road, marks the northern boundary of the WSA.

The east boundary of the WSA follows the base of the Red Rock escarpment, skirting around two small parcels of State owned lands.

The National Forest and Public Lands of Nevada Enhancement Act (Public Law 100-550) adjusted the administrative boundaries for the Humbolt-Toiyabe National Forest, placing approximately 15 percent of the Pine Creek WSA within the new Forest boundary.

The recommendation for this WSA, as identified in the Nevada BLM Statewide Wilderness Report (1991), is to designate 22,966 acres of public land, including 705 acres outside the WSA, as wilderness and release approximately 2,357 acres for uses other than wilderness. Wilderness designation is recommended because of high quality wilderness values and special features, its easy accessibility for primitive and unconfined recreational uses, the lack of conflicts with other actual or potential uses, and the overwhelming public support for wilderness designation of this area.

Designation would preserve and protect an undisturbed area for several solitude-dependent wildlife species, and numerous prehistoric and historic archeological sites. This offers residents of a booming metropolitan area outstanding opportunities for a quality wilderness experience within 15 miles of the urban sprawl.

Outstanding opportunities for solitude and primitive and unconfined recreation are available within the WSA. The numerous canyons and stands of ponderosa pine, pinyon, and juniper isolate visitors from one another and provide geological, ecological and scenic interest for hikers. The sheer sandstone cliffs challenge rock climbers and scramblers and serve as dramatic backdrops for photographers. Perennial springs, seasonally flowing streams, and waterfalls permit backpack camping year-long. Wildlife viewing and nature study are particularly enjoyable in the cool, moist canyons which support a variety of small and large animal species and many rare and endemic plant types.

Within the area recommended for wilderness, extremely rugged terrain and dense vegetation have acted as a natural barrier, precluding motorized access. This inaccessibility enhances the manageability of the WSA. The RRCNCA encompasses most of the WSA where off-highway vehicle (OHV) use is limited to existing roads and trails.

Conflicts with other resource uses of the lands recommended for designation are limited. Seventy-five percent of the recommended area is contained within the RRCNCA and closed to mineral entry; the remaining western portion of the WSA is open to mining location.

Approximately 2,083 acres of BLM and 274 acres of Forest Service administered land, recommended as nonwilderness, are located along the eastern and western borders of the WSA. Adjustments to the eastern boundary delineated a more easily identifiable boundary along the base of the escarpment. This action would enhance the management of the WSA by providing a recognizable boundary for that portion of the WSA. The remaining acreage recommended as nonwilderness is located in a strip on the western boundary of the WSA, and includes areas where OHV use is ongoing and not impeded by natural physical barriers. Management of this area for OHV use is considered to be more appropriate than for wilderness values.

The 22,966 acres recommended for wilderness are predominately natural. The sandstone cliffs of the escarpment, narrow canyons of Pine Creek, and the stands of ponderosa pine, pinyon and juniper have formed natural barriers to the intrusion of man. Rare and endemic plant species still flourish adjacent to the perennial stream and springs and along ephemeral water courses; solitude-dependent wildlife still find quality habitat within the WSA.

The majority of the area is free of man's imprints. A single 2 mile long cherry-stemmed way runs on the west side of the study area; this is a localized imprint visible only from the immediate vicinity.

Within the area recommended for wilderness designation exists outstanding opportunities for solitude. The rugged complex of canyons and ridges provides excellent topographic screening. The sandstone cliffs have differentially weathered into natural arches, bridges and pockets that create numerous secluded spots. These geologic features are heavily interlaced with dense stands of pinyon-juniper and ponderosa pine, forming isolated glades in which the visitor is remote from even relatively nearby groups. Willow, ash, and hackberry form a secondary vegetative cover along the canyon bottoms. These distinctive features combine to create an area where not only can outstanding solitude be found, but where its enjoyment is greatly complemented by natural and scenic values.

Opportunities for primitive and unconfined recreation are outstanding in the area recommended for wilderness designation because of the variety, quality, and accessibility of the activities. Day hiking, backpacking, rock climbing and scrambling, nature study and photography are all enhanced by the unique geology, scenic beauty, rare and endemic biota, and rich cultural manifestations. Perennial spring and seasonal catchments provide year-round water sources for backpack camping.

Several special features supplement the wilderness values of the

area recommended for wilderness designation. The sandstone cliffs are the dominant landform feature. The cross-bedding of ancient sand dunes and the Keystone Overthrust of limestone are of geologic and paleontological interest. Weathering of the sandstone layers has created natural bridges, arches, and sloughs through which seasonal runoff cascades as waterfalls to the canyons below.

Canyons below the escarpment create micro-climates that sustain botanical resources dramatically different from those of the surrounding Mohave desert. They support species of milkvetch, penstemon, worts, and numerous ferns that are endemic to Red Rock Canyon and the Spring Mountains. Relic stands of ponderosa pine occur at unusually low elevations in the WSA.

Unique plant communities and reliable water sources of the Pine Creek WSA sustain a variety of solitude-dependent animals. A sizeable herd of bighorn sheep find crucial summer habitat within the area recommended for wilderness. The presence of kit fox, bobcat, mountain lion, and a variety of raptors also offers excellent opportunities for scientific observation and nature study in this WSA.

A wide range of cultural resources are of special value in the reconstruction of regional history. High concentrations of rock art sites, with both petroglyphs and the more unusual pictographs, rock shelters, and campsites suggest that the unique biomes within the WSA were very important to early peoples. Milling stations and agave roasting pits point to the processing of local plant resources. The historic Spanish trail also passes through the extreme southern end of the WSA.

The entire WSA and the additional acreage recommended for wilderness designation could reasonably be managed as wilderness to preserve values now present in the area. The area is a solid block of public land with no private inholdings, State lands or rights-of-way. OHV use is confined to existing ways within the WSA, and designated roads in the RRCNCA.

The WSA has moderate favorability for oil and gas, low favorability for geothermal, and low favorability to unfavorable for metallic minerals. The entire WSA is moderately favorable for sand and gravel resources.

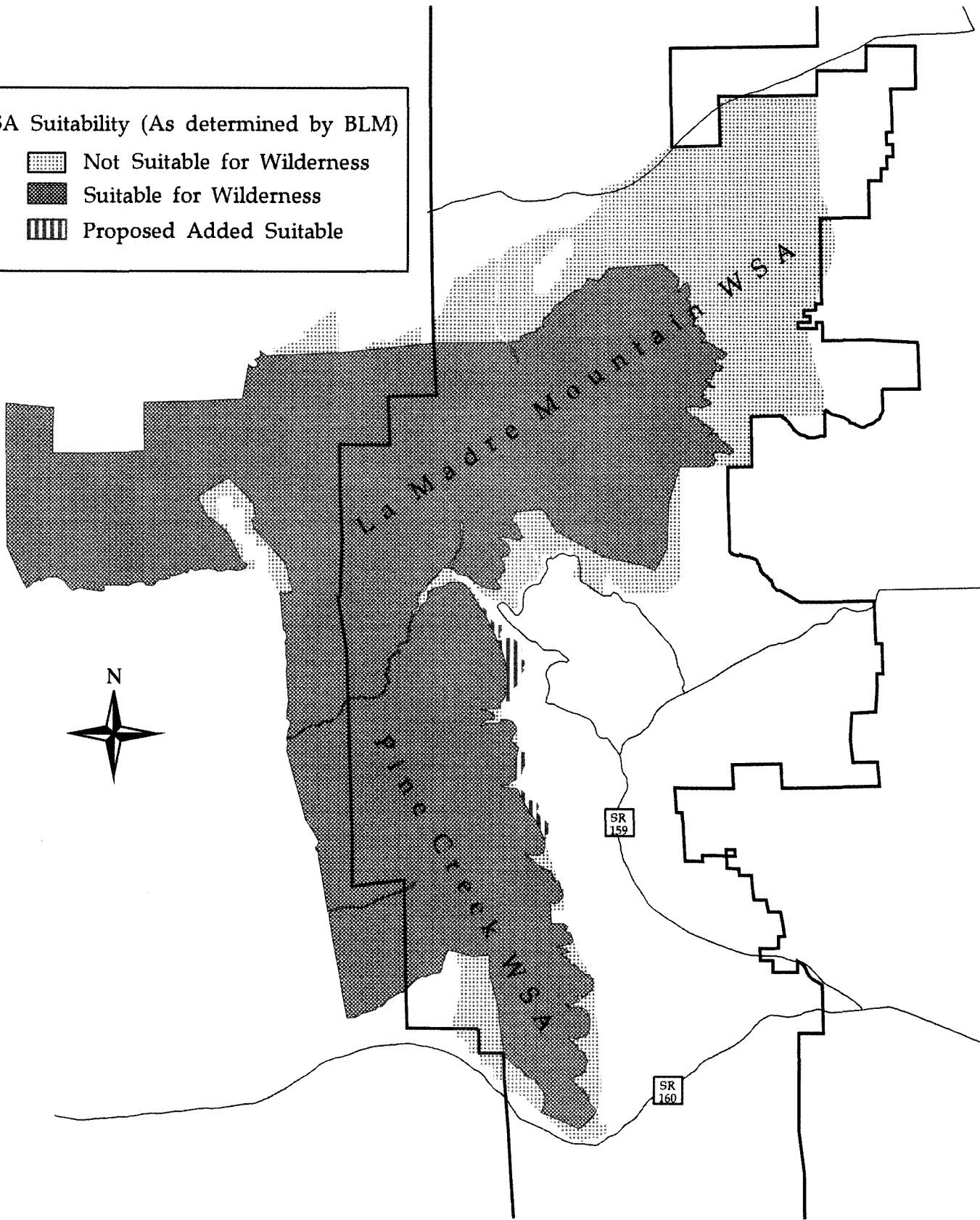
Eighty-one percent (19,952 acres) of the WSA is contained in the RRCNCA, and thus segregated from mining laws, preventing mineral entry. An additional 150 acre area, Pine Creek Research Natural Area, is also withdrawn from mineral entry. There are twelve oil and gas leases covering 22,800 acres of the WSA. Approximately 35 post-FLPMA mining claims are located in the southwest portion of the WSA. This area is not recommended for

wilderness.

Wilderness Study Areas (WSAs)

WSA Suitability (As determined by BLM)

- Not Suitable for Wilderness
- Suitable for Wilderness
- Proposed Added Suitable



1 0 1 2 3 4 Miles

BIODIVERSITY

The *Affected Environment* of Red Rock Canyon National Conservation Area is more than an assemblage of individual biotic components. In its entirety the Red Rock Canyon environment also comprises an integral portion of the *Spring Mountains ecosystem*.

LANDSCAPE ECOSYSTEM: SPRING MOUNTAINS

An ecosystem is a community of organisms that functions with its non-living environment as an integrated unit. The moisture and organic decomposition of a rotting log sustains a unique host of fungi, insects and various other organisms. The log is thus a microsite ecosystem within a larger riparian habitat ecosystem, and so on through ecosystems of canyon, watershed and mountain range scale. The function of ecosystems together span all of the complex linkages between energy flows; nutrient cycles; food chains; environmental processes and cycles; biotic succession; disturbance regimes; evolutionary change; community, population and species dynamics; and the flow of gene materials.

The appropriate ecosystem scale at which to evaluate the affected environment of Red Rock Canyon is the Spring Mountains landscape. Biotically, the distinct physical conditions of the Spring Range support communities and species that are unique from those of the adjacent open desert. Opportunistically, the Spring Range poses the increasingly rare case of an unfragmented landscape ecosystem that is wholly under public ownership, as well as protective management status (NCA; USFS National Recreation Area). A landscape-centered holistic focus offers the most cost-efficient solution to ecological conservation goals as comprehensive and complex as those of Red Rock Canyon National Conservation Area.

BIOLOGICAL DIVERSITY

Biological diversity (also *biodiversity*; *biotic diversity*) is the "variety and variability of living organisms ... (and) ... of the ecological complexes in which they occur; encompassing all levels of biotic organization from ecosystems to species to ... genes." (Office Technology Assessment; 1987). Biological diversity is a dynamic aggregate of ecosystem diversity, community diversity, species diversity, genetic diversity and diversity of ecological processes. Biotic diversity thus refers to viable populations of native species maintained in sustainable ecosystems. The degree of biological diversity that is present in the Spring Mountains is of global significance. This quality reflects not only the variety and rarity of area species, but also the variety of their communities and associations, and the intactness of the landscape ecosystem.

Biogeography

Many factors contribute to the great biodiversity of the Spring Mountains. Geographically, the range lies in a transition zone between the Colorado River Plateau, the warm Mojave Desert and the Great Basin cold desert. This melding of physical and biotic influences heightens the variety of site adaptive niches to be filled by organisms, both at the species level and in numerous associations. Over time, as natural populations have dispersed into this "biological crossroads" region the terrain relief of the Spring Mountains has presented habitat conditions suitable to both species with low elevation southern affinities (warmer and drier) and high elevation northern affinities (cooler, wetter). Biological niches are differentiated along gradients of wind, precipitation, sunlight, shade, humidity and soil conditions; themselves dictated by the topographic variables of slope, aspect, exposure and elevation. Spring Range soil conditions are particularly diverse, owing to their broad spectrum of parent materials (dolomites, limestones, shales, gypsum, sandstones) and wildly variegated surface layer; these being the combined result of the area's unique geological history (thrust faulting, crossbedding) and routine weathering.

Springs

Another geological factor in the biodiversity of the Spring Mountains ecosystem is the unique abundance of springs and seeps. Many of the springs are controlled by impermeable fault contacts between rock strata of different density, eventually resulting in lateral movement of yearly precipitation that has percolated down to the impermeable layer. The other local springs discharge from perched or elevated water tables of respective aquifer systems. Also contributing to this favorable spring hydrology is the fact that the Spring Mountains receive more annual precipitation than other southern Nevada ranges (Bradley; 1965).

The local springbrooks are typically short, due to rapid water infiltration on alluvia largely composed of gravels and porous sandy soils. The passive discharge mechanism of these springs leads to wide fluctuations in their output, either seasonally or from year-to-year. Durations of surface flow also vary. While some springs function continuously throughout the year (perennial springs), others cease flowing during the hottest months of the year (intermittent springs). Local intermittent springs usually fail by mid-summer and resume flowing during the fall. Some very low-volume intermittent springs fail altogether in drought years or other extended periods of abnormal environmental conditions. Because the springs are all recharged by winter precipitation and infiltration, their peak output typically occurs during the late spring or early summer. Finally, there are also local perennial springs that exhibit patterns of interrupted flow (First Creek;

Oak Creek), alternately sinking and resurfacing in the streambed as varied substrate densities are encountered.

Forty springs have been inventoried in RRCNCA (Appendix 9A); 17 historical records are pending verification (Appendix 9B). Nine other records, including citations from previous Red Rock Canyon planning documents, have recently been invalidated as duplicate or false reports (Appendix 9C). RRCNCA has 31 perennial and 9 intermittent springs, with discharges ranging from unmeasurable traces (wet soil only) to 100-gal/minute. Approximately 50% of the NCA springbrooks do not exceed 100-feet in length, nor do the longest streams (South Fork; La Madre) exceed 0.5-0.75 miles.

In terms of biological significance Red Rock Canyon possesses no fewer than 10 perennial springs with average minimum outputs of 25-gals/minute (La Madre, South Fork, Wheeler Camp, Lost Creek, Oliver Ranch, Oak Creek, Mormon Green #1, Pine Creek, Rainbow and Bootleg). The Red Rock Canyon and Spring Mountains landscape ecosystem is an oasis of life-giving surface water located amid an otherwise arid desert environment.

Surface Water Availability

Geologic weathering of the signature exposed sandstone strata in Red Rock Canyon has produced an array of water-holding depressions, called tinajas. These natural water catchments are distributed throughout the NCA, but are especially abundant in the Sandstone Escarpment and in the Calico Hills. Tinaja pools range in capacity from scant ounces to many thousands of gallons, with depths of water from inches to several feet. Regardless of individual size, tinaja water sources are vital to many Red Rock Canyon wildlife species, in particular the Bighorn sheep (Ovis canadensis). Tinajas occur in vicinities that lack spring sources (Brownstone Canyon; Little Red Rocks), and include pools that can persist beyond mid-summer, thus supplementing the diminished output from perennial springs or replacing altogether the waters from intermittent springs that have seasonally failed. In addition, there are 9 artificial water catchments in Red Rock Canyon (see Appendix 11). Three have varied potential benefit to wildlife, particularly Bighorn sheep, for similar reasons as for tinaja waters. Two are circa-1930's Civilian Conservation Corps masonry reservoirs built onto rimrock faces in Brownstone Basin; the other is a mammal guzzler built in 1974 by the BLM and Nevada Division of Wildlife (NDOW) to improve Bighorn sheep habitat in the north drainage of La Madre Mountain. Six more NDOW guzzlers were erected in Cottonwood Valley in 1987 to specifically benefit two game birds, the native Gambel's quail (Callipepla gambelli) and Chukar (Alectoris chukar), an introduced Eurasian species. The guzzlers consist of sheet metal aprons that funnel rain and snow water into partly-buried tanks that are wildlife accessible. The rugged terrain also contributes to the episodic formation of

ephemeral streams in what ordinarily are dry channels or washes. These ephemeral streams are the immediate surface run-off from storm events, which occur primarily during the Gulf-produced monsoon season of late summer and early fall. The persistence of such streamflows is limited to the duration of the storm events, since the water is quickly absorbed into the dry channel bottom. However, pools may persist for some days afterward, depending on soil and gravel substrate, shading and rainfall amount variables. Such ephemeral pools offer opportunistic wildlife benefits, from forage water for individual animals to providing the stimulus for localized population blooms, as happens in Red Rock Canyon with both the Red-spotted toad (Bufo punctatus) and Pacific chorus frog (Pseudachris regilla).

Riparian Areas

Just as the geology, hydrology and topography of the Spring Range gives rise to an abundance of local springs, these water sources in turn give rise to the landscape's unique plenitude of riparian areas. More than any other single factor, it is the presence of these riparian areas that accounts for the biodiversity which is, again, the fundamental unit of biological resource value posed by the Red Rock Canyon National Conservation Area. Just as the entire Spring Range ecosystem can be thought of as an island of enhanced biological diversity in comparison to its surrounding desert environs, the riparian areas can be viewed as representing smaller islands of biodiversity within this landscape as a whole. Because these riparian areas also invariably attract and sustain the highest amount of recreational use and feral horse and burro pressure, they pose one of the key management issues in RRCNCA as well.

The BLM classifies riparian-wetland areas as being inundated or saturated by surface or ground water at a frequency and duration necessary to support a prevalence of vegetation typically adapted for life in saturated soil conditions. However, not all riparian areas exhibit the hydric soils, hydrophytic plants and shallow or surfaced water table that is requisite of wetlands under the more ecologically appropriate definition. Bureau policy further defines riparian areas to be a form of wetland transition between permanently saturated wetlands and dry upland areas. The key factor is that these areas exhibit vegetation or physical features that demonstrate the influence of permanent surface or subsurface water, such as lands adjacent to perennially or intermittently flowing spring streams. Ephemeral streams and dry washes do not support plant species dependent on free soil water however, and thus are not classified as riparian areas regardless of the fact that such wash vegetation is clearly distinct from that of the immediately adjacent landscape.

Riparian areas provide an array of important functional values in

Red Rock Canyon. By physically and chemically trapping sediments in the runoff from upland areas, riparian vegetative cover helps maintain the water quality of the associated springbrook streams. Riparian areas serve as significant flood water storage sites due to the ability to decrease water velocities and increase sediment deposition in upstream locations. Properly functioning riparian areas help to maintain high water tables and increase the assimilation of organic material into the soil (Medina; 1995). Riparian areas are crucial wildlife habitat as well, furnishing food, water, shelter, predation opportunities and transportation corridors to a multitude of organisms. Within the Spring Range and RRCNCA, many bat, bird, raptor and amphibian populations are especially dependent upon such riparian habitats.

It is the assemblage of riparian areas that is predominately responsible for the biodiversity quality of RRCNCA. The reason being that riparian areas characteristically produce greater biomass and offer more niche differentiation than upland dry habitats. This is also why these riparian areas harbor the greatest proportion of rare, sensitive and special status species found within Red Rock Canyon.

Water is the prime limiting factor in any biological environment. Because the springs in Red Rock Canyon are often the only source of available water across wide expanses of arid desert, riparian areas naturally attract and sustain higher concentrations of life than comparable lands that are without persistent surface waters. Nevertheless, the climate and physical conditions of the Mojave Desert and Great Basin cold desert work against the retention of permanently moist soils (i.e., critical to riparian vegetation). The extreme heat, preponderance of sunny days, low and infrequent precipitation, high evapotranspiration rates and sandy porous soils all combine to restrict the surface influence of the local spring waters. As a consequence, the riparian vegetation in Red Rock Canyon is predominately confined to narrow corridors along the immediate stream courses.

The biotic value of riparian areas throughout the arid Southwest is disproportionate to their areal extent (Szaro; 1989). Riparian areas are estimated to provide habitat for approximately 80% of all terrestrial species within the Great Basin ecological region (Thomas; 1979). In appropriate recognition of this biotic circumstance, western riparian areas comprise one of the highest program priorities of the Bureau of Land Management today, though representing only approximately 09% of agency-administered lands (BLM; 1994). This resource protection focus is particularly applicable to the riparian areas managed within the Red Rock Canyon National Conservation Area.

Vegetative Communities

The unique biotic diversity of the Spring Mountains and RRCNCA extends as well to the associations formed by natural organisms. In regard to plant species, so great is the variety and variability of local microsite habitat niches, that standard classification schemes of vegetative units, plant communities or series associations are impractical (Myers; 1969) (Leary; 1996). Not only are the boundaries between vegetation groups typically obscure, but their species composition often changes across quite short distances, even within communities that appear homogenous in structure. A second basic reason for the aggregate diversity is simply the large number of individual plant species; they can combine in more numerous permutations.

There are some general classification concepts that remain useful in describing the complex vegetative mosaic pattern of Red Rock Canyon. One is the universal fact that environmental phenomena tend to exist as gradients, with the result that in areas with topographical diversity (i.e., terrain relief) these gradients are steep enough to cause vegetative gradations that are distinct and visually obvious. Another is, within such elevation-stratified vegetation zones there exist various *biotic communities*. These are natural groupings of plant and animal populations that occupy a given locale, differentiated by their unique sets of shared environmental tolerances and life requirements. Finally, those biotic communities with similar yet different environmental tolerances can then be classified as *community types*.

The RRCNCA vegetative communities can be reasonably grouped into eight major community types, derived from the floristic classifications of Bradley & Deacon (1965) and Leary & Niles (1996). Except for the riparian community, all are *terrestrial* types characterized by the absence of permanent surface water. As the sole *hydric* vegetative type present, RRCNCA's riparian areas are both a generic resource type and a definitive plant community type. In terms of distribution, four are *zonal* community types (creosote bush; blackbrush; juniper-pinyon; pine-fir); four are *transzonal* (riparian; desert wash; chaparral; cliff communities). Species composition and occurrence in the former is determined by elevation gradients; in the latter by other environmental factors such as shade or soil moisture. The result is that the zonal vegetative communities demonstrate a clear pattern of stratified terrain distribution, while the transzonal communities are more variably and diffusely situated in the Red Rock Canyon landscape. In terms of vegetative structure, two of the community types are woodlands (juniper-pinyon; pine-fir), two are desert shrub types (creosote bush; blackbrush) and the rest are intermediate shrub/ woodlands (desert wash; chaparral; cliff and riparian).

As to species composition, it must first be stated that all plant

communities consist of species with diverse life cycles. Annual forbs (soft-stemmed plants) and grasses complete their full cycle within one growing season, usually in abrupt response to rainfall and temperature changes. The widespread, rapid growth of annuals often occurs from seeds that have lain dormant for years, due to unfavorable site conditions. In southern Nevada, winter annuals sprout after Pacific frontal storms and stay green for months if temperatures remain cool. The production of summer annuals from Gulf monsoon thunderstorms is more scattered and episodic. Biennials (two-year cycle) and perennials (multiple-year growth and seedset) are more persistent, less susceptible to short-term environmental factors and thus more stable as community components. Though there are important grasses as well, most Red Rock perennials and biennials are woody-stemmed shrubs and trees. Table 1 is a brief outline of species composition in the major RRCNCA vegetative communities (see Appendix 4 for more detail). Ecological status and trend of these communities is discussed later, under Management Concerns.

Ecological condition

The ecological condition of these communities is determined by comparing the existing plant community on a distinct ecological site with the potential natural community identified for the site. An order 3 soil survey is used to classify and differentiate homogeneous vegetative communities or ecological sites. An ecological site is the product of all the environmental factors responsible for its development including soils, topography, climate and fire. It is a kind of land with potential for a specific plant community and with specific physical site characteristics. Ecological sites differ in their ability to produce vegetation and respond to management. The native community in an ecological site differs from that of other ecological sites in the kind or proportion of species or total production.

The ecological sites comprising most of the acreage in RRCNCA are Shallow Gravelly Loam 8-10 (Blackbrush (Coleogyne ramossissima) and desert needlegrass (Stipa speciosa)), Shallow Gravelly Loam 5-7 (Blackbrush and big galleta (Hilaria rigida)), Coarse Gravelly Loam 5-7 (Blackbrush, big galleta, spiny Menodora (Menodora spinescens), and winterfat (Cerotoides lanata)), Shallow Gravelly Slope 5-7 (Blackbrush), Shallow Gravelly Loam and Slope 7-9 (Blackbrush, big galleta and black grama (Bouteloua eriopoda)), Gravelly Fan 5-7 (White bursage (Ambrosia dumosa) and big galleta), Limy Fan 5-7 (Big galleta), Limy 5-7 (Creosote bush and white bursage), wash sites and a number of woodland sites dominated by Pinion or Juniper, co-dominant Pinion and Juniper, or Ponderosa Pine. Joshua tree is a common aspect species component of the blackbrush ecological sites.

Ecological condition is use-independent and is defined as the present state of the vegetation and soil protection of an ecological site in relation to the potential natural community for that site. It is an ecological expression of the relative degree to which the kinds, proportions, and amounts of plants in the present plant community resemble that of the potential natural community. A range of classifications from Potential Natural Community through Late, Mid and Early Seral condition with early seral condition being the farthest from the potential of the site. Formal ecological site mapping for RRCNCA has not been accomplished.

Areas that would probably be classified as early seral ecological condition are predominantly located in blackbrush communities that have been burned by wild fire or subject to past heavy grazing pressure. These areas are in early successional stages. When blackbrush is disturbed by fire, overgrazing, or other surface disturbing activities, purple threeawn (Aristida purpurea), Indian ricegrass (Oryzopsis hymenoides), globemallow (Sphaeralcea ambigua), baileya (Baileya multiradiata), brittle bush (Encelia actoni), and broom snakeweed (Gutierrezia sarothrae) are some of the native species that increase. Red brome (Bromus rubens), Russian thistle (Salsola kali), and cheatgrass (Bromus tectorum) often invade the site. Some of the early seral condition fall within localized areas around riparian areas.

Four one acre exclosures were established in the RRCNCA to study wild horse and burro impacts and to better understand the ecological sites present. Quantifiable vegetative trend and condition data for three of these exclosures is lacking. However, a trend study was done for the Mud Spring exclosure (Mud Spring #1) in 1999. The apparent trends on the burn areas, based on one exclosure (Burn Site #2), when they are subject to re-burn, are downward. No data exists for the burn areas that have not re-burned in recent times. The apparent trends on the Kern River Pipeline seeding (Blondie #3) are strongly upward but this is based on recovery of a highly disturbed construction site and not the normal conditions found on lands in RRCNCA.

The following examines vegetative trends and conditions for the Mud Spring exclosure. The analysis and interpretation of the exclosure data looks at the changes inside and outside separately and independently. Relative, not absolute, comparisons over time between the inside and outside would provide information on wild horse use.

TABLE
Mud Spring #1 Established May 1, 1990
Coarse Gravelly Loam 5-7 30XB107NV
Blackbrush, big galleta, winterfat, & spiny menodora
Late Seral Ecological Condition

Cover/ Plant Species	1990 Percent Cover or Frequency	1993 Percent Cover or Frequency	1999 Percent Cover or Frequency	Analysis and Discussion
INSIDE EXCLOSURE DEEPER SAND SHEET COVER OVER SANDY LOAM MORE PRODUCTIVE LOCATION TREND IS UPWARD due to increase in cover, Indian ricegrass, & big galleta.				
Vegetative Canopy Cover Perennial Only	27.7	29.3	38.3	More Mormon tea and larger shrubs.
Red Brome	39.5	64.5	79	Clearly invading the site
Indian Ricegrass	9	13	20	Plants 2 to 5 years old. Sand sheet thicker than surrounding area.
Big Galleta	15	20	23	Plants show little growth & low vigor, may be ambient temperature related
Mormon Tea	13	14.5	10.5	1990 was a very productive year for shrub species while 1992 was 600 lbs/acre less production. Other than the sandier soils inside, it is not clear why Mormon tea and Menodora are less
Spiny Menodora	23.5	18	16	
Black Brush	42	37.5	41	
OUTSIDE EXCLOSURE THIN SAND SHEET OVER SANDY LOAM LESS PRODUCTIVE LOCATION TREND IS STATIC TO UPWARD DUE TO COVER, & INDIAN RICEGRASS.				

TABLE
Mud Spring #1 Established May 1, 1990
Coarse Gravelly Loam 5-7 30XB107NV
Blackbrush, big galleta, winterfat, & spiny menodora
Late Seral Ecological Condition

Cover/ Plant Species	1990 Percent Cover or Frequency	1993 Percent Cover or Frequency	1999 Percent Cover or Frequency	Analysis and Discussion
Vegetative Canopy Cover Perennial Only	36.3	30.6	36.3	
Red Brome	37.5	64.5	78.5	Clearly invading the site
Indian Ricegrass	2	5	5.5	Showing a relative increase. However, the sample size is too low for statistical analysis. Use varied from 20 to 60 percent on individual plants in transect area.
Big Galleta	3.5	3.5	1.5	Plants show little growth & low vigor may be ambient temperature related. Use varied from 20 to 80 percent on individual plants in transect area.
Mormon Tea	8	5.5	10.5	Young Mormon tea plants noted in transect. 1990 was a very productive year for shrub species while 1992 was 600 lbs/acre less production. It is not clear why Mormon tea and Menodora vary in frequency.
Spiny Menodora	24	17	20	
Black Brush	76	67	66	The difference in 1990 is unclear other than the heavy production and potential for counting a shrub more than once in 1990.

The overall trend is upward inside the enclosure and static to approaching upward outside the enclosure, due to a slight increase in Indian Ricegrass and existing cover.

The 1998 use levels on galleta and ricegrass outside the enclosure are ranging from 20 to 80 percent on individual plants in the transect area with an average use of 50 to 60 percent. This falls within the moderate range of use. Use at 50 percent or less is preferred to minimize stress on the plants.

Red brome is increasing from 1990 to present at a steady rate. Research on the Nevada Test Site show that this is a natural phenomenon. This means that we are in the beginning stages of a Red Brome invasion. The increase is the same outside as inside the enclosure. The increase has been consistent since 1990.

SPECIES DIVERSITY

Based on species diversity alone, the Spring Range has long been recognized as the most biologically significant portion of Clark County (WESTEC; 1980). Recent scientific investigations have expanded this recognition to assume national, if not global proportions (Nachlinger; Sada; Morefield; Ramsey; Leary; others). Besides topography and geology, a third biological factor has to do with the combined effects of the climatological history of southern Nevada and the physical isolation of the Spring Mountain range during that time. The cooler, wetter conditions that prevailed throughout the Pleistocene Epoch allowed northern-adapted species to extend their distribution into this southern region. Roughly 11,500 years ago, during the climatic drying and warming trend of the Holocene, many such species were only able to survive in the cooler conditions found at higher elevations. As the drying and warming trend persisted over time, the lower elevation valleys and basins gradually became deserts, essentially trapping many of the cooler-adapted northern species within their respective mountain territories, such as the Spring Range. Over subsequent centuries this geographical isolation has born three distinctive traits on the biota of the Spring Mountains and RRCNCA as it exists today.

Table 1. Vegetative Community Types (Summary of Key Species)

COMMUNITY TYPE	[Distribution]
1) Dominant/Codominants 2) Associates- Shrub, Tree 3) Associates- Grass, Forb	
<u>CREOSOTE BUSH</u>	[Below 3600'; Valley floors and benches]
1) <u>Larrea tridentata</u> (Creosote bush); various codominants- <u>Ambrosia dumosa</u> (Bursage) 2) <u>Lycium andersonii</u> (Desert-thorn); <u>Grayia spinosa</u> (Hopsage); numerous cacti 3) Introduced annuals- <u>Bromus rubens</u> (Red brome); <u>B. tectorum</u> (Cheatgrass)	
<u>BLACKBRUSH</u>	[3500-6000'; Bajada terraces with shallow soil]
1) <u>Coleogyne ramosissima</u> (Blackbrush); <u>Yucca brevifolia</u> (Joshua tree) on some sites 2) <u>Yucca baccata</u> (Banana yucca); <u>Ephedra</u> spp. (Mormon tea); <u>Tetradymia</u> (Horsebrush) 3) <u>Hilaria rigida</u> (Galleta); <u>Achnatherum speciosum</u> (Desert needle grass)	
<u>JUNIPER-PINYON</u>	[4000-7000'; upper bajadas and mountain slopes]
1) <u>Juniperus osteosperma</u> (Utah juniper); <u>Pinus monophylla</u> (Singleleaf pinyon) upslope 2) <u>Artemisia tridentata</u> (Sagebrush) 3) Typically barren understory- <u>Elymus elymoides</u> (Squirreltail) not uncommon	
<u>PONDEROSA PINE-WHITE FIR</u>	[Generally above 6500'; upper mountain slopes]
1) <u>Pinus ponderosa</u> (Ponderosa pine); <u>Abies concolor</u> (White fir) on La Madre Mountain 2) <u>Quercus turbinella</u> (Scrub oak); <u>Cercocarpus ledifolius</u> (Mountain-mahogany) 3) Numerous species, many in common with lower elevational community types	
<u>DESERT WASH</u>	[Bisects CREOSOTE BUSH, BLACKBRUSH communities]
1) Highly varied- <u>Chrysothamnus</u> (Rabbitbrush); <u>Prunus fasciculata</u> (Desert almond) 2) <u>Chilopsis linearis</u> (False Willow); <u>Prosopis pubescens</u> (Screwbean mesquite) 3) Similar to adjacent traversed terraces (i.e., CREOSOTE BUSH, BLACKBRUSH types)	
<u>CHAPARRAL</u>	[Within upper washes and escarpment canyons]
1) Scrub oak; <u>Garrya flavescens</u> (Silk tassel); <u>Rhus trilobata</u> (Squaw bush); others 2) <u>Rhamnus</u> (Coffee berry); <u>Cercis canadensis</u> (Redbud); <u>Amelanchier</u> (Service berry) 3) Mirrors traversed communities (i.e., BLACKBRUSH, JUNIPER-PINYON, PINE-FIR types)	
<u>CLIFF COMMUNITY</u>	[Crevices in upland sandstones and limestones]
1) Highly varied- <u>Haplopappus cuneatus</u> (Golden bush); <u>Agave</u> spp. (Century plant) 2) <u>Petrophytum caespitosum</u> (Rock spirea); <u>Forsellesia</u> spp. (Grease bush) 3) <u>Monardella odoratissima</u> (Pennyroyal); <u>Heterotheca</u> (Golden aster); various cacti	
<u>RIPARIAN COMMUNITY</u>	[Restricted to permanent surface water sites]
1) Varied- <u>Baccharis</u> (Waterweed); <u>Pluchea</u> (Arrow weed); <u>Fraxinus</u> spp. (Ash) 2) <u>Populus</u> spp. (Cottonwood); <u>Salix</u> spp. (Willow); <u>Vitus arizonica</u> (Canyon grape) 3) <u>Carex & Eleocharis</u> (Rushes); <u>Juncus</u> (Sedges); <u>Agrostis & Polypogon</u> (Grasses)	

Relict, Disjunct and Endemic Species

A large number of *relict* species populations are present, these being descended from those plants and animals which found mountain refuge during the Holocene desertification of the surrounding lowlands. Another relict feature is that some Red Rock species have persisted in ecological habitat niches from which they long ago disappeared in other areas. For example, the White fir (*Abies concolor*) at the south head of Pine Creek Canyon and Ponderosa pine (*Pinus ponderosa*) gallery forest on lower Pine Creek both occur at elevations that are significantly lower than those now normally associated with these species. Many of the RRCNCA relict species also represent *disjunct* populations that are geographically separate and apart from the species' main territorial range. Isolation heightens the potential for genetic variation to independently occur within such populations; in turn favoring the eventual creation of distinct sub-species. This enhanced speciation process rate likewise holds true for the Spring Range biota in general. This isolation, climatology and biogeography generated entirely new, locally-evolved species. As a result, many of the plants and animals of the NCA are *endemic* species, occurring nowhere else on earth except southern Nevada, the Spring Mountains or Red Rock Canyon.

PLANTS

Plants not only make up a large part of the total RRCNCA species diversity, but serve critical ecological functions. The body and roots of plants help stabilize soils against erosional loss from storm water run-off and wind. The decay of their organic content is key to the soil-building process itself. Plants produce free atmospheric oxygen while also filtering some airborne pollutants, as chemical by-products of their dual photosynthesis/respiration phenomena. Plants furnish the basic survival needs for animal life, either directly in the form of food and cover, or indirectly by ameliorating such biotic habitat conditions as surface temperature, humidity, shading and soil moisture retention.

For a summary of floristic groups and families, see Appendix 3. Specific species was taken from A Flora of Red Rock Canyon National Conservation Area (Leary/Niles; 1996).

Though conducted as a baseline survey of formal scientific merit, the Flora does not fully reflect the plant species diversity in Red Rock Canyon. The number of missed species is likely small, and almost certainly so if factored with the sizable list of potentially resident species cited by Leary and Niles (based on the close proximity of outside populations and the presence of suitable NCA habitat conditions). The Red Rock Canyon floristic inventory results are extremely impressive (Table 2), especially

when the limited survey acreage is considered. This significance applies not just to the overall species number but also to the diversity of floristic families represented, as well as to the extraordinary size of the fern species contingent.

Table 2. Plant Species Numbers

FLORISTIC GROUP -Description	Common Name	Species Known/P*	Families
FERNS & FERN ALLIES -Reproduce by spores	<i>Ferns</i>	14/07	07
GYMNOSPERMS -Repro by seed [cones]; no flowers	<i>Evergreens</i>	09/--	03
ANGIOSPERMS (DICOTYLEDONS) -Repro by seed [fruit]; flowering	<i>Broad-leafs: shrubs/trees</i>	515/139	69
MONOCOTYLEDONS -Repro by seed; (simple embryo)	<i>Blade-leafs: grasses/herbs</i>	114/42	09
SPECIES TOTAL:		652/188*	88
		*Potential	

RRCNCA gymnosperms include two types of cone-bearing (coniferous) species: the signature trees of the juniper-pinyon and fir-pine communities [Table 1]; five shrubs in the genus *Ephedra* (Mormon tea), also called joint-firs for the fact that their leaves have been completely replaced by thin, green (photosynthetic) stems. Drastic leaf modifications are also common to many of the shrubs and trees in the angiosperm group in Red Rock Canyon. As in any desert environment, plants have evolved morphologically to cope with the extremes of temperature, humidity, solar radiation, lack of precipitation, and accelerated evapotranspiration rate. Leaf modifications are perhaps the most visibly apparent, whether in the form of reduced size, epidermal sheathing (waxy, resinous or hairy), alteration into spines, or total replacement (i.e., cacti). Numerous shrubs and trees in the lower elevation creosote bush, blackbrush and desert wash communities exhibit pronounced desert adaptations. Meanwhile, other counterpart species in the cooler, higher elevation plant communities display the classic broadleaf appearance, such as Redbud (*Cercis canadensis*) and Canyon grape (*Vitus arizonica*). With 69 families represented, the angiosperms of RRCNCA run the biotic gamut: parsleys, honeysuckles, mustards, mints and poppies to sunflowers, roses, buckwheats, gourds, cacti through ashes, maples, elms, beeches (oaks) and willows.

The Red Rock monocotyledons are likewise diverse, though more by reason of species and family taxonomy than desert morphological

adaptations. What is lacking in species numbers is made up for in historical, ecological and aesthetic distinction. The Century plant (Agave sp.) was a key staple food of local indigenous peoples, as evidenced by the size and number of roasting pits dotting the Red Rock landscape today. All three area Yucca species (Yucca spp.) are integral sources of cover, forage and even pollen to a sizable contingent of closely-associated insects, reptiles, small mammals and birds. In fact, the Joshua tree (Y. brevifolia) is scientifically and popularly acknowledged as the emblem plant of the Mojave Desert. There is diversity inherent in the floristic make-up of this group of non-woody species, which incorporates the grasses, forbs (herbs), rushes and sedges. Distributionally, the grasses and forbs are pandemic throughout the NCA landscape, whereas the majority of rushes and sedges (grass-like plants) are exclusively adapted to riparian, or otherwise marshy, habitats.

RRCNCA harbors an unusual number of fern species in comparison to most desert environments in the region, including mountain ranges of like elevation. Several of the species are also individually distinctive, on the basis of distribution, biology or morphology. An example of the latter is the Giant chain fern (Woodwardia fimbriata), which thrives to a height of five-feet or more in the shade of Pine Creek Canyon, and is by far the largest of all Nevada fern species. The ferns are the only spore-reproducing plant species in the Red Rock Canyon ecosystem.

Those same extraordinary shade, humidity, temperature and surface water conditions that make life possible for ferns, likewise benefit numerous other species as well. These comparatively moister, cooler conditions are predominately found in the deep, narrow, east-facing canyons of the central Red Rock escarpment; which explains why this small portion of the NCA landscape constitutes the very biological core of the Red Rock Canyon natural environment. Persistent water is a habitat trait shared by the riparian, chaparral and cliff plant communities. These few limited extent communities (perhaps 15% of NCA acres) not only comprise the bulk of Red Rock Canyon's vegetative species diversity, but all three are distributed primarily in or near this same central escarpment terrain. These communities and this same critical habitat harbor the majority of all distributionally significant and Special Status species in RRCNCA (Tables 3 & 4).

As Table 3 illustrates, Red Rock Canyon NCA supports an important number of plant species that embody some manner of distributional distinction. The relative degree of biotic significance involved here varies from species whose only worldwide occurrence is known from solitary RRCNCA populations to species that are uncommon in this area, but are widely distributed elsewhere. This last category includes ten species which occur in single known RRCNCA populations (see Appendix 3), which even though of no particular

outside importance, do represent discrete increments of Red Rock Canyon biodiversity and are subject to less room for site disturbance.

Table 3. Species of Distributional Significance

GROUP	Relict	Endemic (Region)	Disjunct or Other
FERNS/ALLIES	--	--	02 Rare in Nevada 02 Locally uncommon
GYMNOSPERMS	01	--	--
ANGIOSPERMS	01	02 Red Rock Canyon 03 Spring Range 08 Southern Nevada	03 Nevada record 02 Rare in Nevada 03 NV range extension 05 Locally uncommon
MONOCOTYLEDONS	--	--	04 Nevada record 06 NV range extension
<hr/>			
SPECIES TOTAL:	02 Relict	13 Endemic	27 Disjunct or Other

Distributional importance, beginning with the disjunct group, include seven species that are Nevada Records, meaning that they are not known to occur anywhere else statewide. Juncus macrophyllus (Large-leaf rush) is known in Red Rock only from two First Creek Canyon locations. Others include a fern, Asplenium resilens (Ebony spleenwort), and a fern ally, Selaginella utahensis (Utah spikemoss), known from Nevada only in the Spring Range on sandstone outcrops.

Red Rock Canyon's relict species features were discussed earlier (Ponderosa pine, and also the relict elevational distribution of both this species and White fir). The other plant thus recognized (Leary; 1996) is Viola purpurea var. charlestonensis (Spring Mountains violet), which is important for being the larval host plant of Speyeria zerene carola, an endemic Spring Range butterfly on the Fish and Wildlife Service Nevada Species of Concern list (see Appendix 1).

Endemic and/or Special Status Plants

Referring to Table 4, fully 12* of the 13 endemic species in RRCNCA possess some degree of special administrative or legal protection status. The Special Status designations fall into two distinctive categories of protection. Opuntia whipplei var. multigeniculata, as a Candidate for Listing under the federal Endangered Species Act of 1973, possesses full legal protection. The remainder of RRCNCA Special Status species all refer to agency-originated administrative designations on the part of

Clark County, NV or the federal Fish and Wildlife Service (FWS) and BLM at their statewide jurisdictional levels.

The Blue Diamond cholla (Opuntia whipplei var multigeniculata) is significant for the fact that its NCA habitat represents the single known worldwide population of this species. The potential vulnerability inherent to such a degree of geographic restriction is compounded by the actual site location as well. Of the species' 312-acres of occupied habitat, 17% is owned by the James Hardie Corporation in conjunction with a major open pit gypsum mine. Though having occurred before this plant's taxonomic uniqueness had yet been identified, incidents of mining damage (from road-building and tailing piles) to the chollas and their habitat resulted in the FWS decision to federally list the Blue Diamond cholla as a Candidate Threatened or Endangered Species. This decision was followed in 1994 with an NCA expansion (which added 880-acres of occupied or adjacent cholla habitat to the Red Rock Canyon NCA) and in 1997 with the signing of a Conservation Agreement between the FWS, RRCNCA and the James Hardie Corporation. This document stipulates the conservation actions to be undertaken on the species' behalf.

Ionactis caelestis (Red Rock Canyon aster) is also endemic to Red Rock Canyon, and occurs in a single known worldwide population (see Appendix 2: Bridge Mountain). This small member of the Sunflower family is notable for being new to science in 1992 (Leary; Nesom). Based on present knowledge, this species is entirely restricted to Aztec Sandstone bedrock, within an area of approximately 10 acres. The plant almost exclusively occupies crevice habitats. This trait together with the site's relatively remote location works in favor of this species' conservation and protection. Nevertheless, the extremely small size of its known occupied range and the significantly increasing recreational use of this same general vicinity over the past three years represent cause for concern.

Spring Range endemic plants Angelica scabrida and Astragalus remotus occur in numerous sites dispersed throughout a large area of the NCA, and additional small populations continue to be found. An especially rare species, Astragalus aequalis was reported for Red Rock by only one author (Deacon; 1964) and never again verified during field inventories, causing a reasonable doubt as to its actual NCA occurrence status.

Of the eight southern Nevada endemics, all but the Penstemons occupy remote, inaccessible higher elevation habitats in Red Rock Canyon and do not appear to be faced with any significant current threats. All but one of these species are known from three or fewer scattered locations, including one solitary population of Pedicularis semibarbata var. charlestonensis. Penstemon bicolor spp. bicolor occupies numerous sites throughout the NCA.

Table 4. Endemic and/or Special Status Plants

<u>Genus Species</u>	<u>Endemism</u>	<u>Special Status</u>
<u>Opuntia whipplei</u> var. <u>multigeniculata</u> ¹	RRCNCA	Candidate- T&E Species List
<u>Ionactis caelestis</u> ¹		Species of Concern- FWS; BLM
<u>Angelica scabrida</u> ¹	Spring Range	Species of Concern- FWS; BLM
<u>Astragalus remotus</u> ¹		Species of Concern- FWS; BLM
<u>Astragalus aequalis</u> ¹		Species of Concern- FWS; BLM
<u>Penstemon bicolor</u> ssp. <u>bicolor</u> ²	Southern Nevada	Species of Concern- FWS; BLM
<u>Salvia dorrii</u> var. <u>clokeyi</u> ¹		Species of Concern- FWS; BLM
<u>Townsendia jonesii</u> var. <u>tumulosa</u> ¹		Species of Concern- FWS; BLM
<u>Eriogonum heermannii</u> var. <u>clokeyi</u> ²		Species of Concern- BLM
<u>Pedicularis semibarbata</u> <u>charlestonensis</u> ¹		Species of Concern- FWS
<u>Erigeron uncialis</u> var. <u>conjugans</u> ¹		Clark County MSHCP
<u>Penstemon thompsoniae</u> var. <u>jaegeri</u> ¹		Clark County MSHCP
<u>Phacelia hastata</u> var. <u>charlestonensis</u> *		None [³ Status potential]
<u>Arctomecon merriamii</u> ¹	Non-local	Species of Concern- FWS; BLM
<u>Calochortus striatus</u> ¹		Species of Concern- FWS; BLM
<u>Glossopetalon pungens</u> var. <u>glabra</u> ¹		Species of Concern- FWS; BLM
<u>Ivesia jaegeri</u> ¹		Species of Concern- FWS; BLM
<u>Astragalus mohavensis</u> v. <u>hemigyris</u> ²		Species of Concern- FWS
<u>Viola purpurea</u> v. <u>charlestonensis</u> ¹		Clark County MSHCP
<u>Castilleja martinii</u> var. <u>clokeyi</u> ¹		Clark County MSHCP
<u>Coryphantha vivipara</u> ssp. <u>rosea</u> ³		Clark County MSHCP
<u>Selaginella utahensis</u> ³		Clark County MSHCP
<u>Penstemon bicolor</u> ssp. <u>roseus</u> ³		Clark County MSHCP
<u>Ferocactus acanthoides</u> v. <u>lecontei</u> ³		Clark County MSHCP
<u>Cryptantha tumulosa</u> ³		Clark County MSHCP
<hr/>		
SPECIES TOTAL:	24 Special Status	[12 Endemic; 12 Non-endemic] [15 Federal/County; 09 County]
<hr/>		
MSHCP= Multiple Species Habitat Conservation Plan ¹ Covered Species ² Evaluation Species ³ Watch List Species		

The Clark County Multiple Species Habitat Conservation Plan is intended to incorporate and expand the provisions of the Clark County Desert Tortoise Conservation Plan. *Evaluation Species* are those for which additional information is required (or for which appropriate management prescriptions are unlikely to be sufficiently definable). *Watch List Species* are those for which information is not available to assess biological conservation potential (or else that are considered not to be at risk during the effective planning period).

While known from only a single RRCNCA site, Arctomecon merriamii (White bearpaw poppy) is now evaluated in the regional context as being reasonably secure, due to the recent discovery of abundant plant populations on the Nellis Air Force Range. Relative to Red Rock Canyon alone, Glossopetalon pungens var glabra has also been found to be more widespread than formerly thought. This species, along with Ivesia jaegeri and four of the NCA's endemic, special status plants all occupy overlapping habitats on Bridge Mountain (see Appendix 2: Priority Management Areas), thereby collectively posing a "biological hotspot" of the first order. Likewise of no particular individual concern due to their relative NCA abundance are the Castilleja, Coryphantha, Ferocactus and Cryptantha spp. from Table 4, as well as Penstemon bicolor ssp. rosea. Similarly widespread through the Spring Range, but nonetheless individually important (endemic butterfly hostplant), the aforementioned Viola sp. also occupies this same key Bridge Mountain habitat area.

In complete contrast, Calochortus striatus (Alkali mariposa lily) and Astragalus mohavensis var. hemigyus are considered to be of high priority concern, within the context of Red Rock Canyon NCA as well as the Mojave region at large. In regard to the mariposa lilly, the NCA situation is compounded by the fact that all known populations occur in heavy recreation use areas within the Calico Basin. The exceedingly rare Astragalus mohavensis sp. has been reported from only two small NCA sites by a lone source (Nevada Natural Heritage Program), and has not since been field verified.

There are several additional locally endemic and/or special status species that may well occur in RRCNCA, based on the close proximity of known off-site populations and the presence of suitable Red Rock Canyon habitat. Among such potential NCA residents are two Spring Range endemics listed as Nevada Species of Concern by the FWS: Arenaria kingii ssp. rosea and Glossopetalon clokeyi. And Haplopappus compactus is a southern Nevada endemic plant that is likewise recognized by the FWS.

WILDLIFE

The geography, geology, hydrology and resultant vegetative variety of Red Rock Canyon give rise to an extraordinarily diverse faunal community in turn, as well as one of exceptional biotic sensitivity (with nearly one-in-ten species possessing some degree of special status protection). Local endemism and disjunct populations are less prevalent among the animals (due to their mobility and dispersal capability).

The RRCNCA wildlife species groups basically fall under two broad sets of shared biological criteria, each entailing highly different resource management implications (Table 5). Based on ecological sensitivity factors (of individuals, populations and/or habitats) the three groups of priority management concern are the bats, raptors (birds of prey) and reptiles and amphibians. On the basis of numbers of species, the primary groups are the small mammals, passerine (perching) birds and non-passerine birds, whose species respectively make up 9%, 43% and 10% of the entire NCA wildlife cohort. The *small mammals* include both rodents (kangaroo rats, mice, squirrels, chipmunks, gophers) and lagamorphs (rabbits and hares). *Passerine birds* include swallows, flycatchers, jays, crows, nuthatches, thrushes, vireos, finches, orioles, wrens, sparrows and warblers, just to name some of the families. The *non-passerine birds* are more loosely associated in terms of shared biology, and include waders (herons, egrets), roadrunners, hummingbirds, doves, kingfishers, woodpeckers, nightjars and fowl-like birds (Chukar, quail).

The remaining NCA wildlife group, *carnivores and hoofed animals*, represent a mix of unrelated species, none of which adequately fit under the two descriptive criteria (ecologic sensitivity or numbers of species) being used here. While not particularly strong in species number, or in regard to any uniqueness of biotic sensitivity (i.e., in the NCA-external context), some of the species do warrant heightened management concern. An example is the Bighorn sheep, whose overall population status and trend in the NCA portion of the Spring Range is a key management issue. NCA carnivores include foxes, coyotes, ringtails, badgers, bobcats and mountain lions. The hoofed animals are mule deer, bighorn sheep and elk (an occasional seasonal migrant).

To the casual visitor, such species numbers may seem to be highly exaggerated, given their own typical wildlife viewing experiences at Red Rock Canyon. But there are many factors which explain why a landscape so often seemingly devoid of animal life, in reality supports a rich community of nearly 300 diverse species. The NCA faunal species are universally adapted to the hot and dry (xeric) living conditions that prevail within the regional desert environment (Mojave, Great Basin and Colorado Plateau). In addition to numerous physiological and anatomical specializations

Table 5. Wildlife Species Numbers

GROUP	Species Total	Special Status Spp. (Group %)	-Management Concerns [* Key Priorities]
MAMMALS	[55]	<u>10</u> (see Bats)	
Small mammals	26	<u>01</u> ¹	- <u>Tamias palmeri</u> ¹
Carnivores, Hoofed Animals	12	00	-Bighorn sheep herd
Bats	17	<u>09</u> (53%)	-Roost conditions*
			[¹ Unconfirmed species report]
BIRDS	[168]	<u>06</u>	
Passerine (perching) birds	119	<u>04</u>	-Riparian habitats
Nonpasserine birds	28	00	-Game bird hunting
Birds of prey (Raptors)	21	<u>02</u> (10%)	-Nest protection*
REPTILES & AMPHIBIANS	[41]	<u>05</u> (12%)	
Lizards, Skinks, Geckos	19	<u>04</u>	-General environment
Snakes	19	00	-General environment
Tortoises, Toads, Frogs	03	<u>01</u>	-Riparian habitats
RRCNCA Total:	273	<u>21</u> (08%)	

(Maximum moisture retention digestive tracts, etc.) these animals also have developed behavioral adaptations, many of which serve to preclude their casual daylight observation. In deserts, even the diurnal species (daylight active) pattern their routine actions and movements in order to minimize their open exposure to full sunshine. This is achieved by limiting their daily activity periods to the relatively low temperature and high humidity hours of dawn and dusk, or by consistently keeping to deep shade cover such as in rock crevices, live-standing or dead and down plants, and underground burrows. Because body moisture conversion and loss is an unavoidable by-product of any metabolic activity, desert fauna often restrict not only the time and place of their daily exertions, but also the overall extent as well.

Being cold-blooded animals that require external heating in order to accomplish normal bodily function, reptiles and amphibians can better tolerate the harsh desert sun. Various lizard species may be commonly observed basking on rocks and fenceposts in virtually any area of the NCA landscape. But there are many other reptiles that cannot tolerate full sun and thus exhibit similar avoidance behaviors as their mammalian counterparts; including at least one lizard (Gambelia sp.) that routinely takes daytime shelter in the burrows of small mammals. Many other reptiles are nocturnal, including two-thirds of all NCA snake species, the geckos and the night lizards (Xantusia sp.). But because snakes as a group are extremely reclusive as well, even diurnal species such as gopher snakes, coachwhips and kingsnakes are not commonly seen.

Two thriving amphibian populations (Red-spotted toad; Pacific chorus frog) occur in a numerous, widespread distribution pattern within the Conservation Area landscape, while amphibians in general have been in serious decline globally for some years now (Bury; 95). Amphibians are not considered to be one of the more common faunal species groups associated with desert environments, particularly in this area.

The numbers of resident bird species in desert habitats are typically quite small, owing to the lack of vertical vegetative structure. Arborescent canopies, whether of trees or taller shrubs, provide both nesting and escape cover and represent one of the prime limiting factors affecting bird species distribution patterns in desert habitats. Of the 33 bird species commonly associated with Creosote bush and Blackbrush vegetation in this area, nine are permanent residents (Bradley/Deacon; 1965), and only two are seen with any regularity (ravens and black-throated sparrows). Two particularly critical habitats are in lower Pine Creek and at Wheeler Camp Spring, which is actually cooperatively managed as a National Audubon Sanctuary. The majority of the NCA species list (Appendix 8) is in fact based on sighting from this same single location. Though most are also non-residents of Red Rock Canyon, instead being either occasional accidental visitors or seasonal migrants.

Table 6. Wildlife Species Numbers: RRCNCA versus Clark County and Nevada

Species Group	Location	Species	RRCNCA	NCA %
Mammals ¹	Clark	142	56	39%
Birds ¹	Clark	392	168	43%
Reptiles & Amphibians ¹	Clark	63	41	65%
Bats ²	NV-south	22	17	77%
Raptors ³	Nevada	25	21	84%

¹ Desert Tortoise Short-term HCP; RECON; 1991.
² Bat Species Status Report; M.A. Ramsey; 1997.
³ Nevada Raptors: Biological Bulletin No. 8; NDOW; 1985.

The other RRCNCA species lists are found in Appendix 5, 6 and 7: Mammals, Bats, Reptiles and Amphibians. Although they are mammals, the bats are broken out separately to emphasize their significant occurrence, diversity and ecological sensitivity. These RRCNCA species lists incorporate the best available information, but are not intended to be viewed as either all-inclusive or unfailingly accurate. Table 6 gives dramatic perspective to the actual magnitude of Red Rock's wildlife diversity, especially when

considering that the 196,000-acre NCA makes up less than 5% of the Clark County land base.

Special Status Species

Eight percent of all wildlife species reported for RRCNCA possess special protective status, including two federally-listed as Threatened or Endangered. The respective vegetative numbers however are significantly smaller: 19 special status of 652 total (3%), and zero federally-listed T&E species. As Table 7 shows Red Rock

Canyon harbors one-half to three-quarters of all Special Status Species listed for Clark County and/or the entire State of Nevada.

Table 7. Special Status Wildlife: RRCNCA versus Clark County and Nevada

Status Category	Location	Species	RRCNCA	NCA %
[All Species*]				
ESA, federal T&E Species	Nevada	04	02	50%
BLM, Sensitive Species	Nevada	25	10	40%
FWS, NV Species of Concern	Clark	23	13	57%
MSHCP, Covered Species	Clark	18	12	67%
MSHCP, Evaluation/Watch List	Clark	70	35	50%
[Bats Only]				
FWS, NV Species of Concern	Clark	12	09	75%
*Excluding fish and invertebrate species [NOTE: Inflated species numbers reflect overlapping agency protective status designations.]				

The 21 Special Status wildlife species in RRCNCA are individually listed in Table 8. [MSHCP Evaluation and Watch List species are listed in Appendix 1, since the designations do not confer actual legal or administrative protections].

Two wildlife species are federally-listed as Threatened and Endangered. On purely biological terms, the Desert tortoise habitat in RRCNCA (i.e., Creosote bush community) is classified by the Bureau as low density occupied species; nor are there any current major threats to the population. The Peregrine falcon situation in Red Rock Canyon is totally different. The entire

population is thought to consist of only two birds, which are suspected to be an adult nesting pair. The number of statewide nest pairs is one of the major evaluation targets stipulated by the FWS Pacific Coast Recovery Plan for the species. At present there are only six known nesting pairs in all of Nevada. The presence of this rare species is clear indication of the quality of RRCNCA's raptor habitat. 84% of Nevada's raptors have been reported in Red Rock Canyon.

Table 8. Special Status Wildlife Species: Vertebrates

<u>Genus Species</u>	<u>Common Name</u>	<u>Status</u>
(02) Federally Listed Species		
<u>Gopherus agassizii</u> *	Desert tortoise	Threatened
<u>Falco peregrinus anatum</u> *	American peregrine falcon	Endangered
(14) Nevada Species of Concern ²		
<u>Idionycteris phyllotis</u>	Allen's big-eared bat	FWS & BLM
<u>Myotis ciliolabrum</u>	Small-footed myotis (bat)	FWS & BLM
<u>Myotis thysanodes</u>	Fringed myotis	FWS & BLM
<u>Myotis volans</u> *	Long-legged myotis	FWS & BLM
<u>Euderma maculatum</u> ³	Spotted bat	FWS
<u>Myotis evotis</u> *	Long-eared myotis	FWS & BLM
<u>Myotis yumanensis</u> ¹	Yuma myotis	FWS & BLM
<u>Plecotus townsendii pallescens</u>	Townsend's big-eared bat	FWS & BLM
<u>Nyctinomops macrotis</u>	Big free-tailed bat	FWS & BLM
<u>Tamias palmeri</u> ³ *	Palmer's chipmunk	FWS
<u>Accipiter gentilis</u>	Northern goshawk	FWS
<u>Phainopepla nitens</u> *	Phainopepla	BLM
<u>Heloderma suspectum cinctum</u>	Banded Gila monster	FWS
<u>Sauromalus obesus obesus</u> *	Western chuckwalla	FWS & BLM
(05) Clark County MSHCP Species		
<u>Guiraca caerulea</u>	Blue grosbeak	Covered
<u>Pyrocephalus rubinus</u>	Vermillion flycatcher	Covered
<u>Piranga rubra</u>	Summer tanager	Covered
<u>Coleonyx variegatus</u>	Banded gecko	Covered
<u>Dipsosaurus dorsalis</u>	Desert iguana	Covered
<hr/>		
RRCNCA Total:	21 Species	
<p>MSHCP - Multiple Species Habitat Conservation Plan; * = Covered Species. ¹ - Potosi Spring reports (USFS) indicate high probability of RRCNCA occurrence. ² - Nevada Species of Concern = FWS List + BLM Nevada Sensitive Species List. ³ - Report solely based on heard vocalizations, not direct observation.</p>		

Eight of the 14 Nevada FWS/BLM special status species in Table 8 are bats. The same habitat features that favor high raptor density and diversity in RRCNCA are almost identical for these flying mammalian predators as well. One critical limiting factor is the stable existence of an abundant, diverse prey base. Reptiles, small mammals and smaller birds all can be typically encountered in greater numbers near the vicinity of springs and riparian areas, as well as many of the insect species that form the prey base of most local bats (versus fruit-eaters). Bats require certain minimum surface-areas of water to be able to skim their drinking intake while in full flight. Major bat-use springs are listed in Appendix 12. White Rock Spring, along with Potosi Spring (USFS), had by far the highest diversity and abundance of bat species use documented for the Spring Range during an intensive, three-year research survey (Ramsey; 97).

Another key limiting factor is the suitability of Red Rock's rugged, vertical terrain for reproductive purposes, as expressed in the number, variety and isolation (relative protection) of the brood-rearing habitats afforded. Numerous high cliffs and craggy ridges satisfy the raptors' need for nesting sites which are inaccessible to other predators, and provide the broadest field of view of their own adjacent foraging territories. Brood-rearing conditions for bats are even more specialized; often translating into site types that are both uncommon and extremely narrow in their parameters. Roosts are critical to the long-term survival of bat populations, yet are the most limited in supply of all bat-use resources. Maternity roost habitats are even more essential and less abundant. Bat populations are now experiencing drastic declines on a global scale, and in the United States the single most important factor in this downward trend is the loss of roost sites (Ramsey; 94). Red Rock Canyon provides caves, rock crevices and large tree cavities (Ponderosa pine) that are suitable to many different bat species.

The remaining species from Table 8 basically fit the description given for the Desert tortoise: beyond the inherent importance of their special protective status there are no identified specific threats to these species in Red Rock Canyon, nor are they acutely restricted in distribution outside the NCA.

As Table 9 shows, Red Rock Canyon harbors special status species from the invertebrate animal kingdom, all of which are significant for being locally endemic. In terms of rarity and direct threats, foremost among these are the two springsnail species. These minute, aquatic creatures are endemic exclusively to five springbrook habitats in RRCNCA, sites which also receive active recreation use and in some cases have been altered to accommodate

that use. These species are only recently known to science, and their populations in Willow Spring disappeared before management was made aware of their presence and this site was oriented toward recreation. Riparian habitat restoration and population re-introduction efforts at the site are in progress, as are preventative protection measures at Red Spring (another high-profile recreation site).

Table 9. Special Status Wildlife Species: Invertebrates

<u>Genus Species</u>	Common Name	Status
(09) Nevada Species of Concern ²		
<u>Pyrgulopsis deaconi</u> * [RRCNCA endemic]	Spring Mountains Springsnail	BLM
<u>Pyrgulopsis turbatrix</u> * [RRCNCA endemic]	Southeast Nevada Springsnail	BLM
<u>Limenitus weidemeyerij nevadae</u> [Southern NV endemic]	Nevada admiral (butterfly)	FWS & BLM
<u>Chlosyne acastus</u> ³ [Spring Range endemic]	Spring Mtns acastus checkerspot (butterfly)	FWS & BLM
<u>Euphilotes enoptes</u> ssp. ³ [Spring Range endemic]	Dark blue butterfly	FWS & BLM
<u>Euphydryas anicia morandi</u> ³ [Spring Range endemic]	Morand's checkerspot	FWS
<u>Hesperia comma</u> spp. ³ [Spring Range endemic]	Spring Mtns comma skipper	FWS & BLM
<u>Plebejus icarioides</u> ssp. ³ [Spring Range endemic]	Spring Mtns icarioides blue (butterfly)	FWS & BLM
<u>Speyeria zerene carolae</u> ³ [Spring Range endemic]	Carole's silverspot butterfly	FWS
* - Covered Species, Multiple Species Habitat Conservation Plan. ² - Nevada Species of Concern = FWS List + BLM Nevada Sensitive Species List. ³ - Unconfirmed in Red Rock Canyon.		

The paucity of survey-generated occurrence data is such that a species list would be under-representative. Undoubtedly, the diverse NCA natural environment supports an invertebrate species community as proportionately rich and varied as those of the higher forms of animal life already described. Typical Mojave Desert invertebrates are the insects (crickets, termites, beetles, ants,

flies, moths, butterflies, etc.) and the arachnids (scorpions and spiders), including one high-profile member in Red Rock Canyon, the Desert tarantula (Aphonopelma chalcodes). The unique local moisture conditions of the Spring Range support any number of centipedes, millipedes and molluscs (both terrestrial and aquatic snail species).

WILD HORSES AND BURROS

On December 15, 1971, Congress enacted the *Wild and Free-Roaming Horse and Burro Act*, mandating that BLM manage wild horses and burros on public lands where they existed at that time. The Act mandated that wild and free-roaming horses and burros be protected from unauthorized capture, branding, harassment, or death. They are to be considered an integral part of the natural system, based on their distribution at the time the law was enacted.

While horses originated in the America's, for some unknown reason they eventually became extinct throughout the western hemisphere. Horses were re-introduced to this country by early Spanish explorers and missionaries. The Native Americans took advantage of the animals and used them extensively. When ranchers and farmers came, they brought horses with them and commonly turned them loose to let nature cull and produce strong ranch or work animals. They would periodically round up and take the best animals to sell or use as ranch horses. The Old Spanish Trail/Mormon Road passed through RRCNCA at Cottonwood Spring at the present site of Blue Diamond and from 1844 through 1898, brought horses and burros to the area. Mining in the late 1800's and early 1900's brought more burros, used as work animals for the old sourdoughs, and the burros escaped or were released when the miner's luck turned.

An early Nevada rancher named Frank Allen ran horses at White Rock Springs near Sheep Mountain in the early 1930's. Allen sold his horses to Lee Simpson in the 1940's. Simpson ran the horses at Goodsprings and bred primarily palominos and watered the horses with well water. Francis Thorn ran appaloosas with Simpson's palominos from the 1940's to the 1950's. The horses ran free on the range and were gathered to get the best animals and turned loose again. The horses were abandoned in the 1950's. These animals are considered the original ancestors of the Red Rock HMA wild horses. Some of the other ranchers such as the Wilson Ranch also contributed animals to the herd. The Wilson Ranch passed to Vera Krupp, Howard Hughes and Fletcher Jones before being purchased by the State of Nevada.

Herd Management Area (HMA) boundaries are not entirely clear. Four different HMA maps exist. The Clark County Grazing Environmental Impact Statement dated August 13, 1982 delineated the wild horse and burro populations into zones of historic use referred to as Herd Management Areas (HMAs). The Management Framework Plan (MFP) Major Land Use Decision Summary and Environmental Impact Statement Record of Decision, dated January 9, 1984, formalized the HMA's boundaries through decision, using the 1982 grazing EIS maps. Two other maps, of about the same vintage, show differing boundaries. The boundaries shown in the 1998 Las Vegas Resource Management Plan, which replaced the 1984 MFP, differ from the 1982 EIS/1984 MFP boundaries.

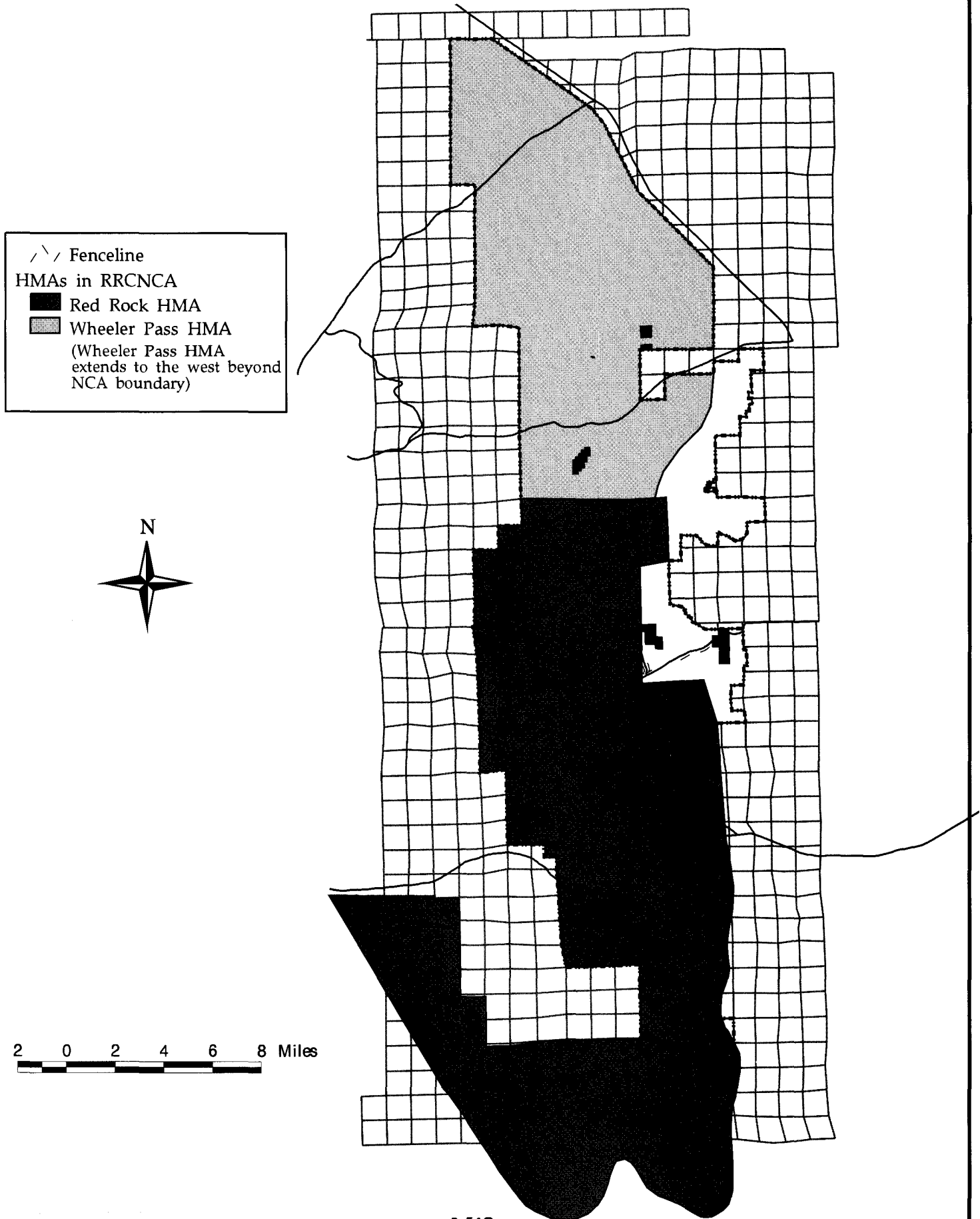
Documenting where wild horses and burros existed at the time of passage of the Act (1971) has been difficult, as little definitive data exists. The best known documentation may be contained in two Nevada Division of Wildlife Desert Bighorn Sheep reports; Red Rock-La Madre (McQuivey 1976) and South Spring Mountain Range (McQuivey 1978). The Red Rock-La Madre report, based on random observations and aerial surveys from 1969 to 1976, documents burro populations in Lucky Strike Canyon and on the north side of La Madre Mountain, in Kyle Canyon; on Blue Diamond Hill; near Lone Grapevine spring; and in Lovell Canyon. No mention is made of burros in the Calico Basin area or horse use at all. The South Spring Mountain Range report, based on field observations and intensive aerial surveys between 1973 and 1978, relates a slow expansion of burro populations into the South Spring Mountains from populations in the Clark Mountain Range, further south. Both reports state that burros/sheep competition was minimal at the time. Both reports discuss the need for available water, especially during the hot summer months.

The 1971 law provides that wild horses and burros be managed in wild free roaming herds in a thriving natural ecological balance within the HMAs. There are two HMA's which include portions of RRCNCA, the Wheeler Pass and Red Rock HMAs. These HMAs are portions of the larger, original, Spring Mountain HMA, which was broken into three smaller HMAs in the 1998 RMP. The Red Rock HMA and the Red Rock Canyon NCA are not the same area(s). They overlap each other but are not identical. The Wheeler Pass HMA includes RRCNCA north of La Madre Mountain. RRCNCA lands make up about 15% of the Wheeler Pass HMA. Most of the remaining portion of the RRCNCA falls within the Red Rock HMA. RRCNCA lands make up about 60% of the Red Rock HMA.

The management objective for wild horses and burros is to maintain animals at a population level which provides a thriving natural ecological balance consistent with multiple use management objectives. This population level is referred to as the Appropriate Management Level (AML) and is derived from field studies which determine the amount of available forage and water, and combined monitoring of the affects of the animals on other resources. HMAs in the Las Vegas Field Office are currently under review to determine the appropriate carrying capacity. AMLs for the portions of the HMAs managed by the USFS Spring Mountain National Recreation Area were set in the Forest Plan Amendment of 1998. It is unclear how the coordinated management of the BLM/USFS joint HMAs is working. BLM plans have not been modified to reflect USFS planning decisions.

The Red Rock HMA has an existing estimated population of 61 wild burros and 71 wild horses. The wild horse herd currently has a sex ratio of 2 studs to 1 mare. The animals usually run in family groups of 3 to 5 animals with a few bachelor bands of 2 to 3 stud

Herd Management Areas (HMAs) in Red Rock Canyon NCA



horses. The colors of wild horses in the Red Rock HMA are 27 percent palomino, 29 percent sorrel, 15 percent bay, 10 percent paint, with the remaining 19 percent being buckskin, black, white or chestnut in color.

In 1988, the BLM census data showed 42 wild burros and 31 wild horses in the Red Rock HMA. From 1987 through 1990 there were 28 wild burros and no wild horses removed by BLM for entry into the animal public adoption program. During that same time period there were 17 horses shot, 10 horses and 15 burros killed by cars, and 10 horses dying due to drought (in 1990) for a total reduction in numbers of 37 horses and 15 burros. During the drought of 1990, BLM documented that wild burros immigrated into the Bonnie Springs area from Potosi Mountain, seeking forage and water. This caused a growth in the wild burro population.

From 1992 through 1998 there have been 127 wild burros and 15 wild horses removed by BLM from the Red Rock HMA. While it is known that mountain lions take some of the wild horses and burros, it has not been possible to document the numbers. Through removals and the other herd reduction occurrences, the population levels have stayed fairly constant since 1987, except during the wild burro immigration period from 1991 to August 1995, across SR 160 from Potosi Mountain.

The Red Rock wild horses have historically trailed back and forth, across SR 160, in pursuit of food and water sources. Lone Grapevine, Muddy, Wheeler Camp and many other dependable perennial springs exist on the north side of the highway. Bird and Tunnel springs are on the south side of SR 160. The springs that the animals have historically relied on during drought or the hot summer months lay to the north. The wild horses typically moved farther south towards Goodsprings and Bird Springs during the fall, winter and spring, when physiological water demands were less. Forage is not a limiting factor in the Red Rock HMA. The southwestern part of the HMA is lacking a permanent water source and only receives use during the cooler months. Additional water south of SR 160 would promote dispersed use by the animals and reduce the impacts on existing areas of concentrated use.

In 1987, the BLM recognized the increasing safety problem present along SR 160, due to the growth in Clark County and associated vehicle traffic. To mitigate the impacts to the animal herds and provide for human safety, the BLM identified the need for future fencing of SR 160's right-of-way, while providing underpasses to allow free movement north and south for the wild horse herd. BLM took no action to implement these identified needs. In 1995, the Nevada Department of Transportation (NDOT) notified the BLM of their intention to fence both sides of SR 160, through the NCA, for safety purposes. The plan included the installation of 3 large culverts to handle the natural flow of water across the roadway.

The BLM and NDOT worked together to design the underpass/culverts to facilitate wild horse and burro travel under SR 160. Additionally, to reduce the possibility of horses and burros funneling across the highway, the completion of the fences was timed to coincide with the final construction of the culverts. The BLM installed numerous highway signs advising and warning the highway motorists of the presence of wild horses and burros.

In August 1995, the three underpasses/culverts and the fences were completed on SR 160. The culverts design not only provided safe and unrestricted movement of wild horses and burros but safe passage to bicyclists, hikers and equestrians recreating in RRCNCA. The use of water and hay to periodically train or re-familiarize the animals with the underpasses/culverts is done 2 to 3 time a year.

Balancing highway safety, public interest, and the continued free movement of wild burros and horses along SR 159 and the Red Rock scenic loop are conflicting issues that have not been fully mitigated or resolved. The wild burros and horses have been a tourist attraction to RRCNCA since the 1980's when the numbers of visitors to the area began to increase. Visitors actively travel to RRCNCA seeking out the wild burros on SR 159 and wild horses near the Goodsprings road. Greeting cards displaying photographs of the Red Rock wild horses and burros were initiated in 1991 and are a big seller at the RRCNCA visitors center. These and the tour companies interest in the animals represent examples of the public attraction to wild burros and horses in Red Rock.

Due to the domestic and intelligent nature of the burros, they are easily attracted to SR 159 by the many tourists looking for them in order to photograph, pet and/or feed a wild burro. This has created "feeding" zones along the highway. Although there are signs along the road directing the public to not feed the burros, feeding persists. The result is an ever increasing traffic congestion problem and the potential for collisions/accidents between motorist and burro and pedestrian and motorist. Semi-tractor trailers hauling wall board from the James Hardie Gypsum Plant regularly use this route.

As with SR 160, there are conflicting management issues of highway safety and tourist interest and the continued free movement of wild burros and horses along the Kyle Canyon and Lee Canyon roads leading to Mount Charleston in the Wheeler Pass HMA. The expanding Las Vegas urban interface is a management issue threatening the continued viability and existence of both HMAs.

The Wheeler Pass HMA has approximately 96 wild horses and 16 wild burros. Census data in 1988 counted 22 wild horses and 3 burros. The cover provided by pinion pine and juniper trees in this HMA makes aerial counts difficult and animal census is not considered

very accurate. The herd colors in Wheeler Pass HMA are predominantly black, bay and sorrel. This herd is managed jointly with the Humbolt-Toiyabe National Forest, United States Forest Service (USFS).

In the Red Rock HMA, the historical primary use area of the wild horses is from Bonnie Springs south to Bird Spring and Goodsprings. The wild burro primary use area is from Bonnie Springs north and east all the way to White Rock and Red Springs. There is overlap in the use areas around SR 160. The historic separation of the horses and burros has been due to existing old livestock fences across the HMA at Oliver Ranch, Bonnie Springs and Spring Mountain Ranch. The Wheeler Pass animals use the lower elevations in the fall and winter and upper elevations on adjacent lands administered by the USFS in the spring and summer.

In 1989 and 1990, the need for more dependable waters for wild burros and horses and the need to reduce impacts to riparian habitat at spring sources was recognized. The BLM fenced four spring sources and reconstructed the spring developments to provide water outside for wild horses and burros and wildlife. The projects are at Bird and Tunnel springs in the Red Rock HMA, and Grapevine and Grassy springs in Wheeler Pass HMA. In 1994, BLM fenced additional riparian spring sources while providing water outside for the animals at Wheeler Camp, Lone Grapevine, Mud, and Shovel springs in the Red Rock HMA.

The increased public recreational activities in RRCNCA have created conflicts between hikers, mountain bikers and equestrians and the resident wild horses and burros. Since wild horse and burro trails follow terrain contours and provide the easiest routes for off road travel, mountain bikers and equestrians have adopted most of the animal trails in the Red Rock HMA. The impact to the animals is not clear. However, documentation shows formation of new animal trails, often adjacent to the old trails, where recreational use is heavy. Since these trails usually lead to water, the increased public use concentrates competing activities around springs.

Since 1995, in an attempt to provide resource protection and avoid animal/vehicle accidents, the HMA has become fragmented by new fences that do not offer underpasses/culverts. As a result, these new fences restrict the ability of the wild horses and burros to continue roaming freely throughout the HMA (depending on which HMA map is referred to). The following factors have combined to reduce the range quality and fragmented habitat:

Calico Basin/Visitor Center area

- BLM fencing of State Route 159 and Calico Basin Road as a result of increased unauthorized off-road vehicle use in response to increased illegal off-highway vehicle use

primarily caused by closure of the adjacent Summerlin private lands;

- increased residential development in Calico Basin;
- rapid development of private lands on West Charleston Boulevard including developments directly adjacent to the NCA's east boundary;
- and effective loss of the use of Red Spring with no water provided away from the source to wild burros done in response to increased recreational use and fencing the spring source to aid in springsnail recovery.

Between Blue Diamond and Spring Mountain Ranch State Park:

- increase traffic associated with entry areas for the State Park and Bonnie Springs;
- increased speeding of traffic on State Route 159;
- increased use of State Route 159 by commercial truck traffic.
- fencing along the west side of State Route 159 to prevent vehicle access into RRCNCA desert (Scenic Drive to Spring Mt. Ranch 1978, Calico Basin Road to Scenic Drive and Oliver Ranch to Blue Diamond 1998).

State Route 160:

- the highway right-of-way was fenced on both sides through the HMA/RRCNCA in 1997 by the Nevada Department of Transportation (NDOT). Wild horses and burros now use three large box culverts to cross under the highway.

Water Availability

In determining water availability, the first priority for usage is the conservation of the natural resources and the maintenance of a thriving ecological balance. This includes water to maintain the spring riparian habitat at proper functioning condition (PFC), water for native species and water for evaporation in a desert climate. The remainder would be available for wildlife and non-consumptive recreation uses, habitat projects and/or wild horses and burros. The U.S. Forest Service recently finished a land use plan amendment for the Spring Mountains National Recreation Area (SMNRA), in which they determined percentages of available water to be allocated for different needs. The analysis determined that 7 percent of the available water be allocated for use by wild horses and burros.

The following table demonstrates water availability for wild horses in the Red Rock HMA using the same 7% factor. Water is a life sustaining element, thus availability at spring sources is computed based on the lowest flow recorded, so animal populations are not managed at a level greater than available water would support during a drought year. In the column entitled "Minimum Flow", flow is measured in gallons per minute (gpm), "e" stands for estimated and "m" stands for measured. The ".07" is the factor for the percentage of water allocated to wild horses.

Springs in the HMA South of Spring Mountain Ranch

Source	Location	Ownership	Minimum Flow (gpm)	Available For Use (gpm)
Mexican	T23S,R58E,SEC30	USFS	.1(m) x .07	.007
Aztec	T23S,R58E,SEC22	USFS	Dry	0.0
Ninetynine	T23S,R58E,SEC08	USFS	.5(m) x .07	.035
Rainbow	T22S,R57E,SEC08	BLM	Dry	0.0
Bootleg	T22S,R57E,SEC07	BLM	Dry	0.0
Cave	T24S,R58E,SEC06	BLM	.1 x .07	0.007
Bird	T23S,R59E,SEC04	BLM	.1 x .07	0.007
Wilson Tank	T23S,R58E,SEC24	BLM	Dry	0.0
Lone Grapevine	T22S,R58E,SEC22	BLM	.4(m) x .07	0.028
Shovel	T22S,R58E,SEC22	BLM	1(e) x .07	0.07
Mud1	T22S,R58E,SEC14	BLM	.2(e) x .07	0.014
Mud2	T22S,R58E,SEC23	BLM	Dry	0.0
LM	T22S,R58E,SEC14	BLM	Dry	0.0
Wheeler Camp	T22S,R59E,SEC07	BLM	.8(m) x .07	0.056

Total flow calculated at 7% available for horses is .224 gallons per minute, which is equal to 322.56 gallons per day. This amount would support 16 horses with the assumption that a horse consumes 20 gallons of water per day. The figure derived does not take into account that some burros would be sharing that same water allocation. The totals assume that the available water is accessible to the animals that need it, which is not the case. Horses will not always migrate to the active water source if it is too distant from their normal source. Some of the springs are not readily accessible from one location to the next, because of the topography and barriers within the HMA.

The minimum number of horses considered necessary (BLM staff recommendation) to maintain a viable population is 50. The total water available suggests that the portion of the Red Rock HMA utilized by wild horses would not support a viable herd at a 7 % allocation. If the water allocation factor is increased to 15% and the gallons of water a horse consumes per day is reduced to 15, the available water would still only support 40 horses.

At an allocation of 25% (as is recommended in Management common To All Alternatives), as specified in the Management Common to All Alternatives and continued from the existing NCA plan(the IGMP), approximately 56 horses could be supported.

A short coming of all of the above estimates is that burro use is not factored in and that the horses do not fully understand that they need to be geographically dispersed in direct proportion to water availability.

Spring and Riparian Areas Impacted

Severe impacts to riparian vegetation and spring sources have been documented at Wheeler Camp, Lone Grapevine and Shovel Springs. Lesser impacts have been noted at Mud Spring # 1. All four springs have been fenced within the last four years. Wheeler Camp and Lone Grapevine Springs have shown substantial recovery and replacement of riparian vegetation since fencing.

Bird and Tunnel Springs no longer support a riparian area as the waters from these two sources are now captured in storage tanks and dispersed in water troughs. Tunnel Spring is no longer producing reliably and is being considered for reconstruction, which may or may not result in restored flow. Repairs attempted in the summer of 1998 appear to have failed and may in fact have reduced flows significantly as a result.

In May of 1999 a field report was prepared on the condition of the riparian and meadow area in Pine Creek. Most of the meadow is owned by the State of Nevada as part of the Spring mountain Ranch State Park. The use of burros in this area has greatly increased in the past couple of years. In 1996 or 1997 there was an emergency gather of burros that frequented the State Route 159 right of way, begging for food from motorists. Since the burros are no longer concentrated in the highway corridor they have spread north and west into the Pine Creek area, and are spending a great deal more time in that area. The increased intensity of use has resulted in serious resource damage and degradation.

- **TRAMPLING:** Use of the area by bighorn sheep and mule deer occurs in discrete areas at low intensity. The use by the burros has been widespread, and continuous enough to produce long term impacts to vegetation and soils. In some areas the percentage of area trampled reaches 100%, and the soil and vegetation appear to have been cultivated with a roto-tiller. Deep "post hole" foot prints indicate areas where trampling has collapsed burrows of native rodents, and possibly threatened desert tortoise which are present in the area in limited numbers. In other areas all vegetation has been obliterated by burros to create "dust wallows" for dust bathing by the animals to reduce pests and parasites. The trails created by animals frequenting these sites exacerbates the damage.
- **TRAILS:** Burro traffic has created a vast network of trails where no pre-existing system existed. These trails branch off from the main foot trail at frequent intervals, as often as every 10 feet in some areas, to provide access to forage. This results in trampling of grasses, forbs, and shrubs as well as cacti. Human use has consequently spread as hikers use these "new" trails.
- **CRYPTOBIOTIC SOIL CRUSTS:** This spread of the trail network has resulted in the destruction of huge areas of cryptobiotic soil. This crust of moss and lichens grows slowly on the surface of sandy soils, and protects the soil from erosion from wind and rain. It also provides a stable substrate for seed germination and reduces the rate of moisture loss from the soil, thus providing the foundation for plant growth in the area. The cryptobiotic soil crust, and the plants that depend upon it for growth and reproduction have evolved in the absence of large hoofed herbivores such as horses, burros and cattle. The presence of these animals in the area, in any numbers, damages this fundamental biologic feature and thus threatens native plants and animals.
- **SOIL EROSION:** The damage to the cryptobiotic soils, and the constant churning of sandy soils is resulting in increased rates of erosion of crucial top soil which is almost irreplaceable in the arid climate. Gullying is beginning to appear in areas where it was not formerly present. This in turn is leading to silting of perennial stream areas threatening amphibian populations that use these areas for breeding.
- **CONSUMPTION OF FORAGE:** The long term presence of the burros in the area had resulted in serious over utilization of native

bunch grasses. In large areas, especially near the old homestead, the native grasses have been eliminated, allowing non-native bermuda grass to become established from seeds imported in burro manure, probably from these animal which graze in the meadows in both Red Spring and Pine Creek. In addition to native bunch grasses such as rice grass, flowering plants such as penstamon, and mirabilis are consumed before they can produce seeds for future growth.

- ACCUMULATION OF MANURE: In many areas large piles of manure are accumulating faster than normal biodegrading processes can remove it. This poses possible health problems, as well as serious esthetic impacts to the area. Proximity of this material to the perennial stream is a pollution problem in terms of eutrophication from excess nutrients.

These same conditions have existed along the State Route 159 corridor, and in the areas of Spring Mountain Ranch State Park, First Creek, and Oak Creek for a number of years. The State Route 159 corridor was in the worst shape when the roadside begging burro problem was the worst, and has begun to improve with the elimination of these animals.

SOILS

Throughout the Red Rock Canyon National Conservation Area (RRCNCA), there is a sharp contrast in physiography between mountainous areas and lowlands. Soils in the area developed under different environmental influences. Under the arid conditions which prevail at all but the highest elevations, little downward movement of the soluble constituents of the soil occurs. Most leaching is confined to the translocation of the soluble material (usually lime) from the surface to the subsoil, with the resultant formation of a hardpan. These soluble salts are usually leached only to a depth of 1 to 2 feet.

In this climate, rocks tend to break down by disintegration rather than by decomposition. Mechanical breakdown (spalling) is more common than chemical action. As a result, mountains are covered with a thin veneer of rock fragments. Cloud bursts and showers sweep large quantities of this material into ravines and valleys, forming alluvial fans of the coarser material. Finer-grained sediments are washed into the lowlands.

Wind is also an active agent in soil genesis. Wind-blown sand is common, with the greatest accumulations found in the lower valleys, often forming dunes. Wind-blown silts, mixed with the fine alluvium washed down from the slopes, comprises the soil mantle of the lowlands. The term "blow sand" arises from the fact that much of the surface soil is wind-deposited.

Organic matter in most desert soils is far less than the average 3 to 5 percent by weight contained in soils formed in humid regions. Even in a wet year when spring annuals are abundant, much of the vegetal matter is oxidized by the summer heat before it can be turned into humus. A gravelly surface, referred to as "desert pavement", can be found in the planning area. This surface is stable and resistant to erosion. Erosion is normally active on surfaces lacking a desert pavement. The sparse cover of vegetation does little to reduce wind and water velocities. Wind erosion is a major factor in recharging surface soils with carbonates through the movement and deposition of calcareous dusts.

Soils in the RRCNCA are primarily Entisols and Aridisols; a few Mollisols occur at the upper elevation of the Spring Mountains. These are described in detail below. The Entisols have little or no evidence of development of pedogenic horizons. They are located in areas where the soils are actively eroding (steep slopes) or receiving new deposits of soil materials (alluvial fans and floodplains).

Aridisols have one or more pedogenic horizons that may have formed in the present environment or that may be relics from a former pluvial period. These soils do not have water available to plants

for long periods of time and the surface is generally bare. Aridisols are often associated with desert pavement.

Mollisols are the very dark colored, base rich soils of high elevations. A few Mollisols are found high in the Spring Mountains where environmental conditions permit the accumulation of organic materials.

Soils in the RRCNCA have been surveyed previously by the Natural Resources Conservation Service (NRCS). Soils in the eastern one third adjacent to Las Vegas were mapped as a part of the Soil Survey of Las Vegas Valley Area Nevada, 1985. Soils in the western two thirds of the area adjacent to the mountains were mapped as a part of the Draft Soil Survey of Clark County Area Nevada. The surveys contain detailed soils descriptions, supporting data, and maps. The published survey for the Las Vegas Area and advanced information on the unpublished survey for the Clark County Area are available through the Las Vegas NRCS office.

Soil erosion involves two processes: (1) a detachment or loosening influence, and (2) transportation by means of floating, rolling, dragging, and splashing. Freezing and thawing; flowing water; and rain impact provide the detaching agents. Raindrop splash and especially running water facilitate the carrying away of loosened soil. On comparatively smooth soil surfaces, the beating of rain drops results in most of the detachment.

During the high intensity, short duration thunderstorms that are common in the region, raindrop impact tends to destroy soil aggregates, enhance sheet and rill erosion, and encourage considerable transportation by splashing. A hard crust often develops upon drying. This crust impedes seedling emergence, greatly reduces infiltration for the next storm, and limits the possibilities for vegetative shielding which, by absorbing the energy of rain impact, prevents the loss of both water and soil and reduces degranulation to a minimum. However, in some desert locations, this surface crust does cover loose, fine soil particles, resulting in limited protection from wind erosion. In the vegetation types offering generally sparse cover, little interception of precipitation or protection from overland flow of water occurs.

As is the case with water erosion, the loss of soil by wind movement also involves detachment and transportation. The abrasive action of the wind results in some detachment of tiny soil grains from the granules or clods of which they are a part. When the wind is laden with soil particles its abrasive action is greatly increased. The impact of these rapidly moving grains dislodges other particles from soil clods and aggregates. The cutting and abrasive effects, especially of sand, upon tender leaves and vegetation is harmful

Erosion susceptibility is a measure of the erosion potential of a soil whose surface has been disturbed. Wind and water erosion potential are used to determine susceptibility in an area. Soil surveys conducted by the Soil Conservation Service, now the National Resource Conservation Service, were used in the development of erosion susceptibility ratings for the planning area. All of the Las Vegas District falls within the low to moderate susceptibility range with the exception of a few relatively small areas rated as high in the northeast portion of the Las Vegas District. Approximately 90,550 acres in the planning area have a high erosion susceptibility rating, 1,306,620 acres have a moderate rating, and 1,480,440 acres have a low rating.

Wind erosion potential is classified as low, moderate or high. Soils with an Natural Resources Conservation Service wind erodibility group rating of 1 or 2 are classified as high. A moderate rating is given to soils with a wind erodibility group rating of 3 or 4 and a rating of slight is given to soils with a wind erodibility rating of 5 or more.

Each soil also has a high, moderate, or low water erodibility rating. The K value is the soil erodibility factor used in the Universal Soil Loss Equation for estimating erosion. It is derived from data collected in Natural Resources Conservation Service soil survey field notes and is primarily a combination of soil surface texture, structure, organic matter content modified with cover such as rock fragments. It is always less than 1.0. Soils with a high K value have a soil texture that is more erodible than one with a low K value. In general, if the slope multiplied by the K value of a soil is 2.5 or less, the soil is in the slight erosion hazard category. If the slope times the K value is between 2.5 and 7.5, the soil is rated as having a moderate erosion hazard, and values above 7.5 will place the soil into the severe hazard category. It is emphasized that these break points are only general guidelines and are not the only factors used to place a soil in an erosion susceptibility class. For example, a soil with a slope times K value of 2.4 may be placed in either a slight or moderate erosion hazard class depending on information provided in soil survey field notes. This soil would not, however, be classified as having a severe water erosion potential.

Erosion condition data was compiled from several inventories, including the BLM Watershed Conservation and Development program (1977) and the BLM Clark County Range Survey (1979). Determinations of a soil surface factor were used to portray the erosion condition of an area. Erosion condition ranges from slight to critical, with most of the area falling into the slight to moderate erosion condition classes. There are 96,994 acres in critical erosion condition, 1,137,968 in moderate erosion condition, 1,286,420 in slight erosion condition, and 36,970 acres are in stable erosion condition; the remainder is undetermined.

These erosion condition classes are defined as follows:

Stable (0-20) - There are no signs of soil movement. Surface litter is usually accumulating in place. Surface rock, if present, will be evenly distributed over the area. No pedestalling, rills, or flow patterns are apparent. Gullies may be present in a stable condition.

Slight (21-40) - Some movement of soil particles and surface litter is apparent. Surface rock may be present but collection of small particles may be spotty. No pedestals are apparent. Rills less than one-half inch deep occur at infrequent intervals of more than ten feet. Visible flow patterns have been formed by surface water. Deposition of pavement particles may appear in flow patterns. Gullies may be present, but with little evidence of streambank or streambed erosion.

Moderate (41-60) - Moderate movement of soil is plainly visible and recent. Moderate movement can be recognized slight terracing caused by the accumulation of material deposited against litter, vegetation or rocks. The terraces will generally be less than one inch in height. Moderate movement of litter is apparent. Some surface rock may be exposed in bare spots where fine soil particles have been recently removed by wind and/or water. Small rocks and plants on pedestals occurring in the flow patterns may be noticed. Small rills are apparent in exposed places. These rills will be between one-half and six inches deep at intervals of approximately ten feet. Sediment deposits are visible intermittently in flow patterns and against small obstructions elsewhere.

Critical (61-80) - The soil mantle is in a critically eroded condition. Soil movement occurs with each runoff. Transported soil and debris caused by wind and water is deposited throughout the area against minor surface obstructions. Extreme movement of litter is apparent. Recent exposure of surface rock is common on gravelly and stony soils. Small rocks and plants on pedestals are generally evident and roots are exposed. Large rills are apparent on exposed areas. Flow patterns contain easily noticeable silt and sand deposits and alluvial fans. Actively eroding gullies are present on ten to fifty percent of the area being considered.

Severe (81-100) - Subsoil is exposed over much of the area. Embryonic dunes and wind-scoured depressions may be evident. Only minimal traces of surface litter remain. Surface rock or fragments are dissected by rills and gullies. Most rocks and plants are pedestalled and rocks are exposed. Flow patterns

are numerous and readily noticeable, showing large barren fan deposits. Large rills are apparent on exposed areas at intervals of less than five feet. Actively eroding gullies are present on more than fifty percent of the area.

WATER RESOURCES

The Red Rock Canyon National Conservation Area (RRCNCA) contains portions of two hydrographic regions or basins: the Central Region and the Colorado River Basin. These two regions are further divided into five hydrographic areas (listed below) which are partially contained within the planning area.

<u>Hydrographic Area</u>	<u>Region/Basin</u>	<u>Number</u>
Pahrump Valley	Central Region	162
Mesquite Valley (Sandy Valley)	Central Region	163
Ivanpah Valley (Northern Part)	Central Region	164A
Three Lakes Valley (Southern Part)	Colorado River Basin	211
Las Vegas Valley	Colorado River Basin	212

The Central Region is a topographically closed drainage system primarily located in Nevada. The three hydrographic areas within this region are, for the most part, internally drained.

The two hydrographic areas within the Colorado River Basin are tributary to the Colorado River. The southern part of Three Lakes Valley, however, discharges flood water out of Lee Canyon onto an alluvial fan. Depending on which channel the flood water enters, the flow goes either to the Colorado River or to the dry lake within the southern part of Three Lakes Valley.

Approximately 172,137 acres (88%) of RRCNCA drains into the Las Vegas Valley Hydrographic Basin and eventually to the Colorado River. The remaining 23,473 acres (12%) of the RRCNCA drains into the other four hydrographic areas: approximately 3,912 acres (2%) into the Pahrump Valley, 9,781 acres (5%) into the Mesquite Valley, 1,956 acres (1%) into Ivanpah Valley and 7,824 acres (4%) into Three Lakes Valley.

Surface Water

Surface water occurrence is far less abundant than groundwater and is limited to ephemeral streams and springs. Streams such as Pine Creek, First Creek, Oak Creek and Lost Creek, during most years, flow short distances for short periods of time, primarily during early Spring. Numerous ephemeral washes transect the planning area, conveying flows only in response to storm events. These drainages are subject to short duration, high intensity thunderstorms which produce rapid runoff and at times "flash" flooding of downslope areas. Red Rock Wash and Cottonwood Wash are the more significant drainages. Both have been classified as Flood Hazard Areas by the Federal Emergency Management Agency (FEMA). Other areas below the escarpment have also been identified. Flood Hazard Areas are zones subject to the 100 year flood.

High intensity thunderstorms often produce rapid runoff and "flash" flooding which can result in flood water and sediment damage within the region. Flash flooding, which has been on the increase, usually occurs from tropical depressions out of the south or southwest. It is believed that the increase in this flooding can be attributable to both increased recording of flood events as well as a result of population growth expanding into previously undeveloped areas (USDI, BLM, 1990). In an effort to improve the long-term safety of the public and protection of property from flooding, the Clark County Regional Flood Control District has been implementing a program in which siting, design and installation of flood control facilities is guided by a master plan. Most of the existing and proposed control facilities, including detention basins and conveyances, are located on public land. Several flood detention basins are located just outside the RRCNCA boundary. Flood waters exiting RRCNCA, flow toward the valley bottoms. A majority of the flood waters enter the Las Vegas Wash where a mean annual flow has been measured at 57.6 cubic feet per second (cfs), with a peak discharge of 6,510 cfs recorded in 1975 and a low flow of 4.8 cfs in 1960 (Emett, 1993).

Springs are important water sources in RRCNCA as with the rest of southern Nevada. A total of 41 springs have been identified within the planning area (27% of all the springs in the Las Vegas District). See Appendix 11 to view location and discharge for each spring source. The average flow of these springs is 12 gallons per minute (gpm), with some springs being nothing more than a seep area with little discernable flow, while others measured as high as 100 gpm (this average may be misleading in that a few streams with large volume flows have raised the average significantly).

Ground Water

The importance of ground water is obvious in this region of few surface water sources. With the exception of communities that obtain water from major surface water sources such as the Colorado River, developments are restricted by the availability of suitable ground water supplies. The most developed and utilized water-bearing stratum is valley fill alluvium. Although numerous springs are found in association with carbonate rock or sandstone layers, development of these aquifers is relatively difficult. The carbonate rock system is composed of primarily limestone and dolomite deposited during the period that the area was covered by water. The rocks are usually very fractured and locally contain solution channels (openings that occur from the dissolving of soluble materials by water moving through pre-existing interstices or fractures). The carbonate system is regional in nature and provides an avenue for interbasin flow. The ability of the carbonate aquifers to store and transmit water is known to differ depending on location, but characteristics of the carbonate aquifers are largely undetermined at this time. The permeability

of sandstone is much less than the valley fill alluvium releasing its stored water very slowly. The carbonate aquifer, as well as, the alluvial aquifers of several hydrographic basins are currently being looked at, by water purveyors within the Las Vegas Valley, as an alternative to meeting future water demands.

Depth to water varies throughout the planning area, but it can be generally characterized as ranging from at or near the surface to several thousand feet in the case of the carbonate system.

Most ground water recharge in southern Nevada is derived from winter and spring precipitation, representing approximately one-half of the total annual precipitation. The moisture is stored in snowpack, at elevations of 7,000 to 8,000 feet and higher. Precipitation reaches the groundwater reservoirs by way of streams which eventually discharge onto alluvial aprons or by infiltrating directly into consolidated rock and percolating vertically and laterally to the valley fill aquifer. Additional inflow is received from localized intense storms and ground water discharge from adjacent areas. Natural discharge of ground water in the basins occurs as a result of transpiration from phreatophytes (deeply rooted plants that obtain water from the water table or the soil layer just above it), spring discharge, evaporation from bare soil, interbasin flow, and base flow to streams such as the Las Vegas Wash.

As is the case throughout most areas of the arid West, water is a limited resource in southern Nevada and its availability is impacted by human population growth. Of the 5 hydrographic basins wholly or partially contained within the Las Vegas District, all have committed resources which exceed perennial yield (Coche, 1995). These basins, including Las Vegas Valley, are in a water overdraft situation.

The Las Vegas Valley is currently experiencing rapid growth and development. Heavy demands are being placed on an already over-utilized water resource. Entities within the Valley obtain water from both groundwater sources and the Colorado River. The groundwater system within Las Vegas Valley has been in an overdraft condition since 1945. In 1993, approximately 67,356 acre feet of groundwater was extracted from the principal aquifer, far exceeding the estimated recharge of 30,000 acre feet (Barrick, 1995).

This overdrafting has resulted in most of the groundwater problems currently found in the Las Vegas Valley including declining water levels, land subsidence, declining water quality by incursion of water possessing higher concentrations of dissolved solids and nitrate, and the loss of vegetation dependent on groundwater (Morgan, 1994). These problems, resulting from overdrafting of the groundwater resource, are not limited to the Las Vegas Valley. Although not to the same degree as that occurring in the Las Vegas

Valley, all overdrafted basins realize some, if not all of the problems previously identified.

An artificial recharge project was initiated in 1987 and in 1993 resulted in the injection of 24,535 acre feet of Colorado River water back into the Valley's groundwater basin (Barrick, 1995). The project offset some of the groundwater withdrawal resulting in a net pumpage of 42,821 acre feet in 1993, still exceeding annual recharge. This groundwater withdrawal represents 13 percent of Las Vegas Valley's water withdrawals, with the remaining 87 percent (292,803 acre feet) obtained from surface waters, as Nevada's entitlement to waters of the Colorado River (SNWA, 1995).

Of particular concern because of the damage caused to property, is land subsidence. It is primarily associated with over pumping and resultant water level declines and has continued to be a problem in the Las Vegas Valley since the mid 1940s. The decline in water levels and consequential reduction in artesian pressure has resulted in an increase in the stresses imposed upon the sediments from which the water is extracted. In areas containing fine-grained deposits (silt and clay), the increase in effective stress has resulted in compaction of the sediments. This sedimentary compaction is seen on the land surface as subsidence. Although a good portion of the valley is sinking, it is at a uniform rate and most structures are not impacted. Where pre-existing faults occur however, more damage results as fissures are formed and large differential settlement occurs (Bell, 1991). Through artificial recharge, the rate of subsidence in the valley has decreased.

Within the boundaries of the RRCNCA and the Las Vegas Valley, numerous wells have been drilled on public lands. These wells provide permanent and reliable water in an arid environment where natural water sources, such as springs and seeps, are often unpredictable or intermittent.

Water Quality

In southern Nevada, one critical water resource problem is the poor quality of much of the surface and ground water. Several factors contribute to the high quantities of chemicals and solids in the regional water. High evaporation rates leave concentrations of salts at or near the soil surface after rainfall. The composition of rocks and soils, often containing calcium, magnesium, carbonates, silicates, metallic and nonmetallic minerals, also affects water quality. As water moves slowly into and through the soil profile, it dissolves and acquires these constituents. In addition, dust containing salts is blown from playas onto standing surface water and onto soil where it enters both surface and groundwater. A water quality sampling program was initiated in 1979 to obtain baseline water quality data for Clark County. Samples were collected in spring, summer, and fall and analyzed for

biological, chemical, and physical parameters. The primary and secondary drinking water standards, as defined by EPA, were applied to these samples. These standards refer to the maximum contaminant levels allowable for public water supplies, which if exceeded, could adversely affect public health. It is important to note that these drinking water standards are for public water supplies, not necessarily springs, seeps, and others found in the natural environment. These standards may, however, be used to evaluate the quality of naturally occurring waters in terms of suitability for consumption, untreated, by humans.

Results of the three sampling periods indicate that water at many springs does not meet the Federal Drinking Water Standards. The major contaminant in the springs was found to be fecal coliform bacteria, generally considered to be an indicator of fecal contamination. Fecal coliform bacteria, which form a portion of the total coliform group, are restricted to the intestinal tracts of warm-blooded animals and carry disease-causing organisms.

Levels for turbidity, total dissolved solids, sulfate, chloride, manganese, iron, and nitrate nitrogen also exceeded Federal standards in several springs. Many of these levels do not pose health hazards; only nitrate nitrogen is potentially dangerous. This chemical was found to react with hemoglobin in the blood to produce an anemic condition commonly known as "blue baby" in infants under three months of age.

Salinity contributions to the Colorado River have become a concern both nationally and internationally. The Colorado River currently carries approximately 6.6 million tons of dissolved solids annually. Of this total load, it is estimated that only 38,000 tons of dissolved solids emanate from the approximately 6 million acres of public lands within southeastern Nevada (Westenburg, 1995). The contribution from the public lands within the Las Vegas District is a fraction of the 38,000 tons.

The quality of ground water varies throughout the planning area, as it does in the remainder of the state. In general, ground water in areas of recharge has low chemical concentrations, but as it moves through the ground water system to discharge areas (i.e. valley bottoms), it dissolves sediments and rock materials. The extent to which chemical constituents are dissolved is largely determined by these factors: 1) the solubility, volume, and distribution of the materials; 2) the length of time that the water is in contact with the materials; 3) the distance that the water travels from the point of recharge; and 4) the temperature and pressure within the ground water system.

Little is known about ground water quality in much of the Las Vegas District. Several hydrographic basins were investigated at varying levels of intensity. Due to its large urban population, prior

research focused primarily on the Las Vegas Valley. The shallow aquifers within the Las Vegas Valley are generally in poor quality. Total Dissolved Solids concentrations are as high as 8,000 milligrams per liter (mg/l). Such high concentrations are suspected to be the result of recharge from landscape irrigation and possible seasonal fluctuations in the water levels of the shallow aquifers. The concentrations of Total Dissolved Solids have increased over the last few years. High nitrate concentrations also contribute to the poor quality of the more shallow aquifers. In the deeper aquifers (200 to 450 foot depths) of Las Vegas Valley, water quality varies by geographic location. In the northern and western portions of the valley, Total Dissolved Solids concentrations range from 200 to 400 mg/l, with a calcium-magnesium-bicarbonate consistence. Groundwater in the southern and southwestern portions of the valley is a sodium-potassium-bicarbonate type with Total Dissolved Solids concentrations ranging from 700 to 1,500 mg/l. A mixed-cation sulfate type water of generally poor quality characterizes the remainder of the deep aquifer system in the Las Vegas Valley. Further degradation of this system can be anticipated, as the lowering of the water table accelerates the infiltration of poor quality water into adjacent aquifers (USDI, BLM,1990).

The other hydrographic basins in the Las Vegas District exhibit groundwater quality characteristics similar to the Las Vegas Valley, that is, water quality deteriorates from the higher areas to the valley bottoms. In the carbonate and volcanic rock aquifers to the northwest of Las Vegas, water quality is generally acceptable. Water of a calcium-magnesium-bicarbonate composition is found in the carbonate aquifers while a sodium-potassium-bicarbonate composition is associated with the waters of the volcanic rock aquifer. To the east and southeast of Las Vegas unacceptable water, with a mixed cation-sulfate composition, can be found. The area west of the Arrow Canyon Range shows a marked increase in water quality and with further investigation may be a good water supply. The area lying west of the Sheep Range, although little or no data exists, is assumed to generally possess good to fair water quality with the exception of isolated areas of poor quality water (Lyles, 1987).

RECREATION

In 1967, Red Rock Canyon (RRC) was designated as a Class 1, High Density Recreation Area under the Bureau of Land Management (BLM) classification system. Along with that designation came the title "Red Rock Canyon Recreation Lands" (RRCRL) and at that time RRC consisted of 62,000 acres.

In January of 1984, the Clark County Management Framework Plan (MFP) was approved for management of the BLM lands within Clark County, including RRC. The MFP called for the RRCRL to be managed as set forth in the 1975 Environmental Impact Statement (EIS) for RRC, and the 1976 Red Rock Canyon Master Plan. However, the MFP was still the "umbrella" plan and set forth objectives and regulations governing RRC. The MFP called for public land in Clark County to be managed in a way that maximized recreation opportunities. It further stated "Ensure that management actions are not allowed that degrade, preclude use of, or deny access to principal recreation areas.

The MFP recommended that the public lands within the Spring Mountains area (above 5,000' elevation) should be primarily managed for recreation values to accommodate the needs of Southern Nevada residents. It projected that recreation use would continue to grow along with the increasing population and that managing the area primarily for recreation would help protect the resources. It further stated that other resource plans and programs would be coordinated and subordinated to the recreation plan developed for the area. Recreation uses listed at the time included camping, picnicking, sightseeing, trail-bike riding, hiking, hunting, OHV riding and horseback riding.

The MFP divided the area that is now the NCA into two basic OHV designations. The area to the north of State Route 160 limited OHV use to designated roads (no cross-country travel) and disallowed high speed competitive events. The area south of State Route 160 also limited OHV use to designated roads, but allowed high speed competitive events with certain seasonal restrictions. The current direction, as stated in the Interim General Management Plan, disallows motorized vehicle and bicycle events involving speeds in excess of the normal posted speed limit (generally referring to past events held on the Scenic Drive) and no competitive motorized vehicle events are allowed in the NCA.

In November of 1990, legislation passed which changed Red Rock Canyon from "Recreation Lands" to "National Conservation Area" (NCA) and increased the size to 83,100 acres. Although the NCA designation obviously calls for a more stringent effort to preserve the natural resources, there is not a clear definition as to what exactly an NCA is. There is a strong sentiment from a portion of the local community that the "conservation" designation infers

limited recreational use and an abundance of planned actions to protect and enhance the natural resources "...for the enjoyment of present and future generations". Basically, any form of enjoyment derived from what the NCA has to offer is recreational, thus conserving the resources is accomplished through effective recreation management.

The legislation designating the NCA also calls for a General Management Plan (GMP) to be completed for the area. The challenge involved with the GMP is developing a plan which adequately conserves the resources of RRC, while accommodating the rapidly growing Las Vegas community, and increasing visitor use at an international level.

When the Red Rock Canyon Master Plan was approved in 1976, the population of the Las Vegas community was around 350,000 and the east boundary of RRC was about 8 miles from the west edge of Las Vegas. At present, the Las Vegas community has grown to over 1,000,000 and houses are being built directly adjacent to the NCA's eastern boundary. The remaining buffer directly north and south of Charleston Blvd/State Route 159 is planned for community development and will disappear within a few years.

Along with the challenge of managing for the increasing population, is the growing popularity of recreational activities that were of minimal consideration several years ago. Neither the Red Rock Canyon Master Plan nor the Clark County MFP mention mountain biking or technical rock climbing, which are both major recreational pursuits in the NCA today.

In November of 1994, legislation was passed which expanded the NCA boundaries by over 112,000 acres, so the present total NCA acreage is approximately 196,000. Most of the expansion is to the north, although there is a sizeable increase to the southern boundary taking in the Bird Spring Range (see map showing expansion boundaries). The expanded areas offer dispersed recreation activities with very little in the way of facilities. Other than the Kyle Canyon and Lee Canyon Roads, there is no paved access. Recreation activities presently occurring in the expansion include hiking, horse riding, mountain biking, hunting, shooting, rock climbing, and 4-wheeling.

Visitor Use

The majority of visits to the NCA occur in the Scenic Drive vicinity. In 1998 the Scenic Drive received over 1 million visits. The number of visits to the Visitor Center has increased an average of 15.7 percent per year since the first full year of service in 1983, with a visitor count of 397,400 for 1998. Dispersed use includes most of the visitor use outside of the Scenic Drive influence. Dispersed use for the last year is estimated at around

40,000, but this figure is based on observation, limited data collection and projection for various activities including mountain biking, horseback riding, hiking, OHV use and commercial use. The actual use may be higher than estimated.

Seasonally, the highest visitor use in the NCA usually occurs from the beginning of February through April, with peak visitation occurring in early April. Moderate use occurs from around the end of September to mid November. The lowest visitor use generally occurs from June through August and November through January when temperatures are at extreme highs and lows. Actual visitor use corresponds closely to weather conditions, with temperature being the most prominent factor.

Sightseeing

Sightseeing is by far the heaviest recreational pursuit in the NCA. Most of the visits concentrate on the Visitor Center, Scenic Drive and along State Route 159 between the NCA entrance from Charleston Blvd. and the town of Blue Diamond. Scenic touring also occurs in the dispersed areas of the NCA, but most of the roads in these areas are dirt and require 4-wheel drive or at least a vehicle with high clearance. Some of the dirt roads receive minimum maintenance and can be negotiated only with 4-wheel drive.

The typical agenda for visitors not familiar with the local area begins with a tour of the Visitor Center where they can become familiarized with what the NCA has to offer through viewing displays, perusing informative literature and conversing with the Visitor Center interpretive staff. The information most often requested at the information desk includes:

- what attractions to look for along the Scenic Drive and State Route 159;
- what hikes are available and what would be a good hike to take;
- where the wild burros can be found;
- information about picnicking, climbing, mountain biking and camping.

A stop at the Visitor Center is normally followed by a tour of the Scenic Drive and on south as far as the town of Blue Diamond, with stops along the way at points of interest.

Technical Rock Climbing

Technical rock climbing is an activity which was not considered in earlier land use plans, but has grown to the point where it is now a major recreational use in RRC. In fact, RRCNCA has become an international attraction for climbing enthusiasts. The Calico Hills offer numerous sport climbs, while the canyons of the escarpment offer longer routes, some requiring 2 or 3 day excursions. There are estimated to be over 1,000 different existing routes in RRCNCA, offering a wide range of challenge.

With the expansion of the NCA, in November of 1994, additional climbing opportunities are now located in RRCNCA at three areas referred to as the "East Test Site", "West Test Site" and "Area 51". These sites are actually located just south of the Kyle Canyon Road about 5 miles from the junction with Highway 95. They offer an opportunity to climb routes on limestone as opposed to the more common sandstone routes offered in the center of the NCA.

Other climbing opportunities within the Las Vegas vicinity include 60 to 100 (or more) routes in the Mt Charleston area (USFS) and a number of routes in the Keyhole Canyon area, on BLM land, 18 miles south of Boulder City. Within the local community, the city of Las Vegas offers two indoor climbing facilities where the experienced climbers can hone their skills and the beginners can learn the ropes.

Current climbing policy is included in the IGMP (June 1995). It includes the first written climbing management that any document has provided for Red Rock Canyon.

Resource concerns, where climbing is involved, include trail braiding of approach trails, various impacts to rock surfaces, potential impacts to rock art sites, visual intrusion of hardware and slings left on climbing walls, effects on raptors, bats and wildlife in general, and impacts on vegetation. The impacts on vegetation include the trail braiding, trampling along the base of climbing routes, and disturbance of certain plant species that inhabit the crevices and ledges of cliff faces. In past meetings, the local climbing community, in general, has expressed a willingness to help alleviate these concerns. They have offered to help develop designated approach routes to climbing sites and restore excess routes back to a natural state. The cultural and nest site concerns are mostly a need for making restricted sites and policy known to the climbing community, who have generally supported this policy, although there could be reservations depending on the potential extent of imposed restrictions. The most complex and difficult issue to resolve involves bolting in wilderness areas. The canyons along the escarpment and the climbing areas off the Kyle Canyon Road fall within Wilderness Study Areas (WSA). The bolting issue is being pondered at all

agency (BLM) levels as well as within the U.S. Forest Service and National Park Service, and basically involves the interpretation of the Wilderness Act of 1964. Until the lands under consideration for wilderness are either designated or released, the Bureau of Land Management will manage these lands by the policies set forth in the "Interim Management Policy For Lands Under Wilderness Review" (IMP). In regards to rock climbing, the IMP states:

"Rock climbing and caving will be allowed as long as these activities meet the nonimpairment criteria. The use of power driven (i.e. fuel or electric) rock drills or permanent anchors (e.g. bolts) is not allowed. No marring, scarring or defacing resulting in adverse impacts to the wilderness value of naturalness will be permitted, nor will permanent installations be permitted. Exceptions to the above may be allowed for: (a) emergencies, such as search and rescue operations; and (b) authorized actions needed for access travel within WSAs which are the minimum necessary for public health and safety in the use and enjoyment of the wilderness values. Any impacts from emergency actions (a, above), must be reclaimed to a substantially unnoticeable condition following the emergency situation."

Bicycling

Bicycling, like rock climbing, has increased dramatically over the last decade. The increase has occurred in both street cycling and mountain biking. Street cycling occurs along State Route 159 and around the Scenic Drive. Mountain biking occurs on a network of trails in the Cottonwood Valley area north of and south on State Route 160. Some of the trails extend into the southern expansion with one loop trail traversing a couple miles of Humbolt-Toiyabe National Forest land. An Environmental Assessment (EA) for this trail network was completed in 1996, and the trails have been formally designated on the ground. Mountain biking also occurs on existing trails in the expansion area north of Kyle Canyon Road in the vicinity of Grassy and Grapevine Springs. The Kyle Canyon and Lee Canyon Highways also receive bicycle use, with Lee Canyon serving as the site for an annual road race.

The primary problem that has been occurring in the Cottonwood Valley area and within the Pine Creek WSA, is the unauthorized construction of trails on sites not previously disturbed. In the case of Pine Creek WSA, mountain bikes are not allowed in wilderness or WSAs, yet a trail now extends from Bootleg Spring toward First Creek and continues to extend in a northerly direction. A similar problem is the attraction for mountain bikers to explore any disturbance remotely resembling a trail, whether designated or not. This converts subtle horse paths to definite resource disturbance.

Camping

The 1976 Master Plan called for 3 supervised campgrounds in RRC. Locations included Oliver Ranch, which was privately owned at the time, Spring Mountain Ranch, which belongs to the State Parks system, and Oak Creek. A campground was constructed in the Oak Creek area, but it was located adjacent to State Route 159, whereas the Master Plan proposed the location at the mouth of Oak Creek Canyon. This campground has been closed.

The 13 Mile Campground is the only formally designated campground in RRCNCA. Other areas have been utilized to handle overflow but have not been considered official campgrounds. Use of these has now ceased. In 1993 the access road to Oak Creek Canyon was so eroded and visually unappealing that it was closed to allow for restoration. The campground was in a similar state. In the Interim GMP the decision was made to close Oak Creek. After a site review and selection process, 13 Mile was chosen as the new campground location.

Overnight camping is allowed in higher elevations of the core NCA as designated on the included camping map. The map does not refer to campgrounds in the core area or camping designations in the 1994 NCA expansion.

Hunting and Shooting

There is no shooting allowed in the NCA other than at the Desert Sportsman's Rifle & Pistol Club shooting range, which is an inholding, located where Charleston Boulevard enters the NCA. In fact, it is illegal to have a loaded firearm in the NCA, except in designated hunting areas during open season, in accordance with State law. Included in the supplementary rules published in the Federal Register as proposed rules, on December 13, 1991, was a proposal for a target range in the NCA. After review of feedback during the public comment period, the proposal was dropped.

Although shooting is not allowed, there has been an abundance occurring throughout roaded portions of the NCA away from the heavier visitor use areas, and in several locations along the eastern boundary, including some areas of moderate visitor use. Bullet shells, especially the colorful shotgun variety, are seldom collected and lay scattered around at various pull-offs and guzzler sites.

Hunting is allowed in accordance with State law, except within areas designated as closed to hunting. In the core NCA, closed areas include the area north of State Route 160, on the east side of the Spring Mountain range, below 5,000 feet in elevation. There are two specific locations below 5,000 feet where bighorn sheep may

be hunted. The no-hunting restrictions are primarily a public safety concern. Presently, there are no hunting restrictions in the north and south ends of RRCNCA.

Trails Use

Trails planning and management for the original NCA boundaries established in the 1990 Act, are included in the IGMP. Many of the trail locations utilize existing disturbance, such as wild horse and burro trails or routes that climbers have established. These trails offer good visitor access without creating new disturbance to vegetation. The trails offer a variety of experiences for hiking, mountain biking, and horse riding. New trail construction has taken place in locations where other options were not available or existing disturbance is not suitable due to resource concerns or desired experience.

There are no designated limits set for hikers in the NCA. Any trails may be hiked on, but hikers do not normally utilize trails primarily designated for mountain biking, because the locations do not offer the high level of hiking appeal that can be found in other areas. Most hiking takes place in the general vicinity of the Scenic Drive. For the more independent hiker, the Wilderness Study Areas (WSAs) offer an experience requiring more self-reliance.

Equestrians also have access to most trails within RRCNCA, with the exception of high use hike only trails in the Scenic Drive vicinity. Equestrian use seems to be fairly disbursed.

The major mountain bike use occurs in a network of designated trails in the Cottonwood Valley area. The majority of these trails are included in the IGMP, but some of the system is within the southern NCA expansion, which is not included in the IGMP, and approximately 3 miles of trail traverse U.S. Forest Service land. A separate EA, which focuses specifically on the Cottonwood Valley trails network was completed in May of 1996. The trails have recently been designated on the ground with trailhead signs and route markers at intersections and other locations of possible confusion. This will help prevent illegal trail construction and limit riders to appropriate routes. Prior to ground designation it was very difficult to distinguish between trails in the system and existing wild horse routes not included in the designated network.

All of the trails systems need to be more visitor friendly. The BLM is currently improving ground designation of all approved trails systems in the NCA and updating the corresponding maps.

Hiking, horse riding and mountain biking all occur in the areas added to RRCNCA in 1994. Hiking and mountain biking are less prevalent than in the core NCA, due to difference in proximity to

the city of Las Vegas and perhaps because the scenery is less captivating. Mountain biking does occur in the north expansion on existing trails in the Grassy and Grapevine Springs area. The level of equestrian use in the expansion areas is more comparable to core area use than are other trail user groups. The expansion lands offer less congestion and fewer roads, making it more appealing to horse riders. Most of the riding to the north occurs in the Kyle Canyon vicinity. The first 5-6 miles of the Kyle Canyon Road accessing RRCNCA are bordered by private land, of which many of the residents are horse owners.

For existing trail information, see the "Facilities" section in the chapter.

OHV Opportunities

All motor vehicle use in the NCA is limited to designated roads. There are no trails designed for ATVs or dirt bikes. Competitive motor vehicle speed events are not permitted. The core NCA is more intensely managed in this respect and offers relatively few opportunities for off highway experiences. The primary 4X4 road is the Rocky Gap Road, which begins at the back end of the Willow Spring area, climbs to the Red Rock Summit, then continues into Lovell Canyon, within the Spring Mountain National Recreation Area (SMNRA), which is managed buy the U.S. Forest Service.

North of State Route 160 is the "Wildhorse Loop" and access to the Black Velvet area. Access to Black Velvet via the west leg of Wildhorse Loop is 2.6 miles and is traversable by two wheel drive. Other dirt roads in the this vicinity are rougher. To drive the entire 4.45 miles of the Wildhorse Loop would require a minimum of a high clearance vehicle. There is also an old non-maintained jeep road that bisects the Wildhorse Loop. This road is .86 miles at the point of intersection and is recommended for four wheel drive vehicles only.

Within the area south of State Route 160, the Cottonwood Valley Road is the only dirt road slated to remain open. It heads south from State Route 160 for 3 miles before exiting the NCA and entering U.S. Forest Service land and continuing south all the way to Goodsprings. Presently there are a few laterals off of this road within the NCA, but the IGMP calls for their closure.

The expansion portions of the NCA are accessible mainly by dirt roads. The only paved roads are the Kyle Canyon and Lee Canyon State Routes. Some of the dirt road system is suitable for 2 wheel drive, although in many cases the driver runs into spots that require a 4 wheel drive to negotiate. At present, use of the roads is allowed until decisions have been made as to which will be designated and which will be closed.

Commercial Use

In the past, commercial and competitive activities have been permitted openly as long as an environmental analysis concluded that projected impacts would fall within acceptable limits. In 1984, the approval of the Clark County Management Framework Plan (MFP) began introducing restrictions by limiting OHV use in Red Rock Canyon (RRC) to designated roads, with high speed events allowed south of State Route 160 only.

The Interim General Management Plan (IGMP), which is the current management plan for RRCNCA, prohibits any mechanized events involving speeds in excess of the normal speed limit. Competitive events which still occur include running events, mountain bike races and long distance equestrian events. Competitive events for the last calendar year (1997) included 1 running event, 9 mountain bike races, and 2 long distance equestrian events.

Interest in commercial ventures has been on the increase. Almost all of the commercial endeavors involve filming (video or still photography) or schooling/guiding activities. Filming generally includes movies, television commercials and professional still photography. Guiding activities generally include technical rock climbing, bike tours, hiking tours, equestrian trail rides, four-wheel drive tours and charter tours. Proposals, however, are not limited to the activities listed above.

The IGMP was approved in June of 1995 and imposes additional restrictions concerning commercial operations. The number of rock climbing permits has been limited to 6 full time permits at any one time and 10 guest permits, which are temporary and allow guiding/schooling businesses two 5 day visits for the calendar year issued. Guided equestrian trail ride operations have also been limited, with no more than 5 being issued at any one time, and no overlap of geographical operations between any two permittees. The IGMP further states that additional limits may be imposed if necessary for resource protection.

Full time commercial permits currently operating in RRC include 5 rock climbing permits, 4 equestrian trail riding permits, 3 four-wheel drive tour permits, 3 guided hiking permits and 2 guided bicycle tour permits. The numerous charter tour permits that have been in affect are being closed out and will not be reissued. Charter tours now pay an entrance fee upon admission and no longer need to be under individual permits.

Temporary commercial permits issued during the 1997 calendar year included 10 guest climbing permits and 19 film permits.

VISUALS RESOURCE MANAGEMENT

Red Rock Canyon has long been recognized for its scenic values. In 1964, after the passage of the Classification and Multiple Use bill, the BLM placed 10,000 acres in withdrawal status. In November of 1990, the Red Rock Canyon National Conservation Area Establishment Act was passed. This act changed the designation of Red Rock Canyon from "Recreation Lands" to "National Conservation Area" (NCA), and included a total of 83,100 acres. Finally, in November of 1994, additional legislation was passed which expanded the NCA boundary to include an additional 112,210 acres, bringing the total size to approximately 196,000 acres (other minor acquisitions have occurred).

One of the dominant features of Red Rock Canyon is the geologically unique Keystone Thrust Fault running north-south along the west boundary. It is composed of sandstone which is covered and protected by a layer of older and more weather resistant limestone. To the east, and also running north-south for a stretch of 2 ½ miles, are the Calico Hills, a multicolored sandstone formation which features an array of arches, domes, potholes and other interesting natural architecture.

Therefore, it is no surprise that scenic viewing is the activity that attracts the highest percentage of visitors to Red Rock Canyon. A study completed in 1992 (Customer) found that even when involved in other activities, including biking/running, hiking, rock climbing and picnicking/day use, the primary reason for participating in these activities at RRC is the scenery.

In 1976, the Federal Land Policy and Management Act (FLPMA) was passed. One result of FLPMA is the placement of scenic resources on an equal basis with other resources. It makes the consideration of scenic resources mandatory throughout the land management activities of the BLM. It is practiced according to guidelines published as BLM Manual Handbooks 8410-1 *Visual Resource Inventory* and 8431-1 *Visual Resource Contrast Rating*.

An in depth Visual Resource Management (VRM) study was made in 1980, which covers that portion of the NCA included in the original legislation of 1990. There have not been any exhaustive VRM studies done for portions of the NCA added in the 1994 expansion. However, an abbreviated visual inventory was conducted in winter of 1998 to assign VRM Classes for the expansion areas so that they coordinate with the Forest Service's assigned Visual Quality Objectives (VQOs) on adjacent lands published in their 1996 Forest Plan Amendment.

The practice of VRM in BLM land use planning inventories landscape character according to the four basic visual elements of form, line, color and texture, and is used to analyze impacts of development. The planning area is first evaluated and assigned

values for several visual elements based on a numerical point system. The total points assigned to a given area are then used to determine an existing scenic quality class.

The next step is to combine the assigned scenic quality classes with distance zones and viewer sensitivity factors. That step yields the VRM classes as follows:

Class I - Natural ecological changes and very limited management activity are allowed. Any contrast created must not attract attention. This classification is applied to wilderness areas, wild and scenic rivers, and other similar situations.

Class II - Changes in any of the basics (form, line, color, texture) caused by a management activity, should not be evident in the characteristic landscape. Contrasts are seen, but must not attract attention.

Class III - Contrasts to basic elements caused by management activity are evident, but should remain subordinate to the existing landscape.

Class IV - Any contrast attracts attention and is a dominant feature of the landscape in terms of scale, but it should repeat the form, line, color and texture of the characteristic landscape.

The following map depicts the most recent VRM classes assigned for the RRCNCA including the expansion areas.

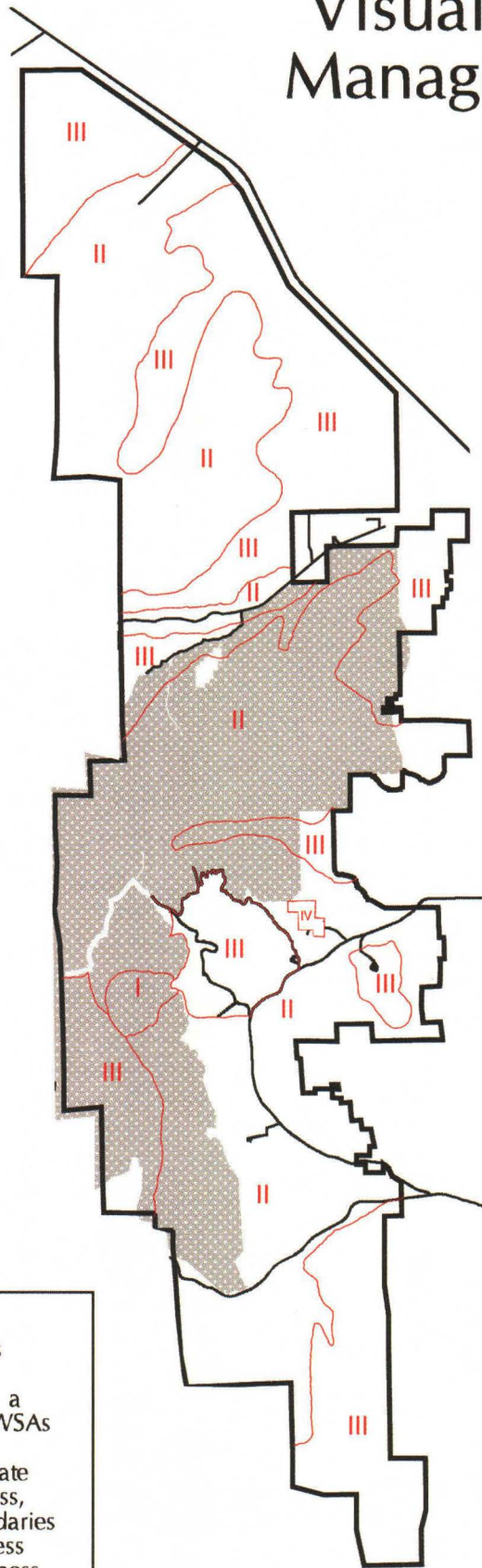
The boundaries of the Wilderness Study Areas (WSAs) are also shown on these maps. Both the La Madre Mountain and Pine Creek WSAs will be managed as Class I, the most restrictive class.

When specific projects are proposed, further visual analysis will occur, on a case by case basis, to determine the impacts of any proposed actions on scenic quality. The level or degree to which various actions affect or degrade the scenic quality of the landscape depends to a great degree on the amount of contrast created by the activity in relation to the existing landscape character. The landscape will also be studied from several key viewpoints to analyze the potential effects of proposed projects on the basic visual elements of form, line, color and texture. When the need arises, Visual Simulations and Seen Area Determinations will be conducted with a computer program, Visual FX, Ver. 2.0, to further determine impacts of proposed projects.

Certain projects may require modification or mitigation measures to lessen contrast so that the project complies with the assigned VRM Class of its location. An example of this would be selecting paint

colors to camouflage or render less conspicuous tanks and buildings or changing the proposed route of a road or powerline to hide it from a popular overlook. In other instances, rehabilitation, revegetation, etc. may be recommended to lessen the visual impact of existing conditions of high contrast so that an area will more closely reflect its assigned VRM Class.

Visual Resource Management Class



The shaded portions of this map indicate two Wilderness Study Areas (WSAs) set aside for wilderness consideration. Until Congress makes a final wilderness determination, the WSAs will be considered Class I. If the eventual decision is to designate all or part of the WSAs as wilderness, all land within the wilderness boundaries will be designated Class I. If Congress decides not to designate any wilderness, VRM classification will be as shown on map.

GEOLOGY

Red Rock Canyon is located in the Spring Mountains of southern Nevada in the Basin and Range province. It straddles the margin of the Great Basin with westward drainage into the Great Basin, and eastward drainage into the Colorado River. The rocks are Paleozoic marine and Mesozoic terrestrial sedimentary rocks that have been shaped into striking cliffs and canyons by uplift and major faulting, followed by erosion.

The most striking feature is the towering cliffs of Aztec sandstone that run from the Cottonwood fault to the eastward bend of the Keystone thrust fault. Less apparent, is the unconformity caused by the Keystone thrust, which drove dark, lower Paleozoic carbonates over the lighter Mesozoic sandstone. Arid conditions limit vegetative cover and large areas of bedrock are exposed, allowing for easy observation of rock layers. Interpretation of tectonic movement is difficult, because fault movements have scrambled small crustal blocks, with vertical displacements of thousands of feet and horizontal displacements of tens of miles. Soils are generally thin and poorly developed, and bedrock type greatly influences vegetative cover by controlling availability of water. The large areas of exposed carbonates at the higher elevations rapidly absorb precipitation, allowing almost no run-off except during periods of torrential downpours in summer. These waters reappear briefly as springs along fault lines and contacts between rock units, flow for short distances, and are then absorbed by coarse gravels that form extensive alluvial fans.

South of State Route 160, which follows the trace of the Cottonwood Fault through the Mountain Springs, surface rocks consist of Paleozoic marine sediments broken into numerous fault blocks by thrust faulting in the Bird Springs area. North of the Cottonwood Fault, that closely follows State Route 160, are the Mesozoic shales and sandstones that form the Wilson Cliffs. The cliffs are topped by several hundred feet to Paleozoic marine limestones driven up from the west along the Keystone Thrust. A portion of the Keystone Thrust extends to the east of the sandstone cliffs to form La Madre Mountain, a steep limestone cliff that divides Red Rock into two sections. North of La Madre the landscape consists of numerous blocks of Paleozoic marine sediments that are broken by faults and dissected by drainages on the east side of Mt Charleston.

PALEOZOIC ERA

The Paleozoic era is represented by approximately 11,000 feet of sediments ranging from deep marine limestones and dolomites of Cambrian age to near shore, evaporite and terrestrial deposits of Permian age. The oldest rocks are found at the highest elevations, due to displacement by fault movement. These carbonate rocks

rapidly absorb most precipitation, with little run-off except during extremely heavy rains. Water moves down through joints and faults to reappear as springs in canyons and at impermeable rock layers. The presence of permanent springs has had a profound effect on plant and wildlife communities. Endemic plants grow around many of the springs, and plants normally restricted to wetter climates survive the harsh Mojave Desert climate. Several caves have developed in these rocks, including the cave in the Kaibab and Toroweap formation near the Visitor Center, and Tea Kettle Cave in the Monte Cristo Limestone east of Brownstone Canyon.

The marine limestones contain rich invertebrate fossil deposits with brachiopods, corals, sponges, and crinoid fragments well represented in many areas.

MESOZOIC ERA

The Mesozoic era is represented by rocks that show a gradual change in the environment from marine conditions to shallow swamps and finally desert. Limestones of the Virgin Member of the Moenkopi are superseded by the sandstones and shales of the Chinle Formation and the wind-blown sands of the Aztec Sandstone. Rocks younger than the Aztec have either been removed by erosion, or were not deposited.

CENOZOIC ERA

Cenozoic deposits are limited to gravels and cemented caliche on alluvial fans, and tufa deposits around springs.

CULTURAL RESOURCES

Cultural resources are the tangible remains of past human activities. They include anything that humans have made or modified for their use. The study of cultural resources enhances our present knowledge of plants and animals, and man's interaction with plants, animals and fellow man. It allows us to understand the process that has led us to where we are today, and can help us deal with future situations. The more intact a cultural site is, the more likely it is to yield valuable scientific information. The study of cultural resources (archaeology) is divided into historic and prehistoric categories. Prehistoric archaeology involves time before Native American contact with European populations (before written history). Historic archaeology in southern Nevada began approximately 170 years ago with Jedidiah Smith's exploration of the area in 1824 and the beginnings of the Spanish Trail in 1829.

Prehistoric

Cultural resources give evidence of the presence of prehistoric Native Americans as early as 13,000 years before present (B.P.) time. Between 5,550 and 13,000 B.P., several phases of occupation occurred in the southern Nevada region, with the different phases being determined by changes in the types of cultural resources recovered. The Little Lake Pinto Gypsum Phase lasted from 5,500 to 2,000 B.P. and consisted of Native American culture acclimated to a desert environment. This period included occupation of the Red Rock Canyon (RRC) area, which was an attractive site due to a higher availability of water than is found in most desert environments. Next came the Ancestral Puebloans (Anasazi) from 2,000 B.P. through 850 B.P. The southern Paiutes were occupants during the late Puebloan phase and were here when early Americans from the United States and Mexicans entered southern Nevada approximately 170 years ago.

Aboriginal peoples commonly used natural formations such as rockshelters or caves for shelter and as storage areas for small quantities of collected resources, tools, and other personal possessions. Evidence of their fires can be found in the blackened staining on the walls and ceilings of such caves. The remnants of food processing equipment and toolmaking activities, as well as seeds, baskets, sandals, and other perishable items, are often preserved within habitation sites. Roasting pits are also often found in association. Roasting pits are circular pits that were used primarily to roast bulbs from the agave plant. They are often associated with milling stones or other food processing equipment, lithic materials, and sometimes ceramics.

Shelters that were extensively used, often contain layers of organic deposition called midden within the floor and surrounding

the entrance. This midden usually shows blackened soil and is filled with artifacts; a midden that has not been disturbed has excellent potential for yielding significant information on the prehistory of the region.

An area that possesses quantities of lithic material, such as stone flakes or formed tools, ceramics, animal bone or plant materials, milling equipment, and often the remains of a cooking fire within a hearth, is considered a campsite. These are generally reflective of temporary locations, on a path from spring to spring or resource to resource. Campsites are found in all areas, but are most prevalent on terraces overlooking major drainages and surrounding springs.

Other types of prehistoric archeological sites include stone features, such as rock rings, and rock art locales. Rock art is defined as the modification of a rock face by pecking (petroglyphs) or painting (pictographs) figures or designs. Rock art panels are common in certain areas, generally near water sources, along game trails, or near resource procurement locations. Sandstone with a stained or patinated surface is perhaps the best medium for illustrating this kind of aboriginal visual creativity.

The RRC area is rich with cultural resources left by Native American inhabitants. When the first Americans of European heritage entered southern Nevada, the southern Paiutes were still in the area, so there are some written records of their presence and lifestyle. Other than that, much of our knowledge about ancient Native Americans is derived from the cultural resources they left behind.

Historic

Commercial travel of the Old Spanish Trail/Mormon Trail began in 1829/30 and the last major mule trail to pass through the area was in 1848. Both Mountain Springs and Blue Diamond served as watering spots. During this period Blue Diamond was known as Cottonwood Springs and Mountain Springs was often referred to as Paiute Springs. Very little evidence of their passing was left by the trail users.

The first white settler in the Red Rock Canyon vicinity was James Wilson, who staked out the Sandstone Ranch (now Spring Mountain Ranch) in 1876. Another homesteader was Horace Wilson, who set up residence in Pine Creek Canyon in 1922.

Red Rock Canyon Sites

Cultural resources have been well inventoried in the northern end of RRC, especially in Brownstone Canyon, Sandstone Quarry, Lost Creek, Willow Spring, Calico Spring and Ice Box Canyon. Over 326

sites have been inventoried at RRC. These sites include mainly prehistoric lithic scatters, agave roasting pits and middens. Lesser known sites consisting of petroglyphs, pictographs, shelters, ceramics, fire hearths and other man made or altered features have been inventoried. The most common artifacts of the historic period in RRC are related to farming, ranching and mining themes. These cultural resources include roads, building foundations, cut stone blocks, developed water holes/springs, mine shafts and adits, and small trash sites consisting mainly of tin cans and broken glass.

Inventory and study of sites to the south is less comprehensive. However, Bird Spring, which is the first recorded cultural site in Clark County, is located on RRCNCA's southern boundary. In general, the vicinity of any stable water source could include cultural sites.

The Willow Spring and Brownstone Canyon areas represent the most significant archeological values in the northern portion of RRCNCA. Long term prehistoric use of the areas is indicated by the presence of significant numbers of rock shelters, roasting pits and petroglyphs.

Sites within RRCNCA have experienced low to moderate levels of damage. Willow Spring, Brownstone Canyon and Sandstone Quarry have sustained much of the vandalism and disturbance.

Paleontological Resources

Paleontological resources (fossils) are remains or traces of plants and animals that existed during the 600 million year geological history of southern Nevada. Fossils are unique, nonrenewable resources which provide clues to the history of life on earth and, as such, are considered to have scientific value. A minimal amount of paleontological research has been conducted in this region. The majority of fossils recorded in RRC are from the Paleozoic and Mesozoic Eras. The fossil record representing this era includes brachiopods, gastropods, crinoids, corals, sponges and petrified wood.

AIR QUALITY

Air quality is determined by several factors, including landform, the amount of contaminants emitted into the atmosphere, and by meteorological conditions. In southern Nevada, stable atmospheric conditions, low mixing heights, and light winds during night and morning hours provide opportunities for contaminants to accumulate. Atmospheric dispersion of pollutants generally improves by mid-afternoon.

The effects of ambient air quality within an air basin depend mainly on the characteristics of the receptors and the type, amount, and duration of exposure. As defined in 40 CFR 50.1(e), ambient air is "that portion of the atmosphere, external to buildings, to which the general public has access." As required by the Clean Air Act and established by the Environmental Protection Agency, National Ambient Air Quality Standards specify the concentration and duration for which pollutants may cause adverse health effects. National primary ambient air quality standards define levels of air quality, with an adequate margin of safety to protect the public health. National secondary ambient air quality standards define levels of air quality, with an adequate margin of safety, to protect the public welfare from any known or anticipated adverse effects of a pollutant. Where differences in local and national standards exist, the more stringent standards apply. The National Ambient Air Quality Standards, shown in Table 3-1, were adopted by the State of Nevada and Clark County. The National Ambient Air Quality Standards were established for carbon monoxide, nitrogen oxides, ozone, particulate matter, sulfur oxides and lead.

Carbon monoxide is produced primarily by incomplete fuel combustion in motor vehicles. The major effects of Carbon monoxide occur near its sources (busy streets and freeways). The highest Carbon monoxide measurements usually occur in the winter when winds are light and temperature inversions trap air near the ground surface from early evening through mid-morning preventing pollutant dispersal. Traffic peaks in early morning and late afternoon produce corresponding peaks in Carbon monoxide concentrations, a trend which occurs throughout the year. Although the 1-hour standard for Carbon monoxide has never been exceeded, the 8-hour standard is exceeded on a seasonal basis. According to Clark County Comprehensive Planning, the overnight buildup of pollutants causes violations of the Carbon monoxide 8-hour air quality standard in a limited area surrounding the East Charleston monitoring station. Carbon monoxide has a toxic potential to human health. When breathed, Carbon monoxide impairs oxygen transport because of its affinity for hemoglobin. Adverse effects in the cardiovascular system and the central nervous system can result. The magnitude of the health effects increases with the level, as well as, the duration of exposure (Seinfeld, 1986).

The primary contributor of PM₁₀ throughout the Las Vegas District is fugitive dust, both naturally occurring in a desert environment and man caused. It is the man caused sources that are largely responsible for excesses of the PM₁₀ National Ambient Air Quality Standards within the Las Vegas Valley. The major sources of PM₁₀ emissions in the Valley are: paved and unpaved roads, construction activities, industrial/commercial facilities, motor vehicle exhaust, and disturbed vacant land. Particulate matter less than 10 microns in size is of special concern because it is inhaled deep into the lungs. The ultimate effects of particles on human health are difficult to determine however. There is little data available regarding the effects of industrial particulates versus those of soil related dust. Because most health studies have examined only fossil fuel generated particulates, and most of Las Vegas Valley's particulate concentrations are due to soil related dust, it is inappropriate at this time to estimate the health effects induced by particulate matter concentrations in the Valley.

Ozone is produced through a series of chemical reactions. A reaction between reactive hydrocarbons and nitric oxides, both of which are primarily emitted by motor vehicles, forms nitrogen dioxide and other compounds. The formation of nitric oxide and an oxygen atom follows the photodissociation of the nitrogen dioxide by sunlight. The oxygen atom then combines with oxygen molecules to form ozone. Ozone is an irritant of the respiratory system. It inhibits proper functioning of the lungs and can cause symptoms of chest tightness, coughing and wheezing. These symptoms can occur after short-term exposure of between 294 and 490 ug/m³ (Clark County Comprehensive Planning, 1980).

Lead is primarily emitted through the combustion of leaded fuel in motor vehicles. Indications are, however, that lead emissions are on the decline due to reductions in the use of leaded fuel. Once absorbed by the respiratory tract and then into the blood stream, lead is accumulated in the kidneys and liver. The nervous system may also be effected through inhalation of lead in the air (Clark County Comprehensive Planning, 1980).

Nitrogen dioxide forms in the high temperature combustion of fuels, motor vehicle exhaust and the burning of organic wastes. At high concentrations nitrogen dioxide has been shown to cause lung damage. The effects at the current levels both indoors and outdoors are difficult to characterize (Seinfeld, 1986).

Sulfur dioxide forms during the combustion of all sulfur-containing fuels, such as coal and oil. Effects of sulfur dioxide on human health is primarily associated with the upper respiratory system, particularly in asthmatics.

Air pollutants not only have the potential to affect humans but also other components of the environment including, wildlife, fish,

and vegetation. Wildlife can be affected by air pollutants through inhalation, adsorption and/or ingestion. Their populations can be directly affected through injury or death or, indirectly through contamination of their food chain or loss of habitat (U.S.D.I., FWS, 1980).

There are several air pollutants that are known to be harmful to vegetation. These include sulfur dioxide, ethene and peroxyacetyl nitrate. Chlorine, hydrogen chloride, mercury and ammonia are also harmful but to a lesser severity. Pollutants enter the plant via the stomata during normal respiration. Once in the leaf, they destroy chlorophyll and disrupt photosynthesis resulting in damage ranging from growth rate reduction to actual death of the plant (Cooper, 1986).

Visibility is generally referred to as the relative ease with which objects can be seen through the atmosphere under various conditions. Particulate matter and gases introduced into the atmosphere either absorb or scatter the light, thus reducing the amount of light a person can receive from a viewed object. The effect is a degraded aesthetic value of surrounding landscape. The Clean Air Act specifies that pollution be prevented that would interfere with visibility in the mandatory Federal Class I areas. Mandatory Federal Class I areas refers to international parks; national wilderness areas and memorial parks greater than 5,000 acres in size; and national parks greater than 6,000 acres in size. Although there are no Class I areas within the Las Vegas District, there are such areas located downwind. The closest to the planning area is the Grand Canyon National Park in Arizona. Others include Bryce Canyon National Park and Zion National Park both located in the southern most portion of Utah. Currently, no data exists that definitively indicates that southern Nevada, in particular the Las Vegas Valley presents an impact to these parks. The Grand Canyon Visibility Transport Commission, which is managed by the Environmental Protection Agency and the Western Governor's Association, is currently investigating visibility impairing pollutants and their effect on these as well as other parks and wilderness areas of the Colorado Plateau (Shivley, 1995).

According to the Clark County Health District, a haze day is classified as an average reading for one hour or more between 5:00 AM and 11:00 AM when the visual range is less than 12 miles. If the visual range for one hour is less than 4.8 miles, haze is considered to be intense. Late fall and winter, when night and morning inversions are most frequent and stagnant conditions exist, tend to produce the highest haze levels. There are currently two locations in the valley where visibility is measured (metropolitan Las Vegas and Henderson). The greatest number of haze days recorded at these locations for a one year period was 194 and 157, respectively. The greatest number of intense haze days for a one year period was 93 and 30, respectively. The data gathered to date

indicates that there is an improvement in Henderson and a deterioration of visibility in Las Vegas. At this time there is no visibility standard for the rest of Clark County.

Air quality is generally considered acceptable if pollutant levels are less than or equal to established standards on a continuous basis as is the case for those areas lying outside Las Vegas Valley. These areas are characterized by a sparse population and few pollution sources. The Las Vegas Valley, however, presently exceeds standards for inhalable particulate matter (PM₁₀) and carbon monoxide and, consequently, has been termed a non-attainment area (an area which exceeds any national ambient air quality standards). Approximately 173,124 acres or 88% of the RRCNCA is within the Las Vegas Valley Non-Attainment Area.

Although air quality outside the Las Vegas Valley is in conformance with the National Ambient Air Quality Standards, there are several primary sources of pollutant emissions. The largest contributors are the two power generating stations, Reid Gardner Power Plant located in the northeastern part of the planning area at Moapa, Nevada and the Mojave Generating Station located in the far southern part of the planning area at Laughlin, Nevada. According to 1994 data, the Reid Gardner Power Plant emits 2,398 tons of PM₁₀, 8,740 tons of NO_x and 9,652 tons of SO₂ annually. The Mojave Generating Station is the largest pollutant source with 2,505 tons of PM₁₀, 21,704 tons of NO_x and 35,852 tons of SO₂ emitted annually.

FIRE HISTORY SUMMARY, 1980-1997, RRCNCA

Fire occurrence in the Red Rock Canyon NCA is described in terms of cause, frequency and acres. Fire occurrence is summarized both for the NCA as a unit, and for its two constituent fire management zones. These zones consist of woodlands (escarpment/canyons) and mixed grass/shrublands (desert basin) and represent the two major fuel types found in the area. The wildfire history during the years 1980-1997 is summarized for the NCA as follows:

Cumulative Fire Occurrence

Cause	-natural ignition (lightning):	108	(37%)
	-human ignition (all sources):	<u>186</u>	(63%)
Frequency	-total number of fires:	294	
Acres	-natural ignition (lightning):	157	(6%)
	-human ignition (all sources):	<u>2448</u>	(94%)
	-combined acreage burned:	2605	
	-average acreage per fire:	8.9	

Annual Average Fire Occurrence

Cause	-natural ignition:	6
	-human ignition:	<u>11</u>
Frequency	-all causes:	17
Acres	-average acres/year:	153

The patterns of wildfire activity in the two fire management zones vary greatly, as seen in the following:

Cumulative Fire Occurrence

[Woodland]

Frequency	-(number of fires):	69
	-(percentage of NCA total):	23%
Acreage	-(total combined acreage):	146
	-(percentage of NCA total):	6%
	-(average acreage per fire):	2.1

[Shrubland]

Frequency	-(number of fires):	225
	-(percentage of NCA total):	77%
Acreage	-(total combined acreage):	2459
	-(percentage of NCA total):	94%
	-(average acreage per fire):	10.9

As shown, 37% of the fires that occurred within the NCA were natural or lightning caused, which amounted to only 6% of the total acres burned. This can be attributed to the fact that most of the human caused fires occurred in the grass/shrub vegetation type, where the fuels are more continuous, allowing for a more intense burn. The acreage per fire for lightning is low, because many occur in the timber community where a tree of two burn, but the ground fuels are generally too sparse to carry the fire.

The statistics can also be somewhat misleading in that 4 of the human caused fires occurring in the shrub community accounted for 2249 acres (86%).

For more in depth information regarding fire, see Appendix 16.

* Note: a single 1983 fire (1250-acres) constitutes 85% of the NCA's cumulative fire acreage for the years 1980-1992.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

The following sections describe the consequences and impacts, both positive and negative, of implementing the actions, decisions and management direction described in Chapter 2. The discussion is organized by Alternative to allow direct comparison with the Alternative descriptions in Chapter 2. Where an impact assessment is common to all alternatives, a note is added at the end of the discussion listing the Alternatives with the same impact assessment (for example All Alts. or Alts. 1,3,4,5). This will make it easier for the reader to determine the primary differences between the alternative impacts. However, for clarity, the complete text of the impact assessment is included (duplicated) in each Alternative so that the reader does not have to flip back and forth in the document when reviewing a specific alternative.

Alternative 1

Biodiversity

Biodiversity Preservation

Mitigating the impacts, both past and present, of recreational use and facilities on populations and discrete habitat niches would provide positive momentum towards ensuring that the diverse and fragile biodiversity of the NCA is preserved. Improved inventory and understanding of both plant and animal populations in the NCA has provided a greater understanding of biodiversity and human interactions.

Managing recreation use to avoid active raptor nests; limiting access to caves critical as bat maternity colonies; restoring Willow and Red Springs; re-routing trails out of riparian areas; defining a specific trail to Bridge Mt.; closing and rehabilitating trails in the Pine Creek WSA; and directing foot traffic away from the Natural Area in the North fork of Pine Creek are all actions that would reduce human impacts on specific identified species that are easily displaced by human presence or inadvertently impacted by human use because the species, like springsnails, cannot be detected. Species which will directly benefit from the above are the Peregrine falcon, Townsend's Big-eared bat, springsnail, Red Rock Canyon aster, and an assemblage of plants, ferns and amphibians in the North Fork of Pine Creek Canyon. (All Alternatives)

By restoring Willow and Red Springs and reducing human use of the spring brook, the deterioration of springsnail habitat may be halted if not reversed while still allowing recreation uses away

from the critical riparian area and snail habitat. This restoration should not be impacted by the proposed development of these springs for wild horse and burros use if the requirements for limiting diversions to 25% of available waters and a diversion location below the riparian area/spring brook are adhered to. Inventory of additional springs may discover new populations of this rare species. (All Alternatives)

The reconstruction or development of range improvements and the piping of water to new locations at nine (9) springs and the establishment of permanent water haul sites (location unknown at present) could have significant impacts on biodiversity. Piping water away from the springs can improve biodiversity by reducing use at the source. However, it can also have a substantial negative impact(s) by increasing use in areas little used at present. This could cause a shift in vegetative cover and species mix that could cause areas now meeting desired plant community goals to fall below desired species mix targets. Field studies have documented that areas closest to water sources have higher utilization of vegetation and less diversity of species. Establishing new water sources would change the pattern of use of wild horses and burros and bring greater pressure to bear on areas now little utilized. Piping water away from escape habitat may also make the water source unattractive or unavailable to wildlife such as bighorn sheep. Fencing spring sources would reduce the accessibility of the springs to ungulate wildlife such as bighorn sheep and mule deer.

Implementation of the Blue Diamond Cholla Conservation Agreement by BLM, the U.S. Fish and Wildlife Service and the James Hardie Gypsum Corp. would ensure the protection of this species and its only known habitat. Completion of the proposed exchange between BLM and James Hardie would place approximately 98% of the cholla's known habitat within the NCA. (All Alternatives)

Ecosystem Management

Aggressive suppression of fires in low elevation communities, in particular Blackbrush, would reduce the trend toward conversion of native desert to annual grassland caused by fires supported by the invasion of highly flammable fine (grass) fuels. This would protect a key component of the Mojave Desert ecosystem in RRCNCA. (All Alternatives)

The closure of 66.2 miles of dirt roads, primarily in the most heavily used "core" area of the NCA, would reduce habitat fragmentation and impacts of vehicles while leaving the primary and heaviest used routes available.

Continued use of RRCNCA by wild horses and burros would limit the ability of ecosystem management techniques to improve habitat

condition in areas where the desired plant community is less than optimal. It would be difficult to meet desired plant community objectives for re-establishing a grass component in soil types and areas where, while the initial impacts were due to livestock grazing, continued selective grazing by wild horses and burros prevents re-establishment of the grass component. The inability to reduce competition for limited water resources between horses and burros, and native wildlife would continue to limit water available for native populations. The removal of significant amounts of water from riparian areas through pipelines and water troughs at four springs; Lone Grapevine, Mud #1, Tunnel and Bird, would continue and new water development are proposed for Shovel, Willow, White Rock, Red and Wheeler Camp Springs and in Pine Creek. The heavier utilization of forage north of the now fenced off State Route 160, caused by the apparent reluctance of some horses to cross (south) to former grazing areas using the new box culverts under the highway, would continue.

Wild Horses and Burros

Wild horse and burro access to waters would be significantly improved and the impact of wild horses and burros on riparian areas decreased as water sources were moved out of the riparian area(s) in conjunction with riparian area fencing. However, the proposed Red Spring range improvement would likely increase conflicts between burros and humans. Assuming that the pipeline would be developed with water running downhill from the source, the trough would have to be located east (downhill) at either the entrance to the Red Spring picnic area on the Calico Basin Road, in the residential area or east of the residences in the wash next to State Route 159 and the Calico Basin Road. All other options would require water to be pumped uphill.

Providing viewing areas would deal directly with the highway safety and public interest issues. The vehicle pull-offs and designated viewing areas with information signs would reduce vehicle and pedestrian congestion on the highway. This would reduce the potential for vehicular accidents and provide the public positive viewing opportunities. It could serve as another way to inform the public on the importance of wild horses and burros to the development of this country. There would still be the possibility of harm to humans trying to feed the burros or to the burros eating something bad for their digestive system.

Development of additional underpasses accompanied by passive management approaches would reduce future and existing fragmentation of the HMAs. It would reduce the potential for motorist collisions with wild burros and horses while allowing for animal movement in response to the need for territory, forage or water. Highway safety would be improved by reducing the potential for animal and motorist collisions.

Mitigating the impacts of organized recreational use on the existing wild horse and burro trails during foaling period would reduce the stress on mares during that critical time. Animals would not be scared off their trails or out of a foraging or watering areas. The potential for abortions or weak foals would be reduced. While all organized events may not be curtailed during the foaling period, any activity authorized would have to show that conflicts have been analyzed and mitigated. Managing recreational activities to consider the needs of the wild horses and burros in the use of the underpasses/culverts, trails, and water sources, would minimize impacts and provide for multiple use management.

Fencing spring sources would provide riparian water source and vegetation protection from wild horse and burros, equestrian and human impacts. The fences would be designed to blend in with the native community and geology and would minimize the visual impact. With most animal trails leading to the water sources and with the extensive recreational use of the trails, the potential for and occurrence of impacts such as trampling and foraging to the riparian community would be minimized. Providing dependable water outside the fenced area away from the existing water developments or spring sources would insure a viable wild horse and burro herd and a stopover site for equestrian users.

Annual or as needed herd removals in response to habitat or safety conflicts would provide for a herd in balance with the forage, territory and water available in both the HMAs. The herd numbers would be regularly adjusted based on habitat and safety data to prevent large fluctuations in animals numbers that can result in ecosystem degradation from over grazing and poor animal health from insufficient forage and water. By regularly managing the herd numbers, the potential for highway accidents would be reduced. Animals would be able to identify discrete territories and maintain them, reducing intraspecific competition. This would reduce the need for young stud horses to seek new territory, an urge that may compel them to push against highway fences or other boundaries and end up on the highways.

Reconstruction of Tunnel Spring (Wilson Tank) would be necessary as this critical water source south of SR 160 is unreliable (dry in 1998). It is expected that even with reconstruction, periodic water hauls to this site, as was done in both 1991/92 and 1998, would be required. (Alternatives 1, 2, 3 & 4)

Viable populations of both wild horse and burros would remain in the Red Rock HMA.

Riparian, Water, Air and Vegetative Resources

Riparian Restoration

Restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition would improve both water quantity and quality. Improved water availability would contribute to a more diverse riparian habitat, with a restored native plant community, and wildlife population. Positive responses and riparian vegetation recovery are already being seen at springs where actions have been taken in the past - Wheeler Camp, Lone Grapevine, Shovel, Red and Willow Springs. Restoration of spring snail habitat, through an improved riparian area at Red and Willow Springs, may lead to stable, increased snail populations. This may reduce the potential for listing the species as Threatened or Endangered as long as proposed water diversions do not impact the area or water quality required for snail recovery. (All Alternatives)

Current wild horse and burro activity, the primary impact on much of the riparian resource, would be unchanged under this alternative. The use of permanent protective fencing around spring associated riparian areas would be required to assist in their restoration and to protect range developments from damage by trampling.

Riparian areas associated with Willow Spring, Lost Creek, Pine Creek and Oak Creek will continue to be influenced by the heavy recreational use associated with sites around the Scenic Drive. The riparian areas associated with these water sources are expected to improve but at a slower rate than other riparian areas in the NCA. Range improvement projects proposed for Willow Spring and Pine Creek could significantly impact the ability of these areas to recover from the impacts of recreation.

Water Resources

Restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition will improve both water quantity and quality. Water availability would be expected to improve as the water holding capability of these areas increases. Flows would be expected to increase in both volume and duration throughout the year. The filtering ability of a healthy riparian area will assist in improvement of overall water quality. (All Alts.)

The elimination of tamarisk from 15 springs as well as Pine and Oak Creeks would contribute to a reduction in salt loading to surface waters. Tamarisk is a salt concentrator (concentrates salts around its roots). During high intensity thunderstorms these salts are flushed into nearby surface waters. Recent tamarisk removal projects in southern Nevada have also produced increased water quality and quantity through the reduction in water consumption by the water loving tamarisk. (All Alts.)

Use of 12 springs and other surface waters including Pine Creek, Oak Creek, and First Creek by wild horses and burros will continue to result in water quality standards being exceeded for fecal coliform. Although the riparian areas associated with the springs will be fenced to eliminate access to these animals, a portion of the flow emanating from these sources will continue to be vulnerable to contamination and continued non-conformity to water quality standards. Creeks utilized by horses and burros would not be fenced and would therefore continue to see contamination.

Air Quality

Because a large portion of the NCA is located within the Las Vegas Valley Non-Attainment Area, any reduction in particulate emissions (pm10) is considered a positive impact. The primary contributor of particulates from the NCA is a result of dust generated by vehicles utilizing dirt roads and parking areas, and vehicle exhausts. A decrease in the amount of these emissions is expected as a result of the closure of 66.2 miles of dirt roads (112.3 acres) and the paving of 3.87 acres of existing roads and parking areas. Paving 3.87 acres of existing roads and parking areas would have a significant positive impact on reducing particulates because these acres include areas with the highest visitor use in the NCA (Red Spring Picnic Area and the White Rock, Willow Spring and Oak Creek roads).

Construction of the short loop Scenic Drive cut-off road from Sandstone Quarry to the Visitor Center would shorten the round trip distance from 13 to 6 miles. This would reduce mileage driven, and vehicle emissions produced, by every vehicle that uses the short loop by 54% as compared to the current situation which requires each and every vehicle that enters the Scenic Drive to travel its entire 13 mile length (and the two miles between the Scenic Drive entrance and exit) regardless of the desired area of visitation. While it is not possible to calculate the total benefit of this shorter route until traffic counts of the new route's use becomes available, it is known that the heaviest concentration of site specific short-term users is at Calico 1, Calico 2 and Sandstone Quarry. Once their visit's purpose is concluded at these sites, the visitor's primary desire is to exit as quickly as possible. The short loop would also facilitate the establishment of a low cost quick turn-around shuttle bus system from the entrance fee station parking lot and Visitor Center for climbers and hikers using the Calico Hills and Sandstone Quarry areas. This shuttle system could significantly reduce the number of vehicles traveling to these sites.

Vegetation

Closure of 66.2 miles of dirt roads would result in revegetation

of 112.3 acres as native plants colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive and construction of a "short loop" Scenic Drive return road from Sandstone Quarry to the Visitor Center would result in the loss of vegetation on 8.38 acres.

Development or reconstruction of ten (10) range improvements with pipelines moving waters away from spring sources would change the pattern of use by wild horses and burros. Areas now little used by wild horses and burros due to lack of water could see an increase in forage utilization. This may benefit spring and riparian areas that could be utilized less but it is doubtful that horses and burros would stop using existing known water sources and the surrounding habitat entirely.

Based on trend data and field studies, it does not appear that the objectives for desired plant community, particularly the goal of 5% (minimum) basal cover for native grasses, can be achieved over large areas in the vicinity of water sources that are used by wild horses and burros. Conversely, areas distant from water sources more closely approximate the desired plant community objectives, particularly for native grasses (BLM field studies 1999). Trend data from the Mud Spring exclosure (1990-1999) shows that the quantity and quality of grass species can be increased in an ungrazed area. However, the area subject to grazing outside the exclosure remained static and virtually unchanged. Field studies by BLM staff have found that in large areas there is a near total absence of the native grasses that should be found. Years of cattle grazing, not wild horses and burros, probably caused the decline or absence of grass species, but the continued selective grazing of these forage species by wild horses and burros, even at current population levels, is enough to prevent re-establishment of the grass component.

Aggressive fire suppression in Blackbrush communities would help to ensure protection of this habitat type. Blackbrush communities are now highly susceptible to fire damage due to the invasion of light flashy grass fuels which now support and easily carry fire through this formerly low intensity and fire intolerant vegetation type. (All Alternatives)

Recreational Opportunities

Camping

Resource damage associated with overflow and illegal off-site camping due to a lack of current capacity would be reduced if not eliminated. Completion of the 13 Mile Campground will finalize the process of consolidating designated camping use in the NCA. The location of the new campground will allow visitors convenient access to other recreational pursuits in Red Rock Canyon. At the

same time, the location will not impair the scenic quality Red Rock Canyon offers. Closing Oak Creek Campground will remove a negative impact on the aesthetic quality of Red Rock Canyon's primary scenic vicinity. (All Alternatives)

There will be no impact on the maximum stay limit which will remain at 14 days. Dispersed camping would be allowed in the NCA north of La Madre Mt. and the area south and east of the Bird Spring Range (the lands added to the NCA in the 1994 NCA expansion). An added opportunity of allowing limited camping by permit would be possible in the Cottonwood Valley area prior to certain permitted commercial and competitive events.

Prohibiting camping within ½ mile of natural water sources used by wild horses and burros to limit impacts on wild horses and burros would have no impact on camping since no natural water sources used by wild horses and burros are within one mile of any area where camping is allowed.

Rock Climbing (same for All Alternatives)

Coordination between BLM and the climbing community would be enhanced through a Liaison Council. This partnership between climbers, climbing businesses, guides and the BLM would provide for improved communications and understanding of both climbers needs and BLM's management responsibilities, rules and regulations.

Climbing management would be the same as it is currently under the Interim GMP.

Bolting would continue to be allowed except for two restricted areas: Sandstone Quarry, no bolting within 1/4 mile of parking area; and the Wilderness Study Areas.

Commercial climbing school permit numbers would remain the same but minimum use limits would be implemented to ensure that the public is being provided adequate services.

Commercial guiding permits would remain at six (6) long-term multi-year and ten (10) individual visit limited "guest" permits.

Requiring commercial climbing schools to operate at a minimum level of 100 user days per year to retain their permit privileges could cause the permits of two or three companies to be terminated in 2000. These companies, which primarily operate out of state and only use the NCA occasionally, would probably not meet the minimum use requirement for two years in a row and thus be subject to termination. The result of setting minimum use levels is

expected to be increased access to climbing services for the visiting public with an increase of 500 user days per year. The impact of increased user days by commercial permittees would be negligible since use by private climbers, estimated to be in the thousands of user days, far exceeds commercial use.

Limits on commercial group size and areas of use would provide for dispersal of use and reduce congestion at popular climbing locations.

Target Shooting

A designated target shooting area would be established at the mouth of Lucky Strike Canyon two miles west of U.S. Highway 95. This is an area which is presently impacted from dumping and illegal shooting. With the establishment of an authorized shooting location, there would be a reduction of the illegal shooting which occurs in many areas throughout the NCA, and a positive impact to the safety of other users.

Providing a designated target shooting area near the mouth of Lucky Strike Canyon would avoid totally eliminating this historic use from the entire NCA. The proposed site would be easily accessed by residents of lower Kyle Canyon where the impact of new shooting restrictions as a result of expansion of the NCA in 1994 were most significant.

Trail Opportunities

This alternative proposes significant trail opportunities by the designation of more additional trails to the existing trail system than are offered in the other alternatives. However, closure of the Red Valley trail to mountain bike use, to eliminate conflict with wild horses, would be a major change to the Cottonwood Valley Trail system and to mountain bike use in this area. The most popular and challenging loop trail would be eliminated.

A total of 49.1 miles of trail would be added to the existing designated trails network. This includes 44.7 miles of routes which exist, but have not been officially designated, and 4.4 miles of proposed trail which would require new construction.

Four trails in the Scenic Drive vicinity would be designated for multiple use. This would offer 9.2 miles of trails open to mountain bike use in the Scenic Drive vicinity. Although allowing additional opportunities for mountain bike enthusiasts, the Scenic Drive vicinity trails receive heavy hiking use and user conflicts would be inevitable. The four multiple use trails intersect with eight other trails that would not be designated

for mountain bike use. Due to the general difficulty in restricting mountain bikes due to their mobility, this situation would likely produce illegal use of intersecting trails not designated for mountain bike use.

Dispersed equestrian use would continue to be allowed throughout the NCA (horse riding would not be limited to designated trails).

Touring Opportunities

Dirt Roads

While most of the commonly used dirt roads would remain open to use, there would be a reduction of dirt roads available for public use throughout the NCA. Most of the reduction in road miles comes from the closure of unauthorized routes in Wilderness Study Areas and of short dead end two track routes. Of the 159.0 miles of dirt road inventoried in the NCA, 92.8 miles would be designated for public access and 66.2 miles would be closed (some have already been closed under direction of the IGMP). The closures would result in a 42% reduction of access for off-highway vehicle use.

Paved Roads

Overlooks and picnic areas in the Scenic Drive vicinity, and access to these sites would eventually be paved.

New sites to be constructed include 3 new overlooks and expansions on 2 existing sites. This would result in 3.05 acres of new paving.

One new road is proposed which would allow visitors the option of driving the entire 13 mile Scenic Drive or taking a short loop when activities focus on the Calico Hills area. The optional route would be 5.65 miles, with the new construction occurring between Sandstone Quarry and the Visitor Center. This would include 2.65 miles of pavement, although it would not be all new disturbance.

The proposed paving projects will benefit the recreating public by providing approximately 105 additional parking spaces around the Scenic Drive, reducing particulate matter in the air, providing smoother surfaces for highway design vehicles, and offering a shorter loop drive opportunity. The short loop not only benefits those that do not wish to drive, bicycle or jog the entire 13 mile Scenic Drive, but also sightseers that prefer the longer drive and do not want the enjoyment of their experience lessened by being constantly passed and tailgated by others impatient to quit the Scenic Drive.

The new short loop would also allow the Scenic Drive to remain open during flash flood events when many local residents want to use the road to see waterfalls which form on the rocks. Currently if either Sandstone, Red Rock or Pine Creek washes flood the entire Scenic Drive must be shut down for public safety. This new road would allow the first three miles of the Scenic Drive to be open at all times as it avoids all the washes.

For hikers and climbers, the view from higher elevations will include an additional 12.25 acres of paved surfaces dispersed throughout the Scenic Drive vicinity.

Cultural Resources (same for all Alternatives)

Continued emphasis would be placed on protecting cultural resources from damage and loss. Where necessary, existing trails would be re-routed to direct use away from sensitive areas. Where separation of uses is not possible, an increased emphasis on visitor education and interpretation will be used to educate visitors on the need to avoid inadvertently damaging fragile cultural sites.

Continued restriction of vehicle access at Brownstone Canyon will provide long term protection while still allowing for public appreciation and use of these areas.

Enhancing existing volunteer partnerships to provide for improved site monitoring will provide greatly improved information on site conditions and use patterns. Bureau staffing limits have not allowed adequate monitoring to be done in the past.

Signing of rock art sites at climbing locations would be used to reduce the impact of climbing on these resources.

Native American Concerns (same for all Alternatives)

The proposed plan provides for and encourages consultation with Native Americans on issues that may affect Native American values and traditions. As provided for by law, provision has been made for the use of NCA lands and resources for traditional ceremonial purposes. As opportunities arise, Native American partnerships will be developed to enhance and improve cultural exhibits and to provide improved education on Native American issues for NCA visitors.

Visual Resources (same for all Alternatives)

The most significant, and positive, impact to visual resources would be the closure of the Oak Creek Campground and Spanish Trail overflow camping area. Both of these areas are visually evident to the casual observer. Oak Creek interrupts the view of

the escarpment and lower valley floor with tents, vehicles, motor homes and the large silver water trailer. The new camping area cannot be seen from any of the regularly used roads or trails in the NCA.

Visual resources could be degraded with the construction of range improvements (water pipelines), particularly at Shovel, Willow, White Rock, and Red Springs and in Pine Creek. Since site specific environmental analysis has not yet been completed, the level of impact is not yet certain. However, installation of a pipeline will require a lineal trench be dug for the pipe. This would produce a form, line and color not natural in these locations, but similar to that created by road development. If heavy pipe laying equipment is approved for this purpose, a significant visual impact would occur.

Closure of 66.2 miles of dirt roads would result in revegetation and the eventual visual disappearance of dirt tracks on 112.3 acres as native plants colonize these routes. Development or expansion of five parking area/trailheads along the Scenic Drive and construction of a "short loop" Scenic Drive return road from Sandstone Quarry to the Visitor Center would result in visual impacts characteristic of paved surfaces on 12.25 acres. The impact of this paving is mitigated by the fact that 3.87 acres involves paving of existing dirt roads and parking areas. The visual impact of paving these areas will actually be reduced due to 1) the darker color of the paving which will blend with surrounding natural colors better than the bright bare surface of heavily used dirt roads and 2) the elimination of the dust plume that accompanies each vehicle using these dirt roads.

Wilderness Characteristics

Under this alternative, both the La Madre Mountains Wilderness Study Area (WSA) and the Pine Creek WSA will continue to be managed in compliance with the *Interim Management Policy for Lands Under Wilderness Review* (H-8550-1). (All Alternatives)

Naturalness of both the La Madre Mountains and Pine Creek WSAs would see improvement through the restoration of riparian areas associated with 17 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition. The elimination of non-native vegetative species (i.e. tamarisk) along with improvement of vegetative diversity will ensure natural, self maintaining riparian areas. (All Alternatives)

Current wild horse and burro activity, within the Pine Creek WSA, would be unchanged under this alternative. The use of protective fencing around 2 spring associated riparian areas within the Pine Creek WSA would continue, presenting unnatural manmade features into the landscape. (Alternatives 1, 2 &3)

Construction of range improvements to provide off-site waters at Shovel, White Rock and Lone Grapevine Springs would involve lands within both WSAs. These would not be temporary improvements. Impacts to naturalness could occur and would need to be assessed on a site specific basis prior to project approval. Improvements that require motorized access would not be approved.

Rock climbing restrictions that includes no new bolts in WSAs; no alterations of the rock surfaces; no establishment of permanent fixed ropes or cables; and the encouragement of the use of equipment that better blends with the rock face will all contribute to minimizing impacts to naturalness and the WSAs. Although rock climbing activity will be noticeable while climbers are present on the rock faces, during inactive periods, evidence of this activity would be substantially unnoticeable. (All Alts.)

The closure and eventual rehabilitation of 19.3 miles (46.4 acres) of ways within the La Madre Mountains WSA north of La Madre Mountain and in Little Red Rock would halt deterioration of wilderness characteristics caused by expansion of these ways through casual use. Ways which were inventoried in 1979 as short intrusions into lands with wilderness characteristics now form an interconnected system of routes, none of which has been officially approved, which has caused significant and visual localized impacts to naturalness. (All Alternatives)

By not allowing new developments that would diminish wilderness characteristics and limiting facilities in the WSAs to existing hiking trails (re-routing sections of these trails to avoid sensitive riparian areas and plant populations) protection of inventoried wilderness characteristics would be ensured. (All Alternatives)

The development of a target shooting area south of the Lucky Strike road at the existing unauthorized dump/shooting site, although outside the boundary of the La Madre Mountains WSA, will present a degree of noise pollution. This site is immediately next to the WSA boundary and the concentration of target shooting in this one area is expected to produce noise sufficient to detract somewhat from a true wilderness experience.

Alternative 2

Biodiversity

Biodiversity Preservation

Mitigating the impacts, both past and present, of recreational use and facilities on populations and discrete habitat niches would provide positive momentum towards ensuring that the diverse and fragile biodiversity of the NCA is preserved. Improved inventory and understanding of both plant and animal populations in the NCA has provided a greater understanding of biodiversity/human interactions.

Managing recreation use to avoid active raptor nests; limiting access to caves critical as bat maternity colonies; restoring Willow and Red Springs; re-routing trails out of riparian areas; defining a specific trail to Bridge Mt.; closing and rehabilitating trails in the Pine Creek WSA; and directing foot traffic away from the Natural Area in the North fork of Pine Creek are all actions that would reduce human impacts on specific identified species that are easily displaced by human presence or inadvertently impacted by human use because the species, like springsnails, cannot be detected. Species which will directly benefit from the above are the Peregrine falcon, Townsend's Big-eared bat, springsnail, Red Rock Canyon aster, and an assemblage of plants, ferns and amphibians in the North Fork of Pine Creek Canyon. (All Alternatives)

By restoring Willow and Red Springs and reducing human use of the spring brook, the deterioration of springsnail habitat may be halted if not reversed while still allowing recreation uses away from the critical riparian area and snail habitat. Inventory of additional springs may discover new populations of this rare species. (All Alternatives)

Implementation of the Blue Diamond Cholla Conservation Agreement by BLM, the U.S. Fish and Wildlife Service and the James Hardie Gypsum Corp. would ensure the protection of this species and its only known habitat. Completion of the proposed exchange between BLM and James Hardie would place approximately 98% of the cholla's known habitat within the NCA. (All Alternatives)

Ecosystem Management

Aggressive suppression of fires in low elevation communities, in particular Blackbrush, would reduce the trend toward conversion of native desert to annual grassland caused by fires supported by the invasion of highly flammable fine (grass) fuels. This would protect a key component of the Mojave Desert ecosystem in the NCA. (All Alternatives)

The closure of 66.2 miles of dirt roads, primarily in the most heavily used "core" area of the NCA, would reduce habitat fragmentation and impacts of vehicles while leaving the primary and heaviest used routes available.

Continued use of RRCNCA by wild horses and burros would limit the ability of ecosystem management techniques to improve habitat condition in areas where the desired plant community is less than optimal. It would be difficult to meet desired plant community objectives for re-establishing a grass component in soil types and areas where, while the initial impacts were due to livestock grazing, continued selective grazing by wild horses and burros prevents re-establishment of the grass component. The inability to reduce competition for limited water resources between horses and burros, and native wildlife would continue to limit water available for native populations. The removal of significant amounts of water from riparian areas through pipelines and water troughs at four springs; Lone Grapevine, Mud #1, Tunnel and Bird, would continue and new water development are proposed for Shovel, Willow, White Rock, Red and Wheeler Camp Springs and in Pine Creek. The heavier utilization of forage north of the now fenced off State Route 160, caused by the apparent reluctance of some horses to cross (south) to former grazing areas using the new box culverts under the highway, would continue.

Wild Horses and Burros

Wild horses and burros would remain in their current use areas with the possible exception of the burros in Calico Basin. The Calico Basin band of burros would be evaluated to see if their use can be restricted to the HMA as designated in the Las Vegas RMP (10/98). The increasingly more intensive residential growth in Calico Basin and the pending development of all of the Summerlin property would significantly limit the range available to this band. Only just a few years ago this band was known to travel several miles east on private lands to forage. These lands are all now occupied by new subdivisions and unavailable.

Reconstruction of Tunnel Spring (Wilson Tank) would be necessary as this critical water source south of SR 160 is unreliable (dry in 1998). It is expected that even with reconstruction, periodic water hauls to this site, as was done in both 1991/92 and 1998, would be required. (Alternatives 1, 2, 3 & 4)

Viable populations of both wild horse and burros would remain in the Red Rock HMA.

Riparian, Water, Air and Vegetative Resources

Riparian Restoration

Restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition will improve both water quantity and quality. Improved water availability will contribute to a more diverse riparian habitat, with a restored native plant community, and wildlife population. Positive responses and riparian vegetation recovery are already being seen at springs where actions have been taken in the past - Wheeler Camp, Lone Grapevine, Shovel, Red and Willow Springs. Restoration of springsnail habitat through an improved riparian area at Red and Willow Springs may lead to stable, increased snail populations avoiding the potential for listing the species as Threatened or Endangered. (All Alternatives)

Current wild horse and burro activity, the primary impact on much of the riparian resource, would be unchanged. The use of protective fencing around 12 spring associated riparian areas would be required to assist in their protection and/or restoration. No new range developments would be constructed as none have been proposed in prior plans. Projects benefitting riparian resources and associated with wild horses and burros or wildlife could be proposed on an individual basis in the future.

Riparian areas associated with Willow Spring, Lost Creek, Pine Creek and Oak Creek will continue to be influenced by the heavy recreational use associated with sites around the Scenic Drive. The riparian areas associated with these water sources are expected to improve, but at a slower rate than other riparian areas in the NCA.

Water Resources

Restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition will improve both water quantity and quality. Water availability would be expected to improve as the water holding capability of these areas increases. Flows would be expected to increase in both volume and duration throughout the year. The filtering ability of a healthy riparian area will assist in improvement of overall water quality. (All Alts.)

The elimination of tamarisk from 15 springs as well as Pine and Oak Creeks would contribute to a reduction in salt loading to surface waters. Tamarisk is a salt concentrator (concentrates salts around its roots). During high intensity thunderstorms these salts are flushed into nearby surface waters. Recent tamarisk removal projects in southern Nevada have also produced increased water quality and quantity through the reduction in water consumption by the water loving tamarisk. (All Alts.)

Use of 12 springs and other surface waters including Pine Creek,

Oak Creek, and First Creek by wild horses and burros will continue to result in water quality standards being exceeded for fecal coliform. Although the riparian areas associated with the springs will be fenced to eliminate access to by animals, a portion of the flow emanating from these sources will continue to be vulnerable to contamination and continued non-conformity to water quality standards. Creeks utilized by horses and burros would not be fenced and would therefore continue to see contamination.

Air Quality

Because a large portion of the NCA is located within the Las Vegas Valley Non-Attainment Area, any reduction in particulate emissions (pm10) is considered a positive impact. The primary contributor of particulates from the NCA is a result of dust generated by vehicles utilizing dirt roads and parking areas. A decrease in the amount of these emissions is expected as a result of the closure of 66.2 miles of dirt roads (112.3 acres) and the paving of 3.87 acres of existing roads and parking areas. Paving of existing roads and parking areas would substantially reduce particulate matter emissions because these acres include areas with the highest visitor use in the NCA (Red Spring Picnic Area and the White Rock, Willow Spring and Oak Creek roads).

Vegetation

Closure of 66.2 miles of dirt roads would result in revegetation of 112.3 acres as native plants colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive and construction of a "short loop" Scenic Drive return road from Sandstone Quarry to the Visitor Center would result in the loss of vegetation on 1.61 acres.

Based on trend data and field studies, it does not appear that the objectives for desired plant community, particularly the goal of 5% (minimum) basal cover for native grasses, can be achieved over large areas in the vicinity of water sources that are used by wild horses and burros. Conversely, areas distant from water sources more closely approximate the desired plant community objectives, particularly for native grasses (BLM field studies 1999). Trend data from the Mud Spring exclosure (1990-1999) shows that the quantity and quality of grass species can be increased in an ungrazed area. However, the area subject to grazing outside the exclosure remained static and virtually unchanged. Field studies by BLM staff have found that in large areas there is a near total absence of the native grasses that should be found. Years of cattle grazing, not wild horses and burros, probably caused the decline or absence of grass species, but the continued selective grazing of these forage species by wild horses and burros, even at current population levels, is

enough to prevent re-establishment of the grass component.

Aggressive fire suppression in Blackbrush communities would help to ensure protection of this habitat type. Blackbrush communities are now highly susceptible to fire damage due to the invasion of light flashy grass fuels which now support and easily carry fire through this formerly low intensity and fire intolerant vegetation type. (All Alternatives)

Recreational Opportunities

Camping

Resource damage associated with overflow and illegal off-site camping due to a lack of current capacity would be reduced if not eliminated. Completion of the 13 Mile Campground will finalize the process of consolidating designated camping use in the NCA. (All Alternatives)

The new campground, 2.5 miles southeast of Calico Basin, will offer campers improved facilities including 5 group sites (formerly 0 sites) and 59 individual/family sites (a 56% increase) with a final design plan for 10 group and 100 individual sites. Restroom facilities will be vault toilets (as opposed to porta-potties) and each site will have a tent pad, picnic table and barbecue grill provided.

The location of the new campground will allow visitors convenient access to other recreational pursuits in Red Rock Canyon. At the same time, the location will not impair the scenic quality Red Rock Canyon offers. Closing Oak Creek Campground will remove a negative impact on the aesthetic quality of Red Rock Canyons primary scenic vicinity. (All Alternatives)

There would be no impact on the maximum camping stay limit which will remain at 14 days. Dispersed camping would be allowed in the NCA north of La Madre and the area south and east of the Bird Spring Range (the lands added to the NCA in the 1994 NCA expansion).

Rock Climbing (same for All Alternatives)

Coordination between BLM and the climbing community would be enhanced through a Liaison Council. This partnership between climbers, climbing businesses, guides and the BLM would provide for improved communications and understanding of both climbers needs and BLM's management responsibilities, rules and regulations.

Climbing management would be the same as it is currently under the Interim GMP.

Bolting would continue to be allowed but would be restricted in two areas: Sandstone Quarry, no bolting within 1/4 mile of parking area; and the Wilderness Study Areas.

Commercial climbing school permit numbers would remain the same but minimum use limits would be implemented to ensure that the public is being provided adequate services.

Commercial guiding permits would remain at six (6) long-term multi-year and ten (10) individual visit limited "guest" permits.

Requiring commercial climbing schools to operate at a minimum level of 100 user days per year to retain their permit privileges could cause the permits of two or three companies to be terminated in 2000. These companies, which primarily operate out of state and only use the NCA occasionally, would probably not meet the minimum use requirement for two years in a row and thus be subject to termination. The result of setting minimum use levels is expected to be increased access to climbing services for the visiting public with an increase of 500 user days per year. The impact of increased user days by commercial permittees would be negligible since use by private climbers, estimated to be in the thousands of user days, far exceeds commercial use.

Limits on commercial group size and areas of use would provide for dispersal of use and reduce congestion at popular climbing locations.

Target Shooting

No shooting, other than hunting with a valid hunting license and permit, is allowed in the National Conservation Area. There will be no impact or change to the current situation since RRCNCA is closed to target shooting. (Alternatives 2, 3, 4 & 5)

Trail Opportunities

Very little would be offered in the way of new trails for hikers, horse riders and mountain bikers. Three projects are proposed, which include completion of the Escarpment Base Trail, a trail between the north and south Oak Creek access trails, and an access trail to Kraft Rocks and Gateway Canyon. No trails are proposed for formal designation in the expansion areas (north of La Madre and southeast of the Bird Spring Range).

A total of 4.1 miles of trail would be added to the existing designated trails network. The trail between the Oak Creek access trails would involve designating an existing route of 1.7

miles. The other 2 proposals would involve new construction for a total of 2.4 miles.

Three trails in the Scenic Drive vicinity would be designated for multiple use. This would offer 7.2 miles of trails open to mountain bike use in the Scenic Drive vicinity. Although allowing additional opportunities for mountain bike enthusiasts, the Scenic Drive vicinity trails receive heavy hiking use and user conflicts would be inevitable. The three multiple use trails would have six intersect locations with other trails that would not be designated for mountain bike use. Due to the general difficulty in restricting mountain bikes due to their mobility, this situation would likely produce illegal use of intersecting trails not designated for mountain bike use.

Dispersed equestrian use would continue to be allowed throughout the NCA (horse riding would not be limited to designated trails).

Touring Opportunities

Dirt Roads

The dirt roads most commonly used in the NCA would be officially designated as part of the road system available for public use. Road closures include unauthorized roads in the La Madre Wilderness Study Area, roads within the original NCA boundary planned for closure in the Interim General Management Plan (IGMP) and several short dead end two track routes.

There would be a reduction of dirt roads available for public use throughout the NCA. Of the 159.0 miles of dirt road inventoried in the NCA, 92.8 miles would be designated for public access and 66.2 miles would be closed (some have already been closed under direction of the IGMP). The closures would result in a 42% reduction of access for off-highway vehicle use.

Paved Roads

Overlooks and picnic areas in the Scenic Drive vicinity, and access to these sites will eventually be paved.

New sites to be constructed include 1 new overlook and the expansion of 2 existing sites. This would result in 2.06 acres of new paving. The proposed paving projects will benefit the recreating public by providing approximately 75 additional parking spaces around the Scenic Drive, reducing particulate matter in the air, and providing smoother surfaces for highway design vehicles.

For visitors recreating at higher elevations, the viewshed would include an additional 5.48 acres of pavement.

Cultural Resources (same for All Alternatives)

Continued emphasis would be placed on protecting cultural resources from damage and loss. Where necessary, existing trails would be re-routed to direct use away from sensitive areas. Where separation of uses is not possible, an increased emphasis on visitor education and interpretation will be used to educate visitors on the need to avoid inadvertently damaging fragile cultural sites.

Continued restriction of vehicle access at Brownstone Canyon and new limits on vehicle access to the Cottontail site will provide long term protection while still allowing for public appreciation and use of these areas.

Enhancing existing volunteer partnerships to provide for improved site monitoring will provide greatly improved information on site conditions and use patterns. Bureau staffing limits have not allowed adequate monitoring to be done in the past.

Signing of rock art sites at climbing locations would be used to reduce the impact of climbing on these resources.

Native American Concerns (same for All Alternatives)

The proposed plan provides for and encourages consultation with Native Americans on issues that may affect Native American's values and traditions. As provided for by law, provision has been made for the use of NCA lands and resources for traditional ceremonial purposes. As opportunities arise, Native American partnerships will be developed to enhance and improve cultural exhibits and to provide improved education on Native American issues for NCA visitors.

Visual Resources

The most significant and positive impact to visual resources will be the closure of the Oak Creek Campground and Spanish Trail overflow camping area. Both of these areas are visually evident to the casual observer. Oak Creek interrupts the view of the escarpment and lower valley floor with tents, vehicles, motor homes and the large silver water trailer. The new camping area cannot be seen from any of the regularly used roads or trails in the NCA. (All Alternatives)

Closure of 66.2 miles of dirt roads would result in the eventual disappearance of dirt tracks on 112.3 acres as native plants re-colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive would result in the visual impacts of paved surfaces on 5.48 acres. This impact is mitigated because 3.87 acres involves paving of existing dirt

roads and parking areas which would actually reduce visual impacts due to 1) the darker color of the paving which will blend with surrounding natural colors better than the bright bare surface of heavily used dirt roads and 2) the elimination of the dust plume that accompanies each vehicle using these dirt roads.

Wilderness Characteristics

Under this alternative, both the La Madre Mountains Wilderness Study Area (WSA) and the Pine Creek WSA will continue to be managed in compliance with the *Interim Management Policy for Lands Under Wilderness Review* (H-8550-1). (All Alternatives)

Naturalness of both the La Madre Mountains and Pine Creek WSAs would see improvement through the restoration of riparian areas associated with 17 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition. The elimination of non-native vegetative species (i.e. tamarisk) along with improvement of vegetative diversity will ensure natural, self maintaining riparian areas. (All Alternatives)

Current wild horse and burro activity, within the WSAs, would be unchanged under this alternative. The use of protective fencing around 2 spring associated riparian areas within the Pine Creek WSA would continue, presenting unnatural manmade features into the landscape. (Alternatives 1, 2 & 3)

Rock climbing restrictions that includes no new bolts in WSAs; no alterations of the rock surfaces; no establishment of permanent fixed ropes or cables; and the encouragement of the use of equipment that better blends with the rock face will all contribute to minimizing impacts to naturalness and the WSAs. Although rock climbing activity will be noticeable while climbers are present on the rock faces, during inactive periods, evidence of this activity would be substantially unnoticeable. (All Alts)

The closure and eventual rehabilitation of 19.3 miles (46.4 acres) of ways within the La Madre Mountains WSA north of La Madre Mountain and in Little Red Rock would halt deterioration of wilderness characteristics caused by expansion of these ways through casual use. Ways which were inventoried in 1979 as short intrusions into lands with wilderness characteristics now form an interconnected system of routes, none of which has been officially approved, which has caused significant and visual localized impacts to naturalness. (All Alternatives)

By proposing no new development in the WSAs and limiting facilities within the WSAs to existing hiking trails, re-routing sections of these trails to avoid sensitive riparian areas and plant populations, protection of inventoried wilderness characteristics would be ensured. (All Alternatives)

Alternative 3

Biodiversity

Biodiversity Preservation

An ongoing program of population monitoring will provide the data necessary to evaluate biodiversity and to better define the status of individual species and their associations. Mitigating the impacts, both past and present, of recreational use and facilities on populations and discrete habitat niches would provide positive momentum towards ensuring that the diverse and fragile biodiversity of the NCA is preserved. Improved inventory and understanding of both plant and animal populations in the NCA has provided a greater understanding of biodiversity/human interactions.

Managing recreation use to avoid active raptor nests; limiting access to caves critical as bat maternity colonies; restoring Willow and Red Springs; re-routing trails out of riparian areas; defining a specific trail to Bridge Mt.; closing and rehabilitating trails in the Pine Creek WSA; and directing foot traffic away from the Natural Area in the North Fork of Pine Creek are all actions that would reduce human impacts on specific identified species that are easily displaced by human presence or inadvertently impacted by human use because the species, like springsnails, cannot be detected. Species which will directly benefit from the above are the Peregrine falcon, Townsend's Big-eared bat, springsnail, Red Rock Canyon aster, and an assemblage of plants, ferns and amphibians in the North Fork of Pine Creek Canyon. (All Alternatives)

By restoring Willow and Red Springs and reducing human use of the spring brook, the deterioration of springsnail habitat may be halted if not reversed while still allowing recreation uses away from the critical riparian area and snail habitat. Re-introduction of the springsnail at Willow Spring, should continued inventories confirm its disappearance, would provide an improved gene pool, double the number of habitat areas and reduce the risk of species elimination due to a catastrophic event. Inventory of additional springs may discover new populations of this rare species. (All Alternatives)

Implementation of the Blue Diamond Cholla Conservation Agreement by BLM, the U.S. Fish and Wildlife Service and the James Hardie Gypsum Corp. would ensure the protection of this species and its only known habitat. Completion of the proposed exchange between BLM and James Hardie would place approximately 98% of the cholla's known habitat within the NCA. (All Alternatives)

Ecosystem Management

Removing burro use from the Calico Basin area and Pine Creek would eliminate damage to the riparian areas at Red, Calico and Ash Springs while increasing water available to native wildlife and reducing impacts in the meadow in Pine Creek.

The temporary removal of wild horses and burros from the area west of State Route 159 between Spring Mountain Ranch and State Route 160 would allow both riparian areas and vegetation to recover from years of grazing use. Removal of grazing animals should allow the perennial grasses to re-establish their populations in areas now deficient or lacking in this major vegetative mix component. It is quite probable that livestock grazing was the cause of the documented sparse population, and in some cases total lack, of perennial grasses in this area. However, the selective grazing of perennial grasses that do germinate by wild horses and burros, even at their limited population, is sufficient to prevent re-establishment of a grass component in the vegetative mix of this area.

The temporary removal would also allow recovery of the riparian areas at Shovel, Lone Grapevine, and Mud #1 Springs while at the same time allowing less restricted access for wildlife as the enclosure gates could be left open.

Utilization of Bighorn sheep as an umbrella indicator species would not only provide a method of evaluating recreational impacts and habitat pressures but it would unite BLM's efforts with years of data collection and management by the Nevada Division of Wildlife. This historical data will enable trends to be apparent much more readily and enhance inter-agency cooperative efforts. (Alternatives 3, 4 & 5)

Aggressive suppression of fires in low elevation communities, in particular Blackbrush, would reduce the trend toward conversion of native desert to annual grassland caused by fires supported by the invasion of highly flammable fine (grass) fuels. This would protect a key component of the Mojave Desert ecosystem in the NCA. (All Alternatives)

By implementing a prescribed natural fire program in the montane chaparral communities of the escarpment's canyons, the fire ecology of this habitat type would be enhanced. Successful implementation of this program would benefit fire dependent species like the Ponderosa pine while reducing fuel loading which, when allowed to accumulate to unnatural volumes through aggressive fire suppression, actually increases the level of damage when a fire does occur. High intensity fire threatens the existence of other (often fire tolerant) species, like the Ponderosa pine. While Pine Creek still supports a healthy stand

of Ponderosa pine, most of the other canyons have been burned out and stumps are the only evidence Ponderosa pine once grew there. Because of the narrow restricted nature of the escarpment's canyons, it is unlikely that the prescribed burns would exceed 5 acres each and a total of 50 acres over the next ten years. Natural fires exceeding this size by hundreds or thousands of acres have occurred numerous times in the NCA without lasting impact. (Alternatives 3, 4 & 5)

The use of fire to re-establish a mosaic pattern and provide openings within the pinyon-juniper uplands, which dominate the higher elevations in the NCA, would provide greater habitat diversity and forage values. Aggressive fire suppression in the past has created a homogeneous monotypic forest canopy where past natural disturbance through fire once created pockets of uneven aged forest. Based on past fire histories an average of two fires per year at an average size of two to five acres could be expected. (Alternatives 3, 4 & 5)

The closure of 92.9 miles of dirt roads would provide the greatest reduction of vehicle travel in the NCA of any of the alternatives and reduce habitat fragmentation throughout the NCA. This would also reduce the potential for road kills of reptiles, lizards and snakes.

Wild Horses and Burros

Wild horses and burros would remain within both the Red Rock Canyon National Conservation Area (RRCNCA) and the Red Rock Herd Management Area (HMA) within a reduced HMA. The long term impact of this alternative would be the removal of burros between Calico Basin and Spring Mountain Ranch. A short term impact would be the removal of all wild horses and burros in the area between Spring Mountain Ranch and State Route 160. These animals could eventually be returned to this area when desired plant community objectives have been attained.

Visitors would still be able to view wild horses and burros. However, burro viewing along State Route 159 would not be as easy since there would be fewer animals in this area and, at least for the short term, they would be restricted to the east side of the highway. The animals now most easily observed are those that live on the west side of the highway and spend considerable time on the highway itself begging for handouts.

Two areas would be deleted from the HMA (Las Vegas RMP (10/98)); 1) on the east side of State Route 159, the area north of Cave Canyon; and 2) on the west side of State Route 159, the area from Calico Basin south to Spring Mountain Ranch State Park. The first area is becoming increasingly restricted as it is confined by State Route 159 on the west and the Summerlin developments on

the east and includes the location of the new 13 Mile Campground while the second area includes the Calico Basin residential area, a portion of State Route 159, the heavily used Visitor Center complex and the cliffs and canyons of the RRCNCA escarpment.

The area of the HMA which burros currently may occupy, and historically have used, would be reduced by 20%. Approximately 10 burros that use Calico Basin and nearby lands would be permanently removed and placed in the BLM's adoption program. Most of the Calico Basin band's range is outside the HMA near the Calico Basin residential area and the west boundary of Summerlin. The eventual fencing off of all of private lands in Calico Basin as residential use intensifies and the fencing of State Route 159 to prevent unauthorized off-highway vehicle use, will limit access to waters and force this band into the canyon and cliff areas of western Calico Basin and Gateway Canyon. This area is predominately gravel wash and bare sandstone and would not have the vegetative resources and available waters necessary to support a healthy band. Short term reductions in burros south of Spring Mountain Ranch would occur.

For the short term, wild horses would be removed from the area between Spring Mountain Ranch and State Route 160. If these animals cannot be accommodated in the area south of State Route 160, they would be removed and placed in the adoption program. This could reduce the wild horse herd from its current estimated population of 71 to approximately 56. The viability of the remaining herd would not be impacted. In the long term, following vegetative recovery of perennial grasses, wild horses could be re-introduced north of State Route 160 in the area south of Spring Mountain Ranch State Park. This would reduce the area of the HMA in which wild horses currently may occupy by 34%, but would have no real impact on the number of horses, as they rarely utilize any areas north of Bonnie Springs.

Reintroducing wild horse and burro use in the area between State Route 160 and Spring Mountain Ranch State Park would require the continued fencing and maintenance of spring sources (Mud, Lone Grapevine, Shovel). Field studies have documented significant negative impacts on these springs due to horse use. The springs have shown immediate and visible recovery following fencing.

Reconstruction of Tunnel Spring (Wilson Tank) would be necessary as this critical water source south of SR 160 is unreliable (dry in 1998). It is expected that even with reconstruction, periodic water hauls to this site, as was done in both 1991/92 and 1998, would be required. (Alternatives 1, 2, 3 & 4)

Viable populations of both wild horse and burros would remain in the HMA.

Riparian, Water, Air and Vegetative Resources

Riparian Restoration

Restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition will improve both water quantity and quality. Improved water availability will contribute to a more diverse riparian habitat, with a restored native plant community, and wildlife population. Positive responses and riparian vegetation recovery are already being seen at springs where actions have been taken in the past - Wheeler Camp, Lone Grapevine, Shovel, Red and Willow Springs. Restoration of springsnail habitat, through an improved riparian area at Red and Willow Springs, may lead to stable, increased snail populations, avoiding the potential for listing the species as Threatened or Endangered. (All Alternatives)

The continued use of permanent protective fencing around Shovel, Lone Grapevine and Mud # 1 Springs would be required to assist in ensuring their restoration and to protect range improvements from damage by trampling. (Alternatives 1, 2, & 3)

Riparian areas associated with Willow Spring, Lost Creek, Pine Creek and Oak Creek, which currently receive heavy recreational use, would be evaluated to determine rehabilitation measures which might be taken to minimize human impacts. An effort would be made to deflect recreational use to non-riparian areas through trail rerouting, closure of damaged areas to use and promotion of alternative use sites. Closing and camouflaging numerous side and spur trails would reduce surface disturbance, erosion and vegetation loss. The riparian areas associated with these water sources are expected to improve, but at a slower rate than other riparian areas in the NCA. (Alternatives 3, 4 & 5)

Water Resources

Restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition will improve both water quantity and quality. Water availability would be expected to improve as the water holding capability of these areas increases. Flows would be expected to increase in both volume and duration throughout the year. The filtering ability of a healthy riparian area will assist in improvement of overall water quality. (All Alts.)

The elimination of tamarisk from 15 springs, as well as Pine and Oak Creeks, will contribute to a reduction in salt loading to surface waters. Tamarisk is a salt concentrator (concentrates salts around its roots). During high intensity thunderstorms, these salts are flushed into nearby surface waters. Recent

tamarisk removal projects in southern Nevada have also produced increased water quality and quantity through the reduction in water consumption by the water loving tamarisk. (All Alts.)

Long term use of 9 springs by wild horses and burros will continue to result in water quality standards being exceeded for fecal coliform. Although the riparian areas associated with the springs will be fenced to eliminate access to these animals, a portion of the flow emanating from these sources will continue to be vulnerable to contamination and continued non-conformity to water quality standards.

Air Quality

Because a large portion of the NCA is located within the Las Vegas Valley Non-Attainment Area, any reduction in particulate emissions (pm10) is considered a positive impact. The primary contributor of particulates from the NCA is a result of dust generated by vehicles utilizing dirt roads and parking areas, and vehicle exhausts. A decrease in the amount of these emissions is expected as a result of the closure of 88.4 miles of dirt roads (165.9 acres) and the paving of 3.87 acres of existing roads and parking areas. Paving of existing roads and parking areas would substantially reduce particulate emissions because these acres include areas with the highest visitor use in the NCA (Red Spring Picnic Area and the White Rock, Willow Spring and Oak Creek roads).

Construction of the short loop Scenic Drive cut-off road from Sandstone Quarry to the Visitor Center would shorten the round trip distance from 15 to 6 miles. This would reduce mileage driven, and vehicle emissions produced, by every vehicle that uses the short loop by 60% as compared to the current situation which requires each and every vehicle that enters the Scenic Drive to travel its entire 13 mile length (and the two miles between the Scenic Drive entrance and exit) regardless of the desired area of visitation. While it is not possible to calculate the total benefit of this shorter route until traffic counts of the new route's use becomes available, it is known that the heaviest concentration of site specific short-term users is at Calico 1, Calico 2 and Sandstone Quarry. Once their visit's purpose is concluded at these sites, the visitor's primary desire is to exit as quickly as possible. The short loop would also facilitate the establishment of a low cost quick turn-around shuttle bus system from the entrance fee station parking lot and Visitor Center for climbers and hikers using the Calico Hills and Sandstone Quarry areas. This shuttle system could significantly reduce the number of vehicles traveling to these sites.

Vegetation

Closure of 88.4 miles of dirt roads would result in revegetation of 165.9 acres as native plants colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive and construction of a "short loop" Scenic Drive return road from Sandstone Quarry to the Visitor Center would result in the loss of vegetation on 7.39 acres.

Based on trend data and field studies, it does not appear that the objectives for desired plant community, particularly the goal of 5% (minimum) basal cover for native grasses, can be achieved over large areas in the vicinity of water sources that are used by wild horses and burros. Conversely, areas distant from water sources more closely approximate the desired plant community objectives, particularly for native grasses (BLM field studies 1999). Trend data from the Mud Spring exclosure (1990-1999) shows that the quantity and quality of grass species can be increased in an ungrazed area. However, the area subject to grazing outside the exclosure remained static and virtually unchanged. Field studies by BLM staff have found that in large areas there is a near total absence of the native grasses that should be found. Years of cattle grazing, not wild horses and burros, probably caused the decline or absence of grass species, but the continued selective grazing of these forage species by wild horses and burros, even at current population levels, is enough to prevent re-establishment of the grass component.

Aggressive fire suppression in Blackbrush communities would help to ensure protection of this habitat type. Blackbrush communities are now highly susceptible to fire damage due to the invasion of light flashy grass fuels which now support and easily carry fire through this formerly low intensity and fire intolerant vegetation type. (All Alternatives)

Development of a prescribed fire program in the montane chaparral communities of the escarpment canyons would restore the health of these habitats and reintroduce a natural element of the landscape. Fire use would reduce the accumulation of fuels resulting from previous aggressive suppression of all fires, which has been shown to lead to devastating fires that damage or eliminate even those species which normally would thrive on periodic disturbance caused by fire.

Recreational Opportunities

Camping

Resource damage associated with overflow and illegal off-site camping due to a lack of current capacity would be reduced if not eliminated. Completion of the 13 Mile Campground will finalize the process of consolidating designated camping use in the NCA. (All Alternatives)

The new campground, 2.5 miles southeast of Calico Basin, offers campers improved facilities including 5 group sites (presently 0 sites) and 59 individual/family sites (a 56% increase) with a final design capacity of 10 group and 100 individual sites. Restroom facilities will be vault toilets (as opposed to porta-potties) and each site will have a tent pad, picnic table and barbecue grill provided.

The location of the new campground will allow visitors convenient access to other recreational pursuits in Red Rock Canyon. At the same time, the location will not impair the scenic quality Red Rock Canyon offers. Closing Oak Creek Campground has removed a negative impact on the aesthetic quality of Red Rock Canyon's primary scenic vicinity. (All Alternatives)

There will be no impact on the maximum camping stay limit which would remain 14 days. There will be an impact on dispersed camping. Where camping presently is not restricted in the NCA north of La Madre and south and east of the Bird Spring Range (the lands added to the NCA in the 1994 NCA expansion), certain restrictions will be imposed. Dispersed camping north of La Madre will be limited to existing disturbed sites. If monitoring shows an increase in disturbance, camping will be limited to designated disturbed sites. In the area south and east of the Bird Spring Range, camping will be limited to existing disturbed sites within 200 feet of designated roads.

Rock Climbing (same for All Alternatives)

Coordination between BLM and the climbing community would be enhanced through a Liaison Council. This partnership between climbers, climbing businesses, guides and the BLM would provide for improved communications and understanding of both climbers needs and BLM's management responsibilities, rules and regulations.

Climbing management would be the same as it is currently under the Interim GMP.

Bolting would continue to be allowed except for two restricted areas: Sandstone Quarry, no bolting within 1/4

mile of parking area; and the Wilderness Study Areas.

Commercial climbing school permit numbers would remain the same but minimum use limits would be implemented to ensure that the public is being provided adequate services.

Commercial guiding permits would remain at six (6) long-term multi-year and ten (10) individual visit limited "guest" permits.

Requiring commercial climbing schools to operate at a minimum level of 100 user days per year to retain their permit privileges could cause the permits of two or three companies to be terminated in 2000. These companies, which primarily operate out of state and only use the NCA occasionally, would probably not meet the minimum use requirement for two years in a row and thus be subject to termination. The result of setting minimum use levels is expected to be increased access to climbing services for the visiting public with an increase of 500 user days per year. The impact of increased user days by commercial permittees would be negligible since use by private climbers, estimated to be in the thousands of user days, far exceeds commercial use.

Limits on commercial group size and areas of use would provide for dispersal of use and reduce congestion at popular climbing locations.

Target Shooting

No shooting, other than hunting with a valid hunting license and permit, is allowed in the National Conservation Area. There will be no impact or change to the current situation since RRCNCA is closed to target shooting. (Alternatives 2, 3, 4 & 5)

Trail Opportunities

Trail opportunities for hikers, horse riders and mountain bikers would all be enhanced with the addition of 43.3 miles of trail designated and added to the existing trails network. 38.9 miles are existing routes which have not been formally designated, and 4.4 miles do not exist at this time and would require new construction.

Mountain bike use in the Scenic Drive vicinity would be limited to the trail between Willow Spring and the Visitor Center. The Oak Creek trails would no longer be designated for mountain bike use. This will be a reduction of 3.5 miles of trail for mountain bike enthusiasts. It will have a positive affect on other trail users by eliminating potential user conflicts where hiking use is

very heavy. Use of the Willow to Visitor Center trail will have minor impact on other users as the trail location is very open with no sudden turns and visitor use is low.

Mountain bike use is enhanced in other locations with the designation of trails north of Kyle Canyon Road and southeast of the Bird Spring Range.

Equestrian opportunities within the core of the NCA (Calico Hills south to First Creek) are reduced by limiting use to designated trails. No dispersed (off trail) use would be allowed.

Touring Opportunities

Dirt Roads

There would be a reduction of dirt roads available for public use throughout the NCA. While the most commonly used routes would remain open, of the 159.0 miles of dirt road inventoried in the NCA, 73.8 miles would be designated for public access and 85.2 miles would be closed (some have already been closed under direction of the IGMP). The above closures would result in a 54% reduction of access for the off-highway vehicle (OHV) community.

Paved Roads

Overlooks and picnic areas in the Scenic Drive vicinity, and access to these sites will eventually be paved.

New sites to be constructed include 1 new overlook and the expansion of 2 existing sites. This would result in 2.06 acres of new paving.

One new road is proposed, which would allow visitors the option of driving the entire 13 mile Scenic Drive or taking a short loop when activities focus on the Calico Hills area. The optional route would be 5.65 miles, with the new construction occurring between Sandstone Quarry and the Visitor Center. This would include 2.65 miles of pavement, although it would not be all new disturbance.

The proposed paving projects will benefit the recreating public by providing approximately 75 additional parking spaces around the Scenic Drive, reducing particulate matter in the air, providing smoother surfaces for highway design vehicles, and offering a shorter loop drive opportunity. The short loop not only benefits those that do not wish to drive, bicycle or jog the entire 13 mile Scenic Drive, but also sightseers that prefer the longer drive and do not want the enjoyment of their experience lessened by being constantly passed and tailgated by others impatient to quit the Scenic Drive.

The new short loop would also allow the Scenic Drive to remain open during flash flood events when many local residents want to use the road to see waterfalls which form on the rocks. Currently if either Sandstone, Red Rock or Pine Creek washes flood the entire Scenic Drive must be shut down for public safety. This new road would allow the first three miles of the Scenic Drive to be open at all times as it avoids all the washes.

For hikers and climbers, the view from higher elevations will include an additional 111.26 acres of paved surfaces dispersed throughout the Scenic Drive vicinity.

Cultural Resources (same for All Alternatives)

Continued emphasis would be placed on protecting cultural resources from damage and loss. Where necessary, existing trails would be re-routed to direct use away from sensitive areas. Where separation of uses is not possible, an increased emphasis on visitor education and interpretation will be used to educate visitors on the need to avoid inadvertently damaging fragile cultural sites.

Continued restriction of vehicle access at Brownstone Canyon and new limits on vehicle access to the Cottontail site will provide long term protection while still allowing for public appreciation and use of these areas.

Enhancing existing volunteer partnerships to provide for improved site monitoring will provide greatly improved information on site conditions and use patterns. Bureau staffing limits have not allowed adequate monitoring to be done in the past.

Signing of rock art sites at climbing locations would be used to reduce the impact of climbing on these resources.

Native American Concerns (same for All Alternatives)

The proposed plan provides for and encourages consultation with Native Americans on issues that may affect Native American values and traditions. As provided for by law, provision has been made for the use of NCA lands and resources for traditional ceremonial purposes. As opportunities arise, Native American partnerships will be developed to enhance and improve cultural exhibits and to provide improved education on Native American issues for NCA visitors.

Visual Resources

The most significant, and positive, impact to visual resources will be the closure of the Oak Creek Campground and Spanish Trail overflow camping area. Both of these areas are visually evident

to the casual observer. Oak Creek interrupts the view of the escarpment and lower valley floor with tents, vehicles, motor homes and the large silver water trailer. The new camping area cannot be seen from any of the regularly used roads or trails in the NCA. (All Alternatives)

Closure of 88.4 miles of dirt roads would result in revegetation and the eventual visual disappearance of dirt tracks on 165.9 acres as native plants colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive and construction of a "short loop" Scenic Drive return road from Sandstone Quarry to the Visitor Center would result in visual impacts characteristic of paved surfaces on 11.26 acres. The impact of this paving is mitigated by the fact that 3.87 acres involves paving of existing dirt roads and parking areas. The visual impact of paving these areas will actually be reduced due to 1) the darker color of the paving which will blend with surrounding natural colors better than the bright bare surface of heavily used dirt roads and 2) the elimination of the dust plume that accompanies each vehicle using these dirt roads.

Wilderness Characteristics

Under this alternative, both the La Madre Mountains Wilderness Study Area (WSA) and the Pine Creek WSA will continue to be managed in compliance with the *Interim Management Policy for Lands Under Wilderness Review* (H-8550-1). (All Alternatives)

Naturalness of both the La Madre Mountains and Pine Creek WSAs would see improvement through the restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition. The elimination of non-native vegetative species (i.e. tamarisk) along with improvement of vegetative diversity will ensure natural, self maintaining riparian areas.

Wild horses and burros would continue to utilize 2 springs in the Pine Creek WSA. This would necessitate the continued use of protective fencing around the riparian areas associated with these springs. The presentation of unnatural manmade features into the landscape would continue. (Alternatives 1, 2 & 3)

Rock climbing restrictions that includes no new bolts in WSAs; no alterations of the rock surfaces; no establishment of permanent fixed ropes or cables; and the encouragement of the use of equipment that better blends with the rock face will all contribute to minimizing impacts to naturalness and the WSAs. Although rock climbing activity will be noticeable while climbers are present on the rock faces, during inactive periods evidence of this activity would be substantially unnoticeable. (All Alts)

The closure and eventual rehabilitation of 19.3 miles (46.4 acres) of ways within the La Madre Mountains WSA north of La Madre Mountain and in Little Red Rock would halt deterioration of wilderness characteristics caused by expansion of these ways through casual use. Ways which were inventoried in 1979 as short intrusions into lands with wilderness characteristics now form an interconnected system of routes, none of which has been officially approved, which has caused significant and visual localized impacts to naturalness. (All Alternatives)

By proposing no new development in the WSAs and limiting facilities within the WSAs to existing hiking trails, re-routing sections of these trails to avoid sensitive riparian areas and plant populations, protection of inventoried wilderness characteristics would be ensured. (All Alternatives)

Alternative 4

Biodiversity

Biodiversity Preservation

An ongoing program of population monitoring will provide the data necessary to evaluate biodiversity and to better define the status of individual species and their associations. Mitigating the impacts, both past and present, of recreational use and facilities on populations and discrete habitat niches would provide positive momentum towards ensuring that the diverse and fragile biodiversity of the NCA is preserved. Improved inventory and understanding of both plant and animal populations in the NCA has provided a greater understanding of biodiversity/human interactions.

Managing recreation use to avoid active raptor nests; limiting access to caves critical as bat maternity colonies; restoring Willow and Red Springs; re-routing trails out of riparian areas; defining a specific trail to Bridge Mt.; closing and rehabilitating trails in the Pine Creek WSA; and directing foot traffic away from the Natural Area in the North fork of Pine Creek are all actions that would reduce human impacts on specific identified species that are easily displaced by human presence or inadvertently impacted by human use because the species, like springsnails, cannot be detected. Species which will directly benefit from the above are the Peregrine falcon, Townsend's Big-eared bat, springsnail, Red Rock Canyon aster, and an assemblage of plants, ferns and amphibians in the North Fork of Pine Creek Canyon. (All Alternatives)

By restoring Willow and Red Springs and reducing human use of the spring brook, the deterioration of springsnail habitat may be halted if not reversed while still allowing recreation uses away from the critical riparian area and snail habitat. Re-introduction of the springsnail at Willow Spring, should continued inventories confirm its disappearance, would provide an improved gene pool, double the number of habitat areas and reduce the risk of species elimination due to a catastrophic event. Inventory of additional springs may discover new populations of this rare species. (All Alternatives)

Implementation of the Blue Diamond Cholla Conservation Agreement by BLM, the U.S. Fish and Wildlife Service and the James Hardie Gypsum Corp. would ensure the protection of this species and its only known habitat. Completion of the proposed exchange between BLM and James Hardie would place approximately 98% of the cholla's known habitat within the NCA. (All Alternatives)

Ecosystem Management

Elimination of wild horses and burros north of State Route 160 would have a positive impact on improving the ecosystem integrity of this portion of the NCA. Most important would be; 1) the elimination of competition for limited water resources between horses and burros and native wildlife; 2) the elimination of the need for range improvements or fencing at Shovel, Lone Grapevine and Mud Spring # 1; and 3) the reduction in grazing pressure on native grasses. The removal of significant amounts of water from riparian areas through pipelines and water troughs at Lone Grapevine and Mud #1 springs could be eliminated resulting in restoration of historic riparian environments. The chance for achieving success in the objective of increasing, or restoring, a grass component to the desired plant community would be greatly enhanced. The heavy utilization of forage north of the now fenced off State Route 160, caused by the apparent reluctance of horses to cross (south) to former grazing areas using the new box culverts under the highway, would be eliminated.

Utilization of Bighorn sheep as an umbrella indicator species would not only provide a method of evaluating recreational impacts and habitat pressures but it would unite BLM's efforts with years of data collection and management by the Nevada Division of Wildlife. This historical data will enable trends to be apparent much more readily and enhance inter-agency cooperative efforts. (Alternatives 3, 4 & 5)

Aggressive suppression of fires in low elevation communities, in particular Blackbrush, would reduce the trend toward conversion of native desert to annual grassland caused by fires supported by the invasion of highly flammable fine (grass) fuels. This would protect a key component of the Mojave Desert ecosystem in the NCA. (All Alternatives)

By implementing a prescribed natural fire program in the montane chaparral communities of the escarpment's canyons, the fire ecology of this habitat type would be enhance. Successful implementation of this program would benefit fire dependent species like the Ponderosa pine while reducing fuel loading which, when allowed to accumulate to unnatural volumes through aggressive fire suppression, actually increases the level of damage when a fire does occur and threatens the existence of other (often fire tolerant) species, like the Ponderosa pine. While Pine Creek still supports a healthy stand of Ponderosa pine, most of the other canyons have been burned out and stumps are the only evidence Ponderosa pine once grew there. Because of the narrow restricted nature of the escarpment's canyons, it is unlikely that the prescribed burns would exceed 5 acres each and a total of 50 acres over the next ten years. Natural fires exceeding this size by hundreds or thousands of acres have occurred numerous times in the NCA without lasting impact. (Alternatives 3, 4 & 5)

The use of fire to re-establish a mosaic pattern and provide openings within the pinyon-juniper uplands, which dominate the higher elevations in the NCA, would provide greater habitat diversity and forage values. Aggressive fire suppression in the past has created a homogeneous monotypic forest canopy where past natural disturbance through fire once created pockets of uneven aged forest. Based on past fire histories, an average of two fires per year at an average size of two to five acres could be expected. (Alternatives 3, 4 & 5)

The closure of 92.9 miles of dirt roads would provide the greatest reduction of vehicle travel in the NCA of any of the alternatives and reduce habitat fragmentation throughout the NCA.

Wild Horses and Burros

The HMA would be reduced in size and wild horse and burro use would be limited to the area south of State Route 160. This alternative would reduce the area of the HMA in which wild horses and burros are managed by approximately 44%. However, much of the reduction consists of cliff and canyon areas not used by wild horses and burros because they are too steep and inaccessible. While a Herd Management Plan would need to be prepared for a complete analysis of water and forage availability, it is possible that this alternative would result in complete removal of all burros in order to provide adequate water and forage to sustain a wild horse herd of approximately 60-75 animals.

Implementation of this alternative would allow for the removal of fencing at Mud, Lone Grapevine and Shovel springs. These springs were fenced to eliminate horse use at the water source, due to documented damage to the riparian area. (Alternatives 4 & 5)

Reconstruction of Tunnel Spring (Wilson Tank) would be necessary as this critical water source south of State Route 160 is unreliable (dry in 1998). However, even with reconstruction, periodic water hauls to this site, as was done in both 1991/92 and 1998, would probably be required. (Alternatives 1, 2, 3 & 4)

A viable population of wild horses would remain in the HMA.

Restricting wild horses and burros to the area south of State Route 160 would make the opportunity for viewing these animals, a popular visitor (and tour bus) activity, more difficult. Visitors would have to travel to the Cottonwood Valley area off State Route 160 to view animals. At the same time, it would improve visitor safety and prevent an average of four animal deaths per year by eliminating animal-vehicle accidents and by eliminating the traffic jams which occur regularly on State Route 159 due to visitors stopping to photograph and (illegally) feed burros.

Riparian, Water, Air and Vegetative Resources

Riparian Restoration

Restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition will improve both water quantity and quality. Improved water availability will contribute to a more diverse riparian habitat, with a restored native plant community, and wildlife population. Positive responses and riparian vegetation recovery are already being seen at springs where actions have been taken in the past - Wheeler Camp, Lone Grapevine, Shovel, Red and Willow Springs. Restoration of springsnail habitat through an improved riparian area at Red and Willow Springs, may lead to stable, increased snail populations, avoiding the potential for listing the species as Threatened or Endangered. (All Alternatives)

The removal of all wild horses and burros north of State Route 160 will eliminate the need for protective fencing around riparian areas associated with 3 springs currently utilized by these animals. Fences would be removed and these riparian areas would continue to improve without the need for manmade protective measures. (Alternatives 4 & 5)

Riparian areas associated with Willow Spring, Lost Creek, Pine Creek and Oak Creek which currently receive heavy recreational use would be evaluated to determine rehabilitation measures which might be taken to minimize human impacts. An effort would be made to deflect recreational use to non-riparian areas through trail rerouting, closure of damaged areas to use and promotion of alternative use sites. Closing and camouflaging numerous side and spur trails would reduce surface disturbance, erosion and vegetation loss. The riparian areas associated with these water sources are expected to improve, but at a slower rate than other riparian areas in the NCA. (Alternatives 3, 4 & 5)

Water Resources

Restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition will improve both water quantity and quality. Water availability would be expected to improve as the water holding capability of these areas increases. Flows would be expected to increase in both volume and duration throughout the year. The filtering ability of a healthy riparian area will assist in improvement of overall water quality. (All Alts.)

The elimination of tamarisk from 15 springs, as well as Pine and Oak Creeks, would contribute to a reduction in salt loading to surface waters. Tamarisk is a salt concentrator (concentrates

salts around its roots). During high intensity thunderstorms, these salts are flushed into nearby surface waters. Recent tamarisk removal projects in southern Nevada have also produced increased water quality and quantity through the reduction in water consumption by the water loving tamarisk. (All Alts.)

Reconstruction of Bird and Tunnel Springs would provide more dependable waters for wildlife (and wild horses and burros). These two springs are the only water sources in the NCA south of State Route 160, and provide critical wildlife waters. Competition between wildlife (bighorn sheep) and wild horses and burros for this limited water source would continue.

Air Quality

Because a large portion of the NCA is located within the Las Vegas Valley Non-Attainment Area, any reduction in particulate emissions (pm10) is considered a positive impact. The primary contributor of particulates from the NCA is a result of dust generated by vehicles utilizing dirt roads and parking areas. A decrease in the amount of these emissions is expected as a result of the closure of 92.9 miles of dirt roads (177.1 acres) and the paving of 3.87 acres of existing roads and parking areas. Paving of existing roads and parking areas would substantially reduce particulate emissions because these are areas with the highest visitor use in the NCA (Red Spring Picnic Area and the White Rock, Willow Spring and Oak Creek roads).

Vegetation

Closure of 92.9 miles of dirt roads would result in revegetation of 177.1 acres as native plants colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive and construction of a "short loop" Scenic Drive return road from Sandstone Quarry to the Visitor Center would result in the loss of vegetation on 1.61 acres.

Based on trend data and field studies, it does not appear that the objectives for desired plant community, particularly the goal of 5% (minimum) basal cover for native grasses, can be achieved over large areas in the vicinity of water sources that are used by wild horses and burros. Conversely, areas distant from water sources more closely approximate the desired plant community objectives, particularly for native grasses (BLM field studies 1999). Trend data from the Mud Spring exclosure (1990-1999) shows that the quantity and quality of grass species can be increased in an ungrazed area. However, the area subject to grazing outside the exclosure remained static and virtually unchanged. Field studies by BLM staff have found that in large areas there is a near total absence of the native grasses that should be found. Years of cattle grazing, not wild horses and

burros, probably caused the decline or absence of grass species, but the continued selective grazing of these forage species by wild horses and burros, even at current population levels, is enough to prevent re-establishment of the grass component.

Aggressive fire suppression in Blackbrush communities would help to ensure protection of this habitat type. Blackbrush communities are now highly susceptible to fire damage, due to the invasion of light flashy grass fuels, which now support and easily carry fire through this formerly low intensity and fire intolerant vegetation type. (All Alternatives)

Development of a prescribed fire program in the montane chaparral communities of the escarpment canyons would restore the health of these habitats and reintroduce a natural element of the landscape. Fire use would reduce the accumulation of fuels resulting from previous aggressive suppression of all fires which has been shown to lead to devastating fires which damage or eliminate even those species which normally would thrive on periodic disturbance caused by fire.

Recreational Opportunities

Camping

Resource damage associated with overflow and illegal off-site camping due to a lack of current capacity would be reduced if not eliminated. Completion of the 13 Mile Campground will finalize the process of consolidating designated camping use in the NCA. (All Alternatives)

The new campground, 2.5 miles southeast of Calico Basin, will offer campers an enhanced experience over what is presently offered. 5 group sites will be available (presently 0 sites) and 59 individual/family sites (a 56% increase) with an eventual design goal of 100 individual and 10 group sites. Restroom facilities will be vault toilets (as opposed to porta-potties) and each site will have a tent pad, picnic table and barbecue grill provided. (All Alternatives)

The location of the new campground will allow visitors convenient access to other recreational pursuits in Red Rock Canyon. At the same time, the location will not impair the scenic quality Red Rock Canyon offers. Closing Oak Creek Campground will remove a negative impact on the aesthetic quality of Red Rock Canyons primary scenic vicinity. (All Alternatives)

Several other changes will have impacts on camping in the NCA as follows:

The maximum stay for dispersed use campers (not in the

campground) will be limited to 7 days, a 50% reduction from the current policy.

Dispersed camping will be limited to a maximum group size of 10 people. Groups of more than 10 must use the 13 Mile Campground. This would be a low impact on the existing situation since few groups have been that large, other than those that traditionally make special arrangements with the BLM.

Where camping presently is not restricted in the NCA north of La Madre and south and east of the Bird Spring Range (the lands added to the NCA in the 1994 NCA expansion), opportunities would be restricted or eliminated. Dispersed camping north of La Madre would be limited to existing disturbed sites. If monitoring shows an increase in disturbance, camping would be limited to designated disturbed sites. No dispersed camping would be allowed south of State Route 160.

Rock Climbing (same for All Alternatives)

Coordination between BLM and the climbing community would be enhanced through a Liaison Council. This partnership between climbers, climbing businesses, guides and the BLM would provide for improved communications and understanding of both climbers needs and BLM's management responsibilities, rules and regulations.

Climbing management would be the same as it is currently under the Interim GMP.

Bolting would continue to be allowed except for two restricted areas: Sandstone Quarry, no bolting within 1/4 mile of parking area; and the Wilderness Study Areas.

Commercial climbing school permit numbers would remain the same but minimum use limits would be implemented to ensure that the public is being provided adequate services.

Commercial guiding permits would remain at six (6) long-term multi-year and ten (10) individual visit limited "guest" permits.

Requiring commercial climbing schools to operate at a minimum level of 100 user days per year to retain their permit privileges could cause the permits of two or three companies to be terminated in 2000. These companies, which primarily operate out of state and only use the NCA occasionally, would probably not meet the minimum use requirement for two years in a row and thus be subject to

termination. The result of setting minimum use levels is expected to be increased access to climbing services for the visiting public with an increase of 500 user days per year. The impact of increased user days by commercial permittees would be negligible since use by private climbers, estimated to be in the thousands of user days, far exceeds commercial use.

Limits on commercial group size and areas of use would provide for dispersal of use and reduce congestion at popular climbing locations.

Target Shooting

No shooting, other than hunting with a valid hunting license and permit, is allowed in the National Conservation Area. There will be no impact or change to the current situation since RRCNCA is closed to target shooting. (Alternatives 2, 3, 4 & 5)

Trail Opportunities

Trail opportunities for hikers, horse riders and mountain bikers would all be enhanced with the addition of 43.3 miles of trail designated and added to the existing trails network. 38.9 miles are existing routes which have not been formally designated, and 4.4 miles do not exist at this time and would require new construction.

Mountain bike use will not be allowed on any of the trails in the Scenic Drive vicinity. This would disallow use on 3 currently authorized trails, a reduction of 7.2 miles of trail for Mountain bike enthusiasts. It will have a positive affect on other trail users by eliminating potential user conflicts where hiking use is very heavy. It will also cut down on unauthorized use, since there will be no question on which trails are/are not designated for mountain bike use.

Mountain bike use is enhanced in other locations with the added designation of 25.1 miles from trails north of Kyle Canyon Road and southeast of the Bird Spring Range.

Equestrian opportunities within the original NCA boundary are reduced by limiting use to designated trails. No dispersed (off trail) use would be allowed.

Touring Opportunities

Dirt Roads

There will be a reduction of dirt roads available for public use throughout the NCA. Of the 159.0 miles of dirt road inventoried

in the NCA, 66.1 miles would be designated for public access and 92.9 miles would be closed (some have already been closed under direction of the IGMP). The above closures would result in a 58% reduction of access for the off-highway vehicle (OHV) community.

Paved Roads

Overlooks and picnic areas in the Scenic Drive vicinity, and access to these sites will eventually be paved.

New sites to be constructed include 1 new overlook and the expansion of 2 existing sites. This would result in 2.06 acres of new paving. The proposed paving projects will benefit the recreating public by providing approximately 75 additional parking spaces around the Scenic Drive, reducing particulate matter in the air, and providing smoother surfaces for highway design vehicles.

For hikers and climbers, the view from higher elevations will include an additional 5.48 acres of paved surfaces dispersed throughout the Scenic Drive vicinity.

The short loop return route from Sandstone Quarry will not be constructed. This denies vehicle tourists, bicycle riders and joggers the option of having a shorter alternate route within the Scenic Drive area. The same user groups will suffer the impatience of those desiring a quick exit. The scenic view from higher elevation viewpoints will not include the additional 5.78 acres of pavement that would occur on the valley floor if the road were constructed.

Cultural Resources (same for All Alternatives)

Continued emphasis would be placed on protecting cultural resources from damage and loss. Where necessary, existing trails would be re-routed to direct use away from sensitive areas. Where separation of uses is not possible, an increased emphasis on visitor education and interpretation will be used to educate visitors on the need to avoid inadvertently damaging fragile cultural sites.

Continued restriction of vehicle access at Brownstone Canyon and new limits on vehicle access to the Cottontail site will provide long term protection while still allowing for public appreciation and use of these areas.

Enhancing existing volunteer partnerships to provide for improved site monitoring will provide greatly improved information on site conditions and use patterns. Bureau staffing limits have not allowed adequate monitoring to be done in the past.

Signing of rock art sites at climbing locations would be used to reduce the impact of climbing on these resources.

Native American Concerns (same for All Alternatives)

The proposed plan provides for and encourages consultation with Native Americans on issues that may affect Native American values and traditions. As provided for by law, provision has been made for the use of NCA lands and resources for traditional ceremonial purposes. As opportunities arise, Native American partnerships will be developed to enhance and improve cultural exhibits and to provide improved education on Native American issues for NCA visitors.

Visual Resources

The most significant, and positive, impact to visual resources will be the closure of the Oak Creek Campground and Spanish Trail overflow camping area. Both of these areas are visually evident to the casual observer. Oak Creek interrupts the view of the escarpment and lower valley floor with tents, vehicles, motor homes and the large silver water trailer. The new camping area cannot be seen from any of the regularly used roads or trails in the NCA. (All Alternatives)

Closure of 92.9 miles of dirt roads would result in revegetation and the eventual visual disappearance of dirt tracks on 177.1 acres as native plants colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive would result in visual impacts characteristic of paved surfaces on 5.48 acres. The impact of this paving is mitigated by the fact that 3.87 acres involves paving of existing dirt roads and parking areas. The visual impact of paving these areas will actually be reduced due to 1) the darker color of the paving which will blend with surrounding natural colors better than the bright bare surface of heavily used dirt roads and 2) the elimination of the dust plume that accompanies each vehicle using these dirt roads.

Wilderness Characteristics

Under this alternative, both the La Madre Mountains Wilderness Study Area (WSA) and the Pine Creek WSA will continue to be managed in compliance with the *Interim Management Policy for Lands Under Wilderness Review* (H-8550-1). (All Alternatives)

Naturalness of both the La Madre Mountains and Pine Creek WSAs would see improvement through the restoration of riparian areas associated with 41 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition. The elimination of non-native vegetative species (i.e. tamarisk)

along with improvement of vegetative diversity will ensure natural, self maintaining riparian areas. (All Alternatives)

The removal of all wild horses and burros from the area north of State Route 160 will enable the removal of existing protective fencing around 2 spring associated riparian areas within the Pine Creek WSA. Elimination of these man-made features would contribute to a more natural landscape and wilderness experience.

Rock climbing restrictions that includes no new bolts in WSAs; no alterations of the rock surfaces; no establishment of permanent fixed ropes or cables; and the encouragement of the use of equipment that better blends with the rock face will all contribute to minimizing impacts to naturalness and the WSAs. Although rock climbing activity will be noticeable while climbers are present on the rock faces, during inactive periods evidence of this activity would be substantially unnoticeable. (All Alts)

The closure and eventual rehabilitation of 19.3 miles (46.4 acres) of ways within the La Madre Mountains WSA north of La Madre Mountain and in Little Red Rock would halt deterioration of wilderness characteristics caused by expansion of these ways through casual use. Ways which were inventoried in 1979 as short intrusions into lands with wilderness characteristics now form an interconnected system of routes, none of which has been officially approved, which has caused significant and visual localized impacts to naturalness. (All Alternatives)

By proposing no new development in the WSAs and limiting facilities within the WSAs to existing hiking trails, re-routing sections of these trails to avoid sensitive riparian areas and plant populations, protection of inventoried wilderness characteristics would be ensured. (All Alternatives)

Alternative 5

Biodiversity

Biodiversity Preservation

The emphasis on habitat management and monitoring would benefit three Federally Listed or Candidate species, forty-three State or BLM Sensitive Species and forty-one additional species covered by the Clark County Multi-Species Plan (as listed in App. 1). An ongoing program of population monitoring will provide the data necessary to evaluate biodiversity and to better define the status of individual species and their associations. Mitigating the impacts, both past and present, of recreational use and facilities on populations and discrete habitat niches would provide positive momentum towards ensuring that the diverse and fragile biodiversity of the NCA is preserved. Improved inventory and understanding of both plant and animal populations in the NCA has provided a greater understanding of biodiversity/human interactions.

Directing management efforts at the five Priority Management Areas listed in App. 2; Willow Spring, Bridge Mt. Blue Diamond Hill, Red Spring and the North Fork of Pine Creek Canyon, would immediately address those areas where biodiversity is most at risk. Managing recreation use to avoid active raptor nests; limiting access to caves critical as bat maternity colonies; restoring Willow and Red Springs; re-routing trails out of riparian areas; defining a specific trail to Bridge Mt.; closing and rehabilitating trails in the Pine Creek WSA; and directing foot traffic away from the Natural Area in the North Fork of Pine Creek are all actions that would reduce human impacts on specific identified species that are easily displaced by human presence or inadvertently impacted by human use because the species, like springsnails, cannot be detected. Species which will directly benefit from the above are the Peregrine falcon, Townsend's Big-eared bat, springsnail, Red Rock Canyon aster, and an assemblage of plants, ferns and amphibians in the North Fork of Pine Creek Canyon.

By restoring Willow and Red Springs and reducing human use of the spring brook, the deterioration of springsnail habitat may be halted if not reversed while still allowing recreation uses away from the critical riparian area and snail habitat. Re-introduction of the springsnail at Willow Spring, should continued inventories confirm its disappearance, would provide an improved gene pool by doubling the known habitat locations and reducing the risk of species elimination due to a catastrophic event. Inventory of additional springs may discover new populations of this rare species.

Implementation of the Blue Diamond Cholla Conservation Agreement by BLM, the U.S. Fish and Wildlife Service and the James Hardie Gypsum Corp. would ensure the protection of this species and its only known habitat. Completion of the proposed exchange between BLM and James Hardie would place approximately 98% of the cholla's known habitat within the NCA. (All Alternatives)

Ecosystem Management

Elimination of wild horses and burros would have a significant and positive impact on maintaining the ecosystem integrity of RRCNCA. Most significant would be the elimination of competition for limited water resources between horses/burros and native wildlife. The removal of significant amounts of water from riparian areas through pipelines and water troughs at four springs; Lone Grapevine, Mud #1, Tunnel and Bird, could be eliminated resulting in restoration of historic riparian environments (App. 10, Part C.). The heavier utilization of forage north of the now fenced off State Route 160, caused by the apparent reluctance of some horses to cross (south) to former grazing areas using the new box culverts under the highway, would be eliminated.

Utilization of Bighorn sheep as an umbrella indicator species would not only provide a method of evaluating recreational impacts and habitat pressures, but it would unite BLM's efforts with years of data collection and management by the Nevada Division of Wildlife. This historical data will enable trends to be apparent much more readily and enhance inter-agency cooperative efforts. (Alternatives 3, 4 & 5)

Aggressive suppression of fires in low elevation communities, in particular Blackbrush, would reduce the trend toward conversion of native desert to annual grassland caused by fires supported by the invasion of highly flammable fine (grass) fuels. This would protect a key habitat component of the Mojave Desert ecosystem in the NCA. (App. 4, Vegetative Community Types) (All Alternatives)

By implementing a prescribed natural fire program in the montane chaparral communities of the escarpment's canyons, the fire ecology of this habitat type would be enhanced. Successful implementation of this program would benefit fire dependent species like the Ponderosa pine, while reducing fuel loading which, when allowed to accumulate to unnatural volumes through aggressive fire suppression, actually threatens the existence of other species, like the Ponderosa pine. While Pine Creek still supports a healthy stand of Ponderosa pine, most of the other canyons have been burned out and stumps are the only evidence Ponderosa pine once grew there. Because of the narrow restricted nature of the escarpment's canyons, it is unlikely that the prescribed burns would exceed 5 acres each and a total of 50

acres over the next ten years. Natural fires exceeding this size by hundreds or thousands of acres have occurred numerous times in the NCA without lasting impact. (App. 16, Fire Occurrence History) (Alternative 3, 4 & 5)

The use of fire to re-establish a mosaic pattern and provide openings within the pinyon-juniper uplands, which dominate the higher elevations in the NCA, would provide greater habitat diversity and forage values. Aggressive fire suppression in the past has created a homogeneous monotypic forest canopy where past natural disturbance through fire once created pockets of uneven aged forest. Based on past fire histories, an average of two fires per year at an average size of two to five acres could be expected. (App. 16, Fire Occurrence History) (Alts. 3, 4 & 5)

The closure of 86.8 miles of dirt roads would reduce habitat fragmentation throughout the NCA.

Wild Horses and Burros

Wild horses and burros would be eliminated from the portion of the Red Rock Herd Management Area (HMA) within RRCNCA. This would reduce the area of the HMA by 58%. However, much of the reduction consists of cliff and canyon areas which are not used by wild horses and burros because they are too steep and inaccessible. While a Herd Management Plan would need to be prepared for a complete analysis of water and forage availability, it is possible that this alternative could result in complete removal of all burros in order to provide adequate water and forage to sustain a wild horse herd of approximately 60-75 animals.

Approximately 61 burros and 71 horses currently are located in the HMA. It is unknown how many of these animals would need to be or could be relocated within the reduced HMA remaining south of the NCA rather than removed and adopted. A population of wild horses could be maintained in the reduced HMA but would require the development of artificial water sources to sustain a viable population.

Since there is no proposal to fence the HMA/RRCNCA boundary, it is likely that horses would move into and out of the most southern area of RRCNCA seasonally. The location of future water sources in the HMA would play a key role in horse use patterns.

Implementation of this alternative would allow for the removal of fencing at Mud #1, Lone Grapevine and Shovel springs; eliminate the need for fencing at Mud #2; and eliminate periodic water hauls to Tunnel, Bird and Mud #1 springs. The fenced springs have documented damage to the riparian area at the spring sources due to horse use. Additionally, all of the limited water

resources at Bird and Tunnel (Wilson Tank) Springs would be available for wildlife use. These two springs are the only water sources in the NCA south of State Route 160, and provide critical wildlife waters. Both springs are low producers and have gone dry periodically, Tunnel Spring in particular was dry in 1991/92 and again in 1998. (App. 11, Spring Discharge Measurements)

Removal of the horses and burros would eliminate the opportunity for viewing these animals within RRCNCA, a popular visitor activity. At the same time, it would improve visitor safety and prevent an average of four animal deaths per year by eliminating animal-vehicle accidents and by eliminating the traffic jams which occur regularly on State Route 159 due to visitors stopping to photograph and (illegally) feed burros.

Riparian, Water, Air and Vegetative Resources

Riparian Restoration

Restoration of riparian areas associated with 41 springs, as well as Pine Creek, Oak Creek, Lost Creek, and First Creek, to proper functioning condition will improve both water quantity and quality. Improved water availability will contribute to a more diverse riparian habitat, with a restored native plant community, and wildlife population. Positive responses and riparian vegetation recovery are already being seen at springs where actions have been taken in the past - Wheeler Camp, Lone Grapevine, Shovel, Red and Willow Springs. Restoration of spring snail habitat through an improved riparian area at Red and Willow Springs may lead to stable, increased snail populations avoiding the potential for listing the species as Threatened or Endangered. (All Alternatives)

The removal of all wild horses and burros from RRCNCA will eliminate the need for protective fencing around most riparian areas associated with 12 springs as well as Pine, Oak and First Creeks, currently utilized by these animals. Existing fences (7) could be removed and these riparian areas would continue to improve without the need for manmade protective measures.

Riparian areas associated with Willow Spring, Lost Creek, Pine Creek and Oak Creek will continue to be influenced by the heavy recreational use associated with sites around the Scenic Drive. The riparian areas associated with these water sources are expected to improve, but at a slower rate than other riparian areas in RRCNCA.

Water Resources

Restoration of riparian areas associated with 41 springs, as well as Pine Creek, Oak Creek, Lost Creek and First Creek to proper

functioning condition will improve both water quantity and quality. Water availability would be expected to improve as the water holding capability of these areas increases. Flows would be expected to increase in both volume and duration throughout the year. The filtering ability of a healthy riparian area will assist in improvement of overall water quality. (All Alternatives)

The elimination of tamarisk from 15 springs, as well as Pine and Oak Creeks, would contribute to a reduction in salt loading to surface waters. Tamarisk is a salt concentrator (concentrates salts around its roots). During high intensity thunderstorms, these salts are flushed into nearby surface waters. Recent tamarisk removal projects in southern Nevada have also produced increased water quality and quantity through the reduction in water consumption by the water loving tamarisk. (All Alts.)

The removal of all wild horses and burros from the NCA will eliminate a major source of fecal coliform pollution to 12 springs and other surface waters including Pine Creek, Oak Creek and First Creek. Waters currently exceeding water quality standards for this pollutant would be expected to improve to a conformity level.

Air Quality

Because a large portion of the NCA is located within the Las Vegas Valley Non-Attainment Area, any reduction in particulate emissions (pm10) is considered a positive impact. The primary contributor of particulates from the NCA is a result of dust generated by vehicles utilizing dirt roads and parking areas, and vehicle exhausts. A decrease in the amount of these emissions is expected as a result of the closure of 86.8 miles of dirt roads (162.2 acres) and the paving of 5.17 acres of existing roads and parking areas. Paving of existing roads and parking areas would substantially reduce particulate emissions because these are areas with the highest visitor use in the NCA (Red Spring Picnic Area and the White Rock, Willow Spring and Oak Creek roads).

Construction of the short loop Scenic Drive cut-off road from Sandstone Quarry to the Visitor Center would shorten the round trip distance from 15 to 6 miles. This would reduce mileage driven, and vehicle emissions produced, by every vehicle that uses the short loop by 60% as compared to the current situation which requires each and every vehicle that enters the Scenic Drive to travel its entire 13 mile length (and the two miles between the Scenic Drive entrance and exit) regardless of the desired area of visitation. While it is not possible to calculate the total benefit of this shorter route until traffic counts of the new route's use becomes available, it is known that

the heaviest concentration of site specific short-term users is at Calico 1, Calico 2 and Sandstone Quarry. Once their visit's purpose is concluded at these sites, the visitor's primary desire is to exit as quickly as possible. The short loop would also facilitate the establishment of a low cost quick turn-around shuttle bus system from the entrance fee station parking lot and Visitor Center for climbers and hikers using the Calico Hills and Sandstone Quarry areas. This shuttle system could significantly reduce the number of vehicles traveling to these sites.

Vegetation

Closure of 86.8 miles of dirt roads would result in revegetation of 162.2 acres as native plants colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive and construction of a "short loop" Scenic Drive return road from Sandstone Quarry to the Visitor Center would result in the loss of vegetation on 7.39 acres.

Aggressive fire suppression in Blackbrush communities would help to ensure protection of this habitat type. Blackbrush communities are now highly susceptible to fire damage due to the invasion of light flashy grass fuels which now support and easily carry fire through this formerly low intensity and fire intolerant vegetation type. (All Alternatives)

Development of a prescribed fire program in the montane chaparral communities of the escarpment canyons would restore the health of these habitats and reintroduce a natural element of the landscape. Fire use would reduce the accumulation of fuels resulting from previous aggressive suppression of all fires, which has been shown to lead to devastating fires that damage or eliminate even those species which normally would thrive on periodic disturbance caused by fire. (Alternatives 3, 4 & 5)

Recreational Opportunities

Camping

Resource damage associated with overflow and illegal off-site camping due to a lack of current capacity would be reduced if not eliminated. Completion of the 13 Mile Campground will finalize the process of consolidating designated camping use in the NCA. (All Alternatives)

The location of the new campground will allow visitors convenient access to other recreational pursuits in Red Rock Canyon. At the same time, the location will not impair the scenic quality Red Rock Canyon offers. Closing Oak Creek Campground has removed a negative impact on the aesthetic quality of Red Rock Canyon's primary scenic vicinity. (All Alternatives)

There will be no impact on the maximum stay limit which will remain at 14 days. There will be an impact on dispersed camping. Where camping presently is not restricted in the NCA north of La Madre Mt. and south and east of the Bird Spring Range (the lands added to the NCA in the 1994 NCA expansion), certain restrictions will be imposed. Dispersed camping north of La Madre Mt. will be limited to existing disturbed sites. If monitoring shows an increase in disturbance, camping will be limited to designated disturbed sites. In the area south and east of the Bird Spring Range, camping will be limited to existing disturbed sites within 200 feet of designated roads.

Rock Climbing (same for All Alternatives)

Coordination between BLM and the climbing community would be enhanced through a Liaison Council. This partnership between climbers, climbing businesses, guides and the BLM would provide for improved communications and understanding of both climbers needs and BLM's management responsibilities, rules and regulations.

Climbing management would be the same as it is currently under the Interim GMP.

Bolting would continue to be allowed except for two restricted areas: Sandstone Quarry, no bolting within 1/4 mile of parking area; and the Wilderness Study Areas, no bolting.

Commercial climbing school permit numbers would remain the same but minimum use limits would be implemented to ensure that the public is being provided adequate services.

Commercial guiding permits would remain at six (6) long-term multi-year and ten (10) individual visit limited "guest" permits.

Requiring commercial climbing schools to operate at a minimum level of 100 user days per year to retain their permit privileges could cause the permits of two or three companies to be terminated in 2001. These are companies which primarily operate out of state and only use the NCA occasionally, so they would probably not meet the minimum use requirement for two years in a row and thus be subject to termination. The result of setting minimum use levels is expected to be increased access to climbing services for the visiting public with an increase of 500 user days per year. The impact of increased user days by commercial permittees would be negligible since use by private climbers, estimated to be in the thousands of user days, far exceeds commercial use.

Limits on commercial group size and areas of use would provide for dispersal of use and reduce congestion at popular climbing locations.

Target Shooting

No shooting, other than hunting with a valid hunting license and permit, is allowed in the National Conservation Area. There will be no impact or change to the current situation since RRCNCA is closed to target shooting. (Alternatives 2, 3, 4 & 5)

Trail Opportunities

Trail opportunities for hikers, horse riders, road bikers and mountain bikers would all be enhanced with the addition of 45.8 miles of trail designated and added to the existing trails network. 38.9 miles are existing routes which have not been formally designated, and 4.4 miles do not exist at this time and would require new construction.

Mountain bike use will not be allowed on any of the trails in the Scenic Drive vicinity. Use would be prohibited on 3 currently authorized trails, a reduction of 7.2 miles of trail for Mountain bike enthusiasts. It will have a positive affect on other trail users by eliminating potential user conflicts where hiking use is very heavy. It will also cut down on user confusion and unauthorized use, since there will be no question which trails are/are not designated for mountain bike use. Mountain bike use is enhanced in other locations with the added designation of 25.1 miles of trail north of Kyle Canyon Road and southeast of the Bird Spring Range.

Road biking would be enhanced with the paving of the dirt road/trail connecting Sandstone Quarry with Willow Spring. The number of bike riders on the Scenic Drive, between Sandstone Quarry and Willow Spring, would decrease, lessening bike/vehicle competition. The number of wrong way bike riders would be expected to decrease.

Equestrian freedom of travel would be reduced by limiting use to designated trails within the center of RRCNCA. No dispersed (off trail) use would be allowed.

Touring Opportunities

Dirt Roads

There would be a reduction of dirt roads available for public use throughout the NCA. While the most commonly used routes would remain open, of the 159.0 miles of dirt road inventoried in the NCA, 72.2 miles would be designated for public access and 86.8

miles would be closed (some are already closed under direction of the IGMP). The closures would result in a 55% reduction of dirt roads available for off-highway vehicle use.

Paved Roads

Overlooks and picnic areas in the Scenic Drive vicinity, and access to these sites will eventually be paved.

New sites to be constructed include 1 new overlook and the expansion of 2 existing sites. This would result in 2.06 acres of new paving.

One new road is proposed, which would allow visitors the option of driving the entire 13 mile Scenic Drive or taking a short loop when activities focus on the Calico Hills area. The optional route would be 5.65 miles, with the new construction occurring between Sandstone Quarry and the Visitor Center. This would include 2.65 miles of pavement, although it would not be all new disturbance.

The proposed paving projects will benefit the recreating public by providing approximately 75 additional parking spaces around the Scenic Drive, reducing particulate matter in the air, providing smoother surfaces for highway design vehicles, and offering a shorter loop drive opportunity. The short loop not only benefits those that do not wish to drive, bicycle or jog the entire 13 mile Scenic Drive, but also sightseers that prefer the longer drive and do not want the enjoyment of their experience lessened by being constantly passed and tailgated by others impatient to quit the Scenic Drive.

The new short loop would also allow the Scenic Drive to remain open during flash flood events when many local residents want to use the road to see waterfalls which form on the rocks. Currently if either Sandstone, Red Rock or Pine Creek washes flood the entire Scenic Drive must be shut down for public safety. This new road would allow the first three miles of the Scenic Drive to be open at all times as it avoids all the washes.

For hikers and climbers, the view from higher elevations will include an additional 11.26 acres of paved surfaces dispersed throughout the Scenic Drive vicinity.

Cultural Resources (same for All Alternatives)

Continued emphasis would be placed on protecting cultural resources from damage and loss. Where necessary, existing trails would be re-routed to direct use away from sensitive areas. Where separation of uses is not possible, an increased emphasis on visitor education and interpretation will be used to educate

visitors on the need to avoid inadvertently damaging fragile cultural sites.

Continued restriction of vehicle access at Brownstone Canyon and new limits on vehicle access to the Cottontail site will provide long term protection while still allowing for public appreciation and use of these areas.

Enhancing existing volunteer partnerships to provide for improved site monitoring will provide greatly improved information on site conditions and use patterns. Bureau staffing limits have not allowed adequate monitoring to be done in the past.

Signing of rock art sites at climbing locations would be used to reduce the impact of climbing on these resources.

Native American Concerns (same for All Alternatives)

The proposed plan provides for and encourages consultation with Native Americans on issues that may affect Native American values and traditions. As provided for by law, provision has been made for the use of NCA lands and resources for traditional ceremonial purposes. As opportunities arise, Native American partnerships will be developed to enhance and improve cultural exhibits and to provide improved education on Native American issues for NCA visitors.

Visual Resources

The most significant, and positive, impact to visual resources will be the improved visuals resulting from closure of the Oak Creek Campground and Spanish Trail overflow camping area. Both of these areas are visually evident to the casual observer. Oak Creek interrupts the view of the escarpment and lower valley floor with tents, vehicles, motor homes and the large silver water trailer. The new camping area cannot be seen from any of the regularly used roads or trails in the NCA. (All Alternatives)

Closure of 86.8 miles of dirt roads would result in revegetation and the eventual visual disappearance of dirt tracks on 162.2 acres as native plants colonize these routes. Development or expansion of three parking area/trailheads along the Scenic Drive and construction of a "short loop" Scenic Drive return road from Sandstone Quarry to the Visitor Center would result in visual impacts characteristic of paved surfaces on 13 acres. The impact of this paving is mitigated by the fact that 5.17 acres involves paving of existing dirt roads and parking areas. The visual impact of paving these areas will actually be reduced due to 1) the darker color of the paving which will blend with surrounding natural colors better than the bright bare surface of heavily used dirt roads and 2) the elimination of the dust plume that

accompanies each vehicle using these dirt roads.

Wilderness Characteristics

Under this alternative, both the La Madre Mountains Wilderness Study Area (WSA) and the Pine Creek WSA will continue to be managed in compliance with the *Interim Management Policy for Lands Under Wilderness Review* (H-8550-1). (All Alternatives)

Naturalness of both the La Madre Mountains and Pine Creek WSAs would see improvement through the restoration of riparian areas associated with 17 springs, as well as, Pine Creek, Oak Creek, Lost Creek, and First Creek to proper functioning condition. The elimination of non-native vegetative species (i.e. tamarisk) along with improvement of vegetative diversity will ensure natural, self maintaining riparian areas. (All Alternatives)

The removal of all wild horses and burros from the NCA will enable the removal of existing protective fencing around two spring riparian areas within the Pine Creek WSA. Elimination of these man-made features would contribute to a more natural landscape and wilderness experience. (Alternatives 4 & 5)

Rock climbing restrictions that includes no new bolts in WSAs; no alterations of the rock surfaces; no establishment of permanent fixed ropes or cables; and the encouragement of the use of equipment that better blends with the rock face will all contribute to minimizing impacts to naturalness and the WSAs. Although rock climbing activity will be noticeable while climbers are present on the rock faces, during inactive periods evidence of this activity would be substantially unnoticeable. (All Alts)

The closure and eventual rehabilitation of 19.3 miles (46.4 acres) of ways within the La Madre Mountains WSA north of La Madre Mountain and in Little Red Rock would halt deterioration of wilderness characteristics caused by expansion of these ways through casual use. Ways which were inventoried in 1979 as short intrusions into lands with wilderness characteristics now form an interconnected system of routes, none of which has been officially approved, which has caused significant and visual localized impacts to naturalness. (All Alternatives)

By proposing no new development in the WSAs and limiting facilities within the WSAs to existing hiking trails, re-routing sections of these trails to avoid sensitive riparian areas and plant populations, protection of inventoried wilderness characteristics would be ensured. (All Alternatives)

CHAPTER 5

COORDINATION AND CONSULTATION

Detailed below is the process followed in the development of the General Management Plan and the public representation, special interests, organizations, and other government agencies that contributed to the planning process.

The original Notice Of Intent, informing the public that a General Management Plan (GMP) for RRCNCA would be developed and listing anticipated issues, initiated the planning and scoping process in January of 1992. The notice invited written comments involving the proposed action and announced several planned public comment meetings to discuss the proposal and gather additional comments and concerns. Meetings were held as follows:

<u>Date</u>	<u>Location</u>	<u>Attendance</u>
01/09/92	Green Valley Library	17
01/15/92	Las Vegas District Office	10
01/21/92	Red Rock Visitor Center	60
01/23/92	Las Vegas District Office	42
02/03/92	Goodsprings Citizens Advisory Council Meeting	20

At this point in the process there was a turnover of the BLM planning team personnel and the new team assessed the process and data collected and determined how to re-enter the process. Preliminary alternatives were designed based on the key issues developed from the scoping process. It was decided to expand the scoping process by presenting these alternatives to the public to solicit additional comments and concerns prior to completing a Draft Plan. Additional public meetings were held as follows:

<u>Date</u>	<u>Location</u>	<u>Attendance</u>
03/10/93	Blue Diamond Library	14
03/15/93	Las Vegas District Office	39
03/20/93	Las Vegas District Office	13
03/24/93	Las Vegas District Office	27

In addition to the above, several special emphasis meetings were held to gain specific insight. These meetings included:

Technical Rock Climbing

03/19/93	Las Vegas District Office	18
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Equestrian

03/22/93	Las Vegas District Office	3
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<u>Date</u>	<u>Location</u>	<u>Attendance</u>
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Bicycle

04/22/93	Las Vegas District Office	16
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Utilizing the data and information collected to this point, the Draft General Management Plan was completed in April of 1994 and dispersed for a 60 day public review and comment period. The following Open House meetings were held for discussion and comments on the Draft GMP:

<u>Date</u>	<u>Location</u>	<u>Attendance</u>
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05/11/94	Las Vegas District Office	11
05/14/94	Las Vegas District Office	6
05/19/94	Blue Diamond School	10

In addition to the Open House meetings, the following meetings with special groups were held:

<u>Date</u>	<u>Location</u>	<u>Attendance</u>
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Sierra Club

06/08/94	Las Vegas YMCA	24
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Friends Of Red Rock Canyon

06/18/94	Red Rock Visitor Center	32
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At the conclusion of public meetings held during this review period, a Public Hearing meeting was conducted in a formal manner. This hearing allotted a set amount of time for individuals to express their concerns or make comments with no rebuttal from BLM personnel or other attendees. All comments were recorded for consideration in completing the final plan. The Formal Hearing was as follows:

<u>Date</u>	<u>Location</u>	<u>Attendance</u>
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05/25/94	Las Vegas District Office	40
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The next step in the planning process would normally have been to review all of the input collected during the Draft Plan review period and make the necessary modifications to arrive at a final plan. However, in November of 1994, legislation was passed which

expanded the size of RRCNCA to 195,610 acres, which more than doubled the size of the original designated NCA. It was determined that the planning process should be re-initiated at the scoping phase to consider the entire acreage and that an Environmental Impact Statement (EIS) would be more appropriate than an Environmental Assessment (EA) as was completed for the Draft GMP. It was also decided to develop an interim plan based on the Draft GMP that would administer RRCNCA until a final plan was completed. The plan in affect at the time was the Master Plan for Red Rock Canyon Recreation Lands. The Master Plan had been the governing document since 1976, and was no longer in touch with current activities and values. In June of 1995, the Interim General Management Plan became the governing plan for RRCNCA and will remain so until a final plan is completed.

In September of 1995, the planning process resumed. Even though comments and data collected to this point were still considered valid, public scoping was revisited and meetings were held as follows:

<u>Date</u>	<u>Location</u>	<u>Attendance</u>
09/06/95	Las Vegas District Office	59
09/09/95	Las Vegas District Office	19

A new aspect of the planning process toward the development of the GMP/EIS has been the inclusion of public involvement throughout the planning process. A team of individuals representing the various environmental and recreational interests throughout the local community, along with representatives from commercial interests, the Native American community and other agencies, has been meeting with the BLM interdisciplinary team on a regular basis to continually review and assist in plan development. Participants were requested to have an alternate representative for meetings they could not attend. All members were mailed updates and materials between meetings. Meetings with the expanded team were all held at the Las Vegas BLM District Office and included the following:

<u>Date & Attendance</u>	<u>Date & Attendance</u>
09/26/95 - 17	08/13/96 - 18 (special mtg
10/24/95 - 15	Native American issues
11/04/95 - 13 (field trip	discussed by Richard Arnold)
NCA north of La Madre)	08/27/97 - 11
11/25/95 - 11 (field trip	09/24/97 - 5 (special mtg for
NCA south of S.R.160)	additional input)
11/28/95 - 14	12/15/97 - 5 (special mtg
01/27/96 - 9 (field trip	trails & 4X4 reps)
Scenic Dr. vicinity)	10/28/97 - 19

02/27/96 - 23
03/26/96 - 16
04/23/96 - 17
05/28/96 - 16
06/25/96 - 14
07/23/96 - 15

02/25/97 - 15
03/25/97 - 11
04/22/97 - 15
09/23/97 - 16
10/21/97 - 20
11/13/97 - 15

Other meetings/presentations not associated with the expanded planning team include the following:

Las Vegas Valley Bicycle Club monthly meeting - 8/1/96

Several presentations to classes from the National Outdoor Leadership School 1994-1998

The following list includes the members of the expanded planning team:

Jan Nachlinger	The Nature Conservancy
Nancy Wier	S Nev Rock Art Enthusiasts (SNRAE)
Eddie Longhurst	Friends of Wild Horses & Burros
Ron Gregory	Clark Co. Comprehensive Planning
Claire Toomey	Las Vegas Distance Riders (equestrian)
Randy Grandstaff	Sky's The Limit (climbing guide service)
Suzanne Shelp	Las Vegas Valley Bicycle Club
Greg Currie	Spring Mountain NRA (USFS)
Howard Booth	Sierra Club
Ken Moultray	Red Rock Advisory Council
John Hiatt	Red Rock Audubon
Jan Prida	NV Division of State Parks
Bob Maichle	SMA, RAC, NVWT
Warner Skomars	Friends of Red Rock Canyon (FORRC)
Mickey Goodweiler	NV United 4 Wheelers Assoc.

Don Cloquet	Las Vegas Indian Center (Native American & cultural resources)
Liz Manion	Nevada Trails Coalition
Butch Padilla	NV Division of Wildlife
Jared Fisher	Escape the City Streets (bicycle tours)
Randy Marsh	Climber & Outdoor Interests
Sam Davidson	Access Fund

In addition to the above teammembers, others participated as alternates, replacements, or assisted in some other capacity. Representatives that fall in this category include the following:

Dolf Cardenas	Native American concerns
Randy Harness	Sierra Club
Janet Bair	US Fish and Wildlife Service
Kathy Moskowitz	Spring Mountain NRA (USFS)
Dick Franta	NV United 4 Wheelers Assoc.
Bob Ashbaugh	SNRAE & FORRC
Larry Clinesmith	FORRC
Richard Arnold	Pahrump Paiute Tribe (Native American concerns)
Laura Sanders	Sky's The Limit
Steve Fuquay	FORRC
Monte McAnulty	Mountain bike enthusiast
Roger Herrod	Las Vegas Indian Center (Native American & cultural resources)
Teri Knight	The Nature Conservancy
Tim Short	Spring Mountain NRA (USFS)
Alan Pinkerton	Spring Mountain NRA (USFS)

Jack Tribble	NV Division of State Parks
Wilford Allen	Clark County Wildlife Advisory Board (hunting issues)
Kensen Lee	Clark County Wildlife Advisory Board (hunting issues)
Mac Vorce	Escape the City Streets (bicycle tours)
Amber Belbria	Mountain bike enthusiast
Mike Cox	NV Division of Wildlife
Harry Weldon	Las Vegas Valley Bicycle Club
Marianne Slagle	FORCC
Annice Ellis	Spring Mountain NRA (USFS)

After reviewing the scoping input, the key issues were updated. The original list of key issues resurfaced along with four additional issues. BLM then completed the Analysis of the Management Situation (AMS), which is a comprehensive look at the total area being considered in the planning process. The AMS document is not part of the actual GMP/EIS, but it is an important part of the planning process and can be viewed at the Las Vegas District Office. The list of issues, planning criteria (laws and other directives), and AMS were used to fashion an array of alternatives to be considered in developing a final plan. The alternatives are presented in Chapter 2.

With the distribution of this Draft GMP/EIS, will be a 60 day public review and comment period. The review period will include public meetings for discussion and comments on the plan and preference of the included alternatives. Input collected during this review period will be used to select the appropriate alternative, make necessary corrections and modifications, and create the final GMP.

BUREAU OF LAND MANAGEMENT

Key BLM personnel involved in carrying out the initial scoping process included:

Joel Mur - Red Rock Manager
 Elsie Hardenbrook - Recreation Planner
 Runore Wycoff - Area Manager
 Robert Taylor - Landscape Architect
 Chris Miller - Interpretive Planner

Lorraine Buck - Public Affairs Specialist

BLM Interdisciplinary Planning Team (after the preliminary scoping)

Gene Arnesen - Outdoor Recreation Planner (Team Leader)
Dave Wolf - National Conservation Area Manager
Donn Siebert - Natural Resource/Wilderness Specialist
Mark Rash - Wildlife Biologist
Chris Miller - Interpretive Specialist/Archaeologist
Charles Ward - Supervisory Law Enforcement Ranger

Las Vegas District Reviewers

Jackie Gratton - Realty Specialist
Gayle Marrs-Smith - Botanist
Gary McFadden - Wild Horse and Burro Specialist
Mike Moran - Environmental Protection Specialist
Jack Norman - Hydrologist/Soil Scientist
Mark Rash - Wildlife Biologist/Natural Resource Specialist
Stan Rolf - Archaeologist
Ed Seum - Geologist
Robert Stager - Range Conservationist
Jeff Steinmetz - Planning/Environmental Coordinator
Rex Wells - Assistant Field Office Manager for Lands

Draft GMP/EIS sent to the following agencies and organizations for review and comment

Government

Officials

U.S. Senator Richard Bryan
U.S. Senator Harry Reid
U.S. Congressman John Ensign
U.S. Congressman Jim Gibbons
U.S. Secretary of the Interior Bruce Babbitt
Nevada Governor Bob Miller

Federal Agencies

Bureau of Indian Affairs
Department of Energy
Department of the Air Force
Department of Transportation
Fish and Wildlife Service
Environmental Protection Agency
USDA Forest Service
U.S. Geologic Survey

National Park Service
Natural Resources Conservation Service

State of Nevada

Commission for the Preservation of Wild Horses
Department of Conservation and Natural Resources
Division of Forestry
Department of Minerals
Division of State Lands
Division of State Parks
Department of Transportation
Division of Water Resources
Department of Wildlife

Local Government

Clark County Board of Commissioners
Clark County Department of Comprehensive Planning
Clark County Wildlife Advisory Board
Henderson Parks and Recreation Department
Las Vegas Planning and Development
Red Rock Advisory Council
Regional Transportation Commission

Native American Councils

Intertribal Council of Nevada
Las Vegas Indian Center

Organizations and Commercial Concerns

Access Fund
Adventure Fitness
Adventures to the Edge
American Alpine Institute
American Mountain Guides Association
Association for Experiential Education
ATV Action Tours
Beyond Vertigo Rock Guides
Bonnie Springs Ranch
Citizen Alert
Fraternity for Desert Bighorn
Desert Action Jeep Tours
Desert Rehab Center
Desert Rock Sports
Desert Sportsman's Rifle and Pistol Club
Division of Motion Pictures
Eastern Mountain Sports Climbing School
Escape The City Streets

First Accent Climbing School
Friends of Nevada Wilderness
Friends Of Red Rock Canyon
Friends of Wild Horses and Burros
High Angle Adventures
High and Wild Mountain Guides
Howard Hughes Properties
Jackson Hole Mountain Guides
Las Vegas Mountaineers Club
Las Vegas Distance Riders
Las Vegas Sun
Las Vegas Valley Bicycle Club
Las Vegas Valley Water District
MRAN
Mohonk Preserve
Mountain Skills Inc.
National Audubon Society
National Outdoor Leadership School
National Wild Horse Association
Nevada Power Company
Nevada Sportsman Association
Nevada Wildlife Federation
Pacific Crest Outward Bound
Peak Adventures
Portland Mountain Guides
Public Lands Foundation
Red Rock Adventure
Red Rock Canyon Interpretive Association
Red Rock Audubon
Red Rock Downhill
Rocks & Ropes
Rocky Trials
Seneca Rock Mountain Guides
Sheep Mountain Home Owners Association
Sierra Club
Sky's The Limit
Southern Nevada Environmental Forum
Southern Nevada Grotto
Southern Nevada Land Cruisers
Southern Nevada Rock Art Enthusiasts
Starlight Tours
The Nature Conservancy
The Wilderness Society
Vegas Valley Four Wheelers
Vertical Endeavors
Vertical Ventures
Wildlife Management Institute

APPENDIX 1: SPECIAL STATUS SPECIES

Part A: Federal Endangered Species List [50 CFR 17 (10/31/96)]

<u>Taxon</u> (Common Name) Global Distribution	RRCNCA Population Estimate RRCNCA Occurrence Records
[01] LISTED ENDANGERED	
<u>Falco peregrinus anatum</u> Ⓞ (American peregrine falcon) Western Hemisphere	01 adult male; 01 adult unknown (suspected female) Bridge Mtn, 08/95: unknown adult (02?), rapid flight Bridge Mtn, 10/95: adult ♂, cliff perched* Bridge Mtn, 05/96: unk adult, perched*, then cacking & repeated swooping of underslung cliff area* (defensive behavior) Blue Diamond, 06/97: unk adult, killed dove, flew NW
Biological Significance:	Suspected nesting pair (*all within 150' cliff area)
RRCNCA Priority: <u>High</u>	NV has only 06 nesting pairs; nest pairs; key target element of FWS Species Recovery Plan (Pacific Coast)
Additional Comments:	See Appendix 2: Priority Management Areas Also are unconfirmed Red Rock reports from 1970-80's
[01] LISTED THREATENED	
<u>Gopherus agassazii</u> Ⓞ (Desert tortoise) CA, NV, AZ, UT; Mexico	400-1760 (40 mi ² [low] habitat @ 10-44 animals/mi ²) Red Rocks, Many : Widespread, Creosote bush habitats 10-Mi Cyn, 05/96: 02-11 tortoises (ie, sign indexed) 13-Mi Cyn, 07/96: 09-39 tortoises (ie, sign indexed)
Biological Significance:	Important reptile species within desert ecosystem
RRCNCA Priority: <u>Low</u>	Minimal threats or problems; in low density range
[01] CANDIDATE SPECIES	
<u>Opuntia whipplei</u> var. <u>multigeniculata</u> Ⓞ (Blue Diamond cholla) Red Rock Canyon endemic	6250 BD Hill, 05/91: Occupy 269 of 1,000-acre portion of south Blue Diamond Hill (intensive inventory by J.D. Morefield)
Biological Significance:	Solitary world population
RRCNCA Priority: <u>High</u>	FWS Conservation Agreement species (see Appendix 2)
Additional Comments:	Taxonomy not fully resolved (species or variety?)
.....	
RRCNCA Total:	3 Species
KEY:	Ⓞ Covered Species, Clark County Multiple Species Habitat Conservation Plan (MSHCP) Ⓜ Evaluation Species, Clark County MSHCP Ⓢ Watch List Species, Clark County MSHCP

APPENDIX 1: SPECIAL STATUS SPECIES

Part B: Nevada Species of Concern List, FWS (01/09/97)
 Nevada Sensitive Species List, BLM (04/23/97)

Taxon (Common Name)	Citation	Occurrence (*Unconfirmed)
[09] BATS		
<u>Euderma maculatum</u> * (Spotted bat)Ⓞ	Ramsey/97	White Rock Spring (heard*)
<u>Idionycteris phyllotis</u> Ⓞ (Allen's big-eared bat)	Ramsey/94	Calico Hills; White Rock Spring; Pine Creek
<u>Myotis ciliolabrum</u> (Small-footed myotis)Ⓞ	Ramsey/94	White Rock Spring
<u>Myotis evotis</u> (Long-eared myotis)Ⓛ	Ramsey/94	White Rock Spring
<u>Myotis thysanodes</u> (Fringed myotis)Ⓞ	Ramsey/94	Calico Hills; White Rock; Pine Cr; Grapevine Spr
<u>Myotis volans</u> (Long-legged myotis)Ⓛ	Ramsey/94	Calico Hills; White Rock Spring
<u>Myotis yumanensis</u> * (Yuma myotis)Ⓞ	Ramsey/94	Potosi Spring (USFS) but potential RRCNCA resident
<u>Nyctinomops macrotis</u> (Big free-tailed)Ⓞ	RRHMP/69	No subsequent confirmation
<u>Plecotus townsendii pallescens</u> Ⓞ (Pale Townsend's big-eared bat)	Ramsey/94 Ramsey/97	CH's; WR Spg; Tea Kettle & Wounded Knee & Desert Cave
[01] SMALL MAMMAL		
<u>Tamias palmeri</u> * (Palmer's chipmunk)Ⓛ [Spring Range endemic]	n/a	Suitable fir-pine habitat on La Madre Mountain
[02] BIRDS		
<u>Accipiter gentilis</u> (Northern goshawk)Ⓞ	RRRL/86	Not recorded
<u>Phainopepla nitens</u> (Phainopepla)Ⓛ	RRAS/96	Wheeler Camp Spring
[02] REPTILES		
<u>Heloderma suspectum cinctum</u> Ⓞ (Banded Gila monster)	NDOW/96	Widespread but uncommon, Calico to Bonnie Springs
<u>Sauromalus obesus obesus</u> Ⓛ (Western chuckwalla)	NDOW/95	Widespread but uncommon
[09] INVERTEBRATES		
<u>Pyrgulopsis deaconi</u> Ⓛ (formerly nov.1a) (Spring Mountains springsnail) [Spring Range endemic]	Sada/96	Red Spring; Willow Spring population extirpated but pending re-introduction
<u>Pyrgulopsis turbatrix</u> Ⓛ (formerly nov.58) (Southeast Nevada springsnail) [Southern Nevada endemic]	Sada/96	Lost Creek; La Madre Spg; Willow Spg (extirpated but pending re-introduction)

APPENDIX 1: SPECIAL STATUS SPECIES

Part B: Nevada Species of Concern List, FWS (01/09/97)
 Nevada Sensitive Species List, BLM (04/23/97)

<u>Taxon</u> (Common Name)	Citation	Occurrence (*Unconfirmed)
[07] BUTTERFLIES		
<u>Chlosyne acastus</u> *② (Spring Mtns acastus checkerspot) [Spring Range endemic]	Weiss/95	Widespread hostplant is <u>Chrysothamnus nauseosus</u>
<u>Euphilotes enoptes</u> ssp.*② (Dark blue butterfly) [Spring Range endemic]	Weiss/95	Suspected to be widespread throughout Spring Range
<u>Euphydryas anicia morandi</u> *② (Morand's checkerspot) [Spring Range endemic]	Weiss/95	Widespread host plant is <u>Castilleja lineriaefolia</u>
<u>Hesperia comma</u> spp.* (Spring Mountains comma skipper)② [Spring Range endemic]	Weiss/95	Wide distribution among woodlands and forests
<u>Limenitus weidemeyerii nevadae</u> ② (Nevada admiral) [Southern NV endemic]	NNHP/78	Pine Creek Canyon (File # IILEPL3031-002)
<u>Plebejus icarioides</u> ssp.*② (Spring Mountains icarioides blue) [Spring Range endemic]	Weiss/95	Wide distribution among woodlands and forests
<u>Speyeria zerene carolae</u> *② (Carole's silverspot butterfly) [Spring Range endemic]	Weiss/95	Uncommon host plant <u>Viola purpurea charlestonensis</u> occurs on Bridge Mountain
[20] PLANTS		
<u>Angelica scabrida</u> (Rough angelica)① [Spring Range endemic]	Nachlinger /94	Wide distribution among main escarpment/canyons
<u>Arctomecon merriamii</u> (White bearpoppy)①	RRCNCA/94	Calico Spring
<u>Astragalus aequalis</u> (Clokey milkvetch)① [Spring Range endemic]	Deacon/64	North Fork, Pine Creek Cyn No subsequent confirmation
<u>Astragalus mohavensis</u> var. <u>hemigyris</u> ② (Curve-podded Mojave milkvetch)	NNHP/83	Lucky Strike Canyon Very rare species in NV
<u>Astragalus remotus</u> (Spg Mtns milkvetch)① [Spring Range endemic]	Leary/96	Widespread near ephemeral washes and riparian areas
<u>Calochortus striatus</u> ① (Alkali mariposa lily)	Babcock/97	Red, Calico, Ash Springs & 2 seeps; Lone Willow Spr.
<u>Eriogonum heermannii</u> var. <u>clokeyi</u> ② (Clokey buckwheat) [Southern NV endemic]	Leary/96	Blue Diamond Hill, Kyle & Lee Canyon (3 populations)
<u>Glossopetalon pungens</u> var. <u>glabra</u> ① (Smooth dwarf greasebush)	Leary/96	La Madre Mtn to Cottonwood (Scattered populations)

APPENDIX 1: SPECIAL STATUS SPECIES

Part B: Nevada Species of Concern List, FWS (01/09/97)
 Nevada Sensitive Species List, BLM (04/23/97)

<u>Taxon</u> (Common Name)	Citation	Occurrence {*Unconfirmed}
<u>Ionactis caelestis</u> ⓪ (Red Rock Canyon aster) [Red Rock Canyon endemic]	Leary/96	Bridge Mountain (Solitary worldwide population)
<u>Ivesia jaegeri</u> (Jaeger ivesia)⓪	Leary/96	Scattered populations (8)
<u>Pedicularis semibarbata</u> v <u>charlestonensis</u> (Charleston pinewood lousewort)⓪ [Southern NV endemic]	Leary/96	La Madre Mountain (Single RRCNCA population)
<u>Penstemon bicolor</u> ssp. <u>bicolor</u> ⓪ (Yellow twotone beardtongue) [Southern NV endemic]	Babcock/97	Very common in RRCNCA (20+ known populations)
<u>Salvia dorrii</u> var. <u>clokeyi</u> ⓪ (Clokey mountain sage) [Southern NV endemic]	Nachlinger /94	Mt. Wilson; Bridge Mtn (2 RRCNCA populations)
<u>Townsendia jonesii</u> var. <u>tumulosa</u> ⓪ (Charleston grounddaisy) [Southern NV endemic]	Leary/96	Mt. Wilson; Bridge Mtn; Cottonwood ridgeline (3)
<u>Arenaria kingii</u> var. <u>rosea</u> *⓪ (Rosy king sandwort) [Spring Range endemic]	Leary/96	Suitable dry, +5900' pine habitat on La Madre Mtn
<u>Astragalus funereus</u> *⓪ (Black woolypod)	Leary/96	Suitable +7200' ponderosa habitat on La Madre Mtn
<u>Astragalus oophorus</u> var. <u>clokeyanus</u> *⓪ (Clokey's eggvetch) [Southern NV endemic]	Leary/96	Adjacent USFS populations in Lucky Strike Canyon (Candidate ESA Species)
<u>Epilobium nevadense</u> *⓪ (Nevada willowherb)	Leary/96	Suitable +7400' ponderosa habitat on La Madre Mtn
<u>Glossopetalon clokeyi</u> *⓪ (Clokey's greasebush) [Spring Range endemic]	Leary/96	Proximity of Kyle Canyon (USFS) populations
<u>Phacelia parishii</u> *⓪ (Parish's phacelia)	Leary/96	Known regional occurrence
.....		
RRCNCA Total:	43 Species	

APPENDIX 1: SPECIAL STATUS SPECIES

Part C: Species of Local Concern (Clark County MSHCP; RRCNCA GMP)

[Note: Excluded are MSHCP species already listed under Parts A & B.]

<u>Taxon</u> (Common Name)	Citation	Occurrence {*Unconfirmed}
<input type="checkbox"/> Clark County MSHCP, Covered Species		
{Plants}		
<u>Erigeron uncialis</u> var. <u>conjugans</u> (Inch High Fleabane)	Leary/96	La Madre Mtn; Cottonwood [Southern NV endemic]
<u>Penstemon thompsoniae</u> var. <u>jaegeri</u> (Jaeger beardtongue)	Sada/97	Bootleg Spg; Rainbow Spg [Southern NV endemic]
<u>Viola purpurea</u> var. <u>charlestonensis</u> (Limestone violet)	Leary/96	Bridge Mtn (Appendix 2) - <u>Speyeria</u> sp. hostplant
<u>Castilleja martinii</u> var. <u>clokeyi</u> (Clokey paintbrush)	NNHP/60 NNHP/70	Pine Creek Canyon Lost Creek Canyon
{Birds}		
<u>Guiraca caerulea</u> (Blue grosbeak)	RRAS/96	Wheeler Camp Spring
<u>Pyrocephalus rubinus</u> (Vermillion flycatcher)	RRAS/96	Wheeler Camp Spring
<u>Piranga rubra</u> (Summer tanager)	RRAS/96	Wheeler Camp Spring
{Reptiles & Amphibians}		
<u>Coleonyx variegatus</u> (Banded gecko)	NDOW/93	Loop Drive (Night Survey)
<u>Dipsosaurus dorsalis</u> (Desert iguana)	RRHMP/69	Not recorded
<input type="checkbox"/> Clark County MSHCP, Evaluation Species		
{Mammals}		
<u>Vulpes macrotus</u> (Kit fox)	Misc/97	Throughout the NCA
<u>Dipodomys deserti</u> (Desert kangaroo rat)	RRHMP/69	Not recorded
<u>Dipodomys microps occidentalis</u> (Chisel-toothed kangaroo rat)	RREIS/75	Not recorded
<u>Sylvilagus nuttallii</u> (Nuttall's cottontail)	RRHMP/69	Not recorded

APPENDIX 1: SPECIAL STATUS SPECIES

Part C: Species of Local Concern (Clark County MSHCP; RRCNCA GMP)

[Note: Excluded are MSHCP species already listed under Parts A & B.]

<u>Taxon</u> (Common Name)	Citation	Occurrence (*Unconfirmed)
<input type="checkbox"/> Clark County MSHCP, Evaluation Species		
{Birds}		
<u>Toxostoma bendirei</u> (Bendire's thrasher)	RRRL/86	Not recorded
<u>Toxostoma crissale</u> (Crissal thrasher)	RRAS/95	Wheeler Camp
<u>Toxostoma lecontei</u> (Le Conte's thrasher)	RRRL/86	Not recorded
<u>Vireo vicinior</u> (Gray vireo)	RRRL/86	Not recorded
<u>Lanius ludovicianus</u> (Loggerhead shrike)	NCA/93	Mud Spring #1
<u>Sialia mexicana</u> (Western bluebird)	RRRL/86	Not recorded
{Reptiles & Amphibians}		
<u>Phyllorhynchus descortatus</u> (Western leaf-nosed snake)	RRHMP/69	Not recorded
<u>Crotalus scutulatus</u> (Mojave green rattlesnake)	NDOW/95	Wheeler Camp
<u>Trimorphodon biscutatus lamda</u> (Sonoran lyre snake)	RRHMP/69	Not recorded
<u>Bufo punctatus</u> (Red-spotted toad)	NDOW/93	Not recorded
<u>Xantusia vigilis</u> (Desert night lizard)	NDOW/93	Not recorded
<input type="checkbox"/> Clark County MSHCP, Watch List Species		
{Plants}		
<u>Coryphantha vivipara</u> ssp. <u>rosea</u> (Clokey pincushion)	Leary/96	Lost Creek to Cottonwood (Scattered populations)
<u>Selaginella utahensis</u> (Utah spikemoss)	Pinzl/84	Pine Creek Canyon Very rare in Nevada
<u>Penstemon bicolor</u> ssp. <u>roseus</u> (Rosy twotone beardtongue)	Leary/96	Lost Creek to Cottonwood (Scattered populations)
<u>Ferocactus acanthoides</u> var. <u>lecontei</u> (Barrel cactus)	Leary/96	Widespread and common
<u>Cryptantha tumulosa</u> (New York Mountains catseye)	Leary/96	Lucky Strike Canyon to Cottonwood (Scattered)
{Mammals}		
<u>Chaetodipus penicillatus sobrinus</u> (Desert pocket mouse)	RREIS/75	Not recorded

APPENDIX 1: SPECIAL STATUS SPECIES

Part C: Species of Local Concern (Clark County MSHCP; RRCNCA GMP)

[Note: Excluded are MSHCP species already listed under Parts A & B.]

<u>Taxon</u> (Common Name)	Citation	Occurrence (*Unconfirmed)
<input type="checkbox"/> Clark County MSHCP, Watch List Species		
{Birds}		
<u>Aquila chrysaetos</u> (Golden eagle)	RRAS/95	Wheeler Camp
<u>Buteo regalis</u> (Ferruginous hawk)	RRRL/86	Not recorded
<u>Otus kennicottii</u> (Western screech owl)	RRHMP/69	Not recorded
<u>Butorides striatus</u> (Green-backed heron)	RRAS/94	Wheeler Camp
<u>Campylorhynchus brunneicapillus</u> (Cactus wren)	NCA/93	Juniper Canyon
<u>Catherpes mexicanus</u> (Canyon wren)	RRRL/86	Not recorded
<u>Icterus parisorum</u> (Scott's oriole)	RRRL/86	Not recorded
{Reptiles & Amphibians}		
<u>Pseudacris regilla</u> (Pacific tree frog)	Misc/97	Escarpment canyons
<u>Callisaurus draconoides draconoides</u> (Common zebra-tailed lizard)	NDOW/94	Loop Drive (Night survey)
<input type="checkbox"/> RRCNCA Management Concern Species		
<u>Phacelia hastata</u> var. <u>charlestonensis</u> (Cordilleran phacelia) [Southern NV endemic]	Leary/96	Icebox Canyon; Bridge Mtn
<u>Asplenium resilens</u> (Ebony spleenwort)	Leary/96	Pine Creek Canyon Rare in Nevada
.....		
RRCNCA Total:	41 Species	
	+46 Species (from Part A & B)	
	=87 Species (85 in Clark County MSHCP)	

Key: Misc/97 ... Denotes commonly observed species.
 NNHP ... Nevada Natural Heritage Program database.
 Babcock ... Field surveys by temporary BLM employee.
 RRAS Red Rock Canyon Audubon Society, Wheeler Camp Spring Sanctuary records.

APPENDIX 2: PRIORITY MANAGEMENT AREAS

<u>SITE NAME</u> Biological Status	RRCNCA Management Rank- Rationale Species	Source
<u>WILLOW SPRING</u>	(1) Population Restoration	
Location/Size:	T20S,R58E Sec.33/ 0.10 acres	
Site Description:	Springflow corridor only (upon restoration)	
Threats:	Spring development; intensive recreation	
Species of Concern: (NV USFWS/BLM)	<u>Pyrgulopsis deaconi</u> (Spring Mtns springsnail) -Spring Range endemic species -Global population in 3 springs, 2 in RRCNCA: Red Spring; Willow Spring*	Apx 1B
	<u>Pyrgulopsis turbatrix</u> (SE Nevada springsnail) -Southern Nevada endemic species -Global population in 8 springs, 3 in RRCNCA: Lost Creek; La Madre Spring; Willow Spring*	Apx 1B
<input type="checkbox"/>	Both species exhibit high potential for Candidate ESA-listing, due to their severely limited range and the existing threats to their occupied habitats.	
<input type="checkbox"/>	*Both populations in Willow Spring were inadvertently extirpated due to the diversion of the natural spring flow into a series of artificial pools and/or the subsequent high-volume of recreational visitation and use pressure. Habitat restoration and rehabilitation efforts have been initiated, and the natural spring flow was restored during 1997. Population reintroduction and long-term site monitoring actions will also be completed, possibly in 1999.	
<u>BRIDGE MOUNTAIN</u>	(2) Special Status Species Protection	
Location/Size:	T21S,R58E Sec.8,9/ ≈300 acres	
Site Description:	Sandstone escarpment rimrock to limestone ridgeline	
Threats:	Recreational disturbance; trail-caused erosion	
Endangered Species: (Federally listed)	<u>Falco peregrinus anatum</u> -Probable nesting pair (7th known in Nevada) -Nest pair numbers= critical targets of USFWS Pacific Coast Recovery Plan for the species	Apx 1A
Species of Concern: (NV USFWS/BLM)	[6 plants, in both sandstone and limestone habitats]	
	<u>Ionactis caelestis</u> -RRCNCA endemic species (=Global population) -New to science in 1990	Apx 1B
	<u>Angelica scabrida</u>	Apx 1B
	<u>Salvia dorrii</u> var. <u>clokeyi</u>	Apx 1B
	<u>Townsendia jonesii</u> var. <u>tumulosa</u>	Apx 1B
	<u>Glossopetalon pungens</u> var. <u>glabra</u>	Apx 1B
	<u>Ivesia jaegeri</u>	Apx 1B
Sensitive Species: (RRCNCA List)	<u>Viola purpurea</u> var. <u>charlestonensis</u> <u>Phacelia hastata</u> var. <u>charlestonensis</u>	Apx 1C Apx 1C

APPENDIX 2: PRIORITY MANAGEMENT AREAS

<u>SITE NAME</u> Biological Status	RRCNCA Management Rank- Rationale Species	Source
<u>BLUE DIAMOND HILL</u>	(3) Special Status Species Protection	
Location/Size:	T21S,R59E Sec.31,32; T22S Sec.5-8/ 1000 acres	
Site Description:	South-end, from 3500-4100' in elevation	
Threats:	Mining activity; private land ownership; wildfire	
Candidate Species: (Federal ESA List)	<u>Opuntia whipplei</u> var. <u>multigeniculata</u> -RRCNCA endemic species -Sole global population -USFWS Conservation Agreement in effect	Apx 1A
Species of Concern: (NV USFWS/BLM)	<u>Heloderma suspectum cinctum</u> <u>Penstemon bicolor</u> ssp. <u>bicolor</u> <u>Astragalus remotus</u>	TNC92/ Apx 1B NNHP/ Apx 1B
Raptor Species: (High-use density)	<u>Falco mexicanus</u> <u>Bubo virginianus</u> <u>Buteo jamaicensis</u> -Nesting pair with 2 fledglings in 1997 <u>Falco peregrinus anatum</u> (forage use only)	Apx 8 Apx 8 Apx 8 Apx 1A
Plant Association:	Succulent Scrub community -Relatively rare plant community in Nevada -Sole RRCNCA occurrence	TNC92
<u>RED SPRING</u>	(4) Special Status Species Protection	
Location/Size:	T21S,R59E Sec.06/ 2.00 acres	
Site Description:	Spring flow corridor and riparian meadow	
Threats:	Recreational activity	
Species of Concern: (NV USFWS/BLM)	One invertebrate in aquatic habitat: <u>Pyrgulopsis deaconi</u> (Spring Mtns springsnail) -Spring Range endemic species -Global population in 3 springs, 2 in RRCNCA: Red Spring; Willow Spring -Both RRCNCA occupied habitats are the focus of intensive, high-volume recreation and visitation	Apx 1B
	Two plants in riparian meadow habitat: <u>Astragalus remotus</u> (Spring Mtns milkvetch) <u>Calochortus striatus</u> (Alkali mariposa lily) -Extremely rare in Nevada; easternmost known population of this species -Based on present information, some manner of site protection is required (existing meadow exclosure fence protects only a few plants)	Apx 1B Apx 1B

APPENDIX 2: PRIORITY MANAGEMENT AREAS

<u>SITE NAME</u> Biological Status	RRCNCA Management Rank- Rationale Species	Source
<u>PINE CREEK CANYON-</u> <u>NORTH FORK</u>	(5) Biodiversity Hotspot	
Location/Size:	T21S,R58E Sec.16,17/ ≈50.0 acres	
Site Description:	Riparian corridor and cliff-faces	
Threats:	Recreational activity; trail-braiding	
Endangered Species: (Federally listed)	<u>Falco peregrinus anatum</u> -Occupied habitat overlaps BRIDGE MOUNTAIN Priority Management Area (see previous)	Apx 1A
Species of Concern: (NV USFWS/BLM)	<u>Angelica scabrida</u> * -Largest RRCNCA population <u>Astragalus remotus</u> * <u>Astragalus aequalis</u> * -Sole RRCNCA report; extremely rare species <u>Ivesia jaegeri</u> <u>Euderma maculatum</u> -Evaluated as suitable habitat (Ramsey/94) <u>Idionycteris phyllotis</u> <u>Myotis thysanodes</u> <u>Limenitus weidemeverii nevadae</u> *	Apx 1B Apx 1B Apx 1B Apx 1B Apx 1B Apx 1B Apx 1B
Sensitive Species: (RRCNCA List)	<u>Castilleja martinii</u> var. <u>clokeyi</u> <u>Selaginella utahensis</u> -Rare in Nevada (NNNPS Watch List species) -Sole RRCNCA population	Apx 1C Apx 1C
Ferns/Fern Allies: (Species richness)	<u>Adiantum capillus-veneris</u> (Maidenhair fern) <u>Cheilanthes covillei</u> (Coville lip fern) <u>Cheilanthes feei</u> (Fee lip fern) <u>Cheilanthes parryi</u> (Parry cloak fern) <u>Pellaea truncata</u> (Spiny cliff-brake) <u>Pentagramma triangularis</u> var. <u>triangularis</u> <u>Pityrogramma triangularis</u> (Goldback fern) <u>Woodwardia fimbriata</u> (Giant chain fern)	Leary Leary Leary Leary Leary Leary Leary
Leary	-Largest fern species in Nevada <u>Polystichum scopulinum</u> (Rock holly fern) -rare species in Nevada <u>Selaginella leucobryoides</u> (Spikemoss)	Leary Leary
Spring Range Distinctions:	-Greatest fern species diversity (10) -High number of Spring Range endemics* (4) -Lowest elevation of <u>Pinus ponderosa</u> - <u>Eumeces gilberti</u> is atypically common	Deacon Deacon Deacon Deacon

NOTES:

- Leary: 1996. Flora of Red Rock Canyon NCA.
TNC92: Morefield. Status Report on Opuntia whipplei var. multigeniculata.
NNHP: Nevada Natural Heritage Program database, Reno, Nevada.
Deacon: 1964. Biological significance of Pine Creek Canyon. Personal communication.

APPENDIX 3: FLORISTIC SUMMARY

Family	Common Name	Species/ *Potential	Distributional Significance	Non-native Cohort
<u>FERNS/FERN ALLIES</u>				
Pteridaceae	Maidenhairs	08/*01	Local Uncommon-1 RRCNCA Record- 1	None
Aspleniaceae	Spleenworts	01/---	Rare in Nevada-1	None
Blechnaceae	Chain ferns	01/---	None	None
Dryopteridaceae	Shield ferns	02/*02	Rare in Nevada-1	None
Ophioglossaceae	Adder tongues	--/*01	None	None
Selaginellaceae	Spikemosses	01/*02	Local Uncommon-1	None
Equisetaceae	Horsetails	01/*01	None	None
<u>GYMNOSPERMS</u>				
Ephedraceae	Ephedras	05/---	None	None
Cupressaceae	Cypresses	01/---	None	None
Pinaceae	Pines	03/---	Relict, so NV-1	None
<u>ANGIOSPERMS</u>				
Aceraceae	Maples	02/---	None	None
Amaranthaceae	Amaranths	05/*01	None	None
Anacardiaceae	Cashews	01/---	None	None
Apiaceae	Parsleys	07/*06	Endemic, Spg Mt-1 Local Uncommon-1 RRCNCA Record- 1	None
Apocynaceae	Dogbanes	03/*01	None	None
Asclepiadaceae	Milkweeds	02/---	None	None
Asteraceae	Sunflowers	112/*32	Nevada Record-1 RRCNCA Record- 1 Local Uncommon-4 Rare in Nevada-2 Endemic, RRCNCA-1 Endemic, so NV-2	Adventive-2 Introduced-1
Berberidaceae	Barberrys	02/---	None	None
Bignoniaceae	Bignonias	01/---	None	None
Boraginaceae	Borages	22/*09	None	Adventive-1
Brassicaceae	Mustards	38/*12	Nevada Record- 1 RRCNCA Record- 5	Adventive- 5 Introduced-1
Buddlejaceae	Butterfly bushes	01/---	None	None

APPENDIX 3: FLORISTIC SUMMARY

Family	Common Name	Species/ *Potential	Distributional Significance	Non-native Cohort
Cactaceae	Cacti	21/*03	Endemic, RRCNCA-1	None
Campanulaceae	Bellflowers	02/---	None	None
Capparaceae	Capers	01/*01	None	None
Caprifoliaceae	Honeysuckles	03/---	None	None
Caryophyllaceae	Carnations	04/*01	None	None
Celastraceae	Stafftrees	01/---	None	None
Chenopodiaceae	Goosefoots	09/*03	None	Introduced-1
Convolvulaceae	Morning glories	01/---	None	Adventive -3 Introduced-1
Crassulaceae	Stonecrops	02/---	None	None
Crossomataceae	Greasebushs	02/*01	None	None
Cucurbitaceae	Gourds	01/---	None	None
Cuscutaceae	Dodders	01/*01	None	None
Elaeagnaceae	Oleasters	01/---	None	Introduced-1
Ericaceae	Heaths	01/*01	None	None
Euphorbiaceae	Spurges	07/*04	None	None
Fabaceae	Legumes	29/*13	Endemic, Spg Mt-2	Introduced-6
Fagaceae	Beeches	02/---	None	None
Garryaceae	Silk-tassels	01/---	None	None
Gentianaceae	Gentians	01/---	None	None
Geraniaceae	Geraniums	01/---	None	Adventive -1
Hydrophyllaceae	Waterleafs	21/*03	Endemic, so NV-1	None
Krameriaceae	Krameria	01/---	None	None
Lamiaceae	Mints	10/*01	Endemic, so NV-1	Adventive -1
Linaceae	Flaxes	02/---	None	None
Loasaceae	Loasa	06/*06	None	None
Lythraceae	Loosestrifes	01/---	None	None
Malvaceae	Mallows	04/*02	None	None
Nyctaginaceae	Four-O'Clocks	09/*02	None	None

APPENDIX 3: FLORISTIC SUMMARY

Family	Common Name	Species/ *Potential	Distributional Significance	Non-native Cohort
Oleaceae	Ashs	04/*01	None	None
Onagraceae	Evening primroses	18/*05	RRCNCA Record-2	None
Orobanchaceae	Broomrapes	03/*02	None	None
Papaveraceae	Poppies	03/---	None	None
Pedaliaceae	Sesames	01/---	None	None
Plantaginaceae	Plantains	04/---	None	Introduced-2
Polemoniaceae	Phloxes	16/*03	None	None
Polygonaceae	Buckwheats	26/*05	Endemic, so NV-1 Endemic, Nevada-1	Adventive -2
Portulacaceae	Purslanes	03/*01	Nevada Record -1	None
Primulaceae	Primroses	01/*02	None	None
Ranunculaceae	Buttercups	06/*02	None	None
Rhamnaceae	Buckthorns	04/*01	None	None
Rosaceae	Roses	17/*02	None	Introduced-1
Rubiaceae	Madders	08/*01	None	None
Rutaceae	Citruses	01/---	None	None
Salicaceae	Willows	05/---	None	Introduced-1
Santalaceae	Sandalwoods	01/*01	None	None
Saururaceae	Lizardtails	01/---	None	None
Saxifragaceae	Saxifrages	05/---	None	None
Scrophulariaceae	Figworts	25/*06	NV range extns-3 Endemic, so NV-3	None
Solanaceae	Nightshades	09/*01	None	Introduced-1
Tamaricaceae	Tamarisks	01/---	None	Introduced-1
Ulmaceae	Elms	02/---	None	Introduced-1
Urticaceae	Nettles	01/*01	None	None
Verbenaceae	Verbenas	02/---	None	None
Violaceae	Violets	01/*01	Relict, so NV-1	None
Viscaceae	Mistletoes	03/*01	None	None
Vitaceae	Grapes	01/---	None	None
Zygophyllaceae	Caltrops	02/---	None	Adventive -1

APPENDIX 3: FLORISTIC SUMMARY

Family	Common Name	Species/ *Potential	Distributional Significance	Non-native Cohort
<u>MONOCOTYLEDONS</u>				
Agavaceae	Agaves	05/*03	None	None
Cyperaceae	Sedges	13/*10	None	None
Iridaceae	Irises	02/---	None	None
Juncaceae	Rushes	08/*02	Nevada Record-1	None
Lemnaceae	Duckweeds	01/---	None	None
Liliaceae	Lilies	10/---	None	Introduced-1
Orchidaceae	Orchids	01/---	None	None
Poaceae	Grasses	73/*26	Nevada Record- 3 NV range extns-6	Introduced-18 Adventive -05
Typhaceae	Cattails	01/*01	None	None

[Sub-totals:]	<u>FERNS/ALLIES</u>	14/ *07	Rare in Nevada-2 RRCNCA Record -1 Local Uncommon-2	None
	<u>GYMNOSPERMS</u>	09/---	Relict, so NV -1	None
	<u>ANGIOSPERMS</u>	515/*139	Nevada Record -3 Rare in Nevada-2 NV range extns-3 Relict, So. NV -1 Local Uncommon-5 RRCNCA Record -9 Endemic, RRCNCA-2 Endemic, Spg Mt-3 Endemic, So. NV-8 Endemic, Nevada-1	Adventive -16 Introduced-18
	<u>MONOCOTYLEDONS</u>	114/ *42	Nevada Record -4 NV range extns-6	Introduced-19 Adventive -05
RRCNCA Total:		652/*188	[incl 58 non-native]	

NOTE: 1) Species numbers include subspecies & varieties.
 2) Distributional significance notations do not include (*) potential species.
 3) Source ... A Flora of Red Rock Canyon NCA (Leary & Niles; 1996).

APPENDIX 4: Vegetative Community Types
Part A. Classification Scheme for RRCNCA

NOTES:

- 1) Classification scheme, zonal community types¹ and definitions from Bradley & Deacon (1965).
 - 2) Community types² and RRCNCA species composition are from Leary & Niles (1996).
 - 3) Faunal cohorts are described separately in Appendices 1, 2, 5, 6, 7 and 8.
-

MAJOR BIOTIC COMMUNITIES of RED ROCK CANYON NCA:

I. Terrestrial Types (Permanent water absent)

A) Zonal Community Types (Gradient is elevational)

1. CREOSOTE BUSH Community¹ [Shrubland types]
2. BLACKBRUSH Community¹
3. JUNIPER-PINYON Community¹ [Woodland types]
4. FIR-PINE Community¹

B) Tranzonal Community Types (Gradient is not elevational)

5. DESERT WASH Community² [Shrub/woodlands]
6. CHAPARRAL Community²
7. CLIFF Community²

II. Hydric Type (Permanent water present)

8. RIPARIAN Community² [Shrub/woodlands]
-

Definitions:

VEGETATION ZONES	"Environmental phenomena... exist as gradients which in areas of topographical diversity are quite steep. These gradations consequently form vegetation zones... which can be recognized by even the casual observer. These vegetation zones form a basis for naming and recognizing natural communities".
BIOTIC COMMUNITY	"a natural grouping of populations of plants and animals occupying a given area... [and recognizable] as communities because of the overlapping ranges of tolerance... of the biota."
COMMUNITY TYPE	"an abstraction based on... sampling... [many] discrete areas (communities) which are similar, yet different in varying degrees. By this abstraction, several distinct communities are grouped together and described as a unit."

APPENDIX 4: Vegetative Community Types

Part B. Community Descriptions

COMMUNITY	[Elevational Range]	
Physiography		
Species Composition:	1. Shrubs; Trees	2. Grasses; Forbs
Management Significance		

CREOSOTE BUSH [Below 3600']

Prominent on the gently sloping lower bajadas (valley benches) of the Spring Range, generally up to the base of the steeper mountain slopes.

1. Larrea tridentata (Creosote bush) with various codominants forming a mosaic of communities; including Ambrosia dumosa (Bur-sage), Grayia spinosa (Hop-sage) and Ephedra spp. (Mormon tea). Krameria parvifolia (Range ratany) and Yucca schidigera (Mojave yucca) also common, along with various cacti, especially Opuntia spp. (Cholla).
2. Numbers and species vary greatly with annual precipitation totals. Non-native brome grasses dominant, especially Bromus rubens (Red brome) and B. tectorum (Cheatgrass). Hilaria rigida (Galleta) is a common native perennial grass. Eriogonum inflatum (Desert trumpet) is a typical forb.

Creosote bush-bursage is the preferred vegetative association habitat type of Gopherus agassazii (Desert tortoise), a Listed Threatened species under the federal Endangered Species Act (see Appendix 1). Also, Opuntia whipplei var. multigeniculata (Blue Diamond cholla), a Candidate species for the federal Endangered or Threatened list, occurs exclusively within the broad creosote bush community type, although within a site locality that is characterized by an anomolous vegetative species composition (see Appendix 2).

BLACKBRUSH [3500-6000']

Widespread throughout the upper bajadas, especially on soils shallowed over bedrock or caliche hardpans. Often occurs in nearly homogeneous stands.

1. Coleogyne ramosissima (Blackbrush) clearly dominant, interspersed with such desert shrubs as Yucca baccata (Banana yucca), Y. schidegera, Tetradymia spp. (Horsebrush) and Eriogonum spp. (Buckwheats). Cacti are less abundant but common. Yucca brevifolia (Joshua tree) commonly can occur in densities forming a strong codominance.
2. Herbaceous species composition is similar to the Creosotebush community, including Achnatherum speciosum (Desert needle grass) and A. hymenoides (Indian ricegrass), and Aristida purpurea (Purple three-awn).

The primary RRCNCA management concern relative to this vegetative community is Coleogyne's severe fire intolerance. Fire disturbance is invariably a type-converting event, since blackbrush demonstrates virtually no ability to re-establish itself. The problem affects the creosote bush community as well, but less critically, and in both cases stems from the presence of non-native annual grasses.

APPENDIX 4: Vegetative Community Types

Part B. Community Descriptions

JUNIPER-PINYON

[4000-7000']

Coniferous woodlands of the upper bajadas and mountain slopes. Soils higher in organic content; well-drained. Climate is cooler, with more precipitation.

1. Juniperous osteosperma (Utah juniper) numerous at lower elevations; gradually supplanted upslope by Pinus monophylla (Singleleaf pinyon). Artemisia tridentata (Sagebrush) is the common understory shrub.
2. Typically barren understory conditions with fewer grass/forb species, in sparser densities. Elymus elymoides (Squirreltail grass) not uncommon.

Fire is again a key management issue, but in an inverse relationship. Fire suppression in this community type generally detracts from overall biological biodiversity by preventing the creation of woodland openings that typically become re-colonized by chaparral community species (see Discussion (E)).

PONDEROSA PINE-WHITE FIR* [Generally above 6500']

Upland woodlands of patchy distribution and variable composition. Cooler and moisture climate conditions, with more highly developed soil profiles.

[* Associated species found in the southeastern Spring Range (RRCNCA) differ from those expected for pine-fir community types in southern Nevada. As such, Red Rock ponderosa pine is considered a relict population not properly classifiable under Bradley's coniferous forest series. Here the usage retains Bradley's zonal type but places it under the woodland vegetation series. Although not floristically precise this usage meets the non-technical descriptive purpose of this report, conforms to the key ecologic principle of elevational zonation and employs elements of a standard classification scheme that is widely recognized.]

- 1a. Pinus ponderosa* (Ponderosa pine) common and widespread, mostly as small scattered stands among the escarpment sandstone rimrock, but also forms more continuous, gallery-like stands in several east-draining canyons. Utah juniper, Singleleaf pinyon, Quercus turbinella (Scrub oak) and Cercocarpus ledifolius (Mountain-mahogany) are common associates.
- 1b. Abies concolor* (White fir) limited to a few sparse pockets above Pine Creek and one large closed-canopy forest atop La Madre Mountain. This stand typifies the normal zonal pattern for the two species, with ponderosa pine replaced by white fir at elevations above 7000'.
2. Numerous grasses and forbs occupy this open canopy woodland, including species commonly distributed throughout the Juniper-pinyon elevations, as well as species adapted to the more mesic (moister) uplands.

The relict population status bears management significance, as does the fire ecological condition of the Ponderosa pine, which requires disturbance events for optimal reproductive success.

APPENDIX 4: Vegetative Community Types

Part B. Community Descriptions

DESERT WASH

[Transzonal]

[This is Bradley's DESERT RIPARIAN type renamed to avoid confusion with the riparian terminology of present day usage.]

Shrub-tree community occurring along ephemeral washes that traverse elevations of both the creosote bush and blackbrush communities. Soils typically sandy, silty or rocky. Species composition differs noticeably from the traversed zonal communities, mainly as a function of increased water availability. The climate being identical, the difference is the subsurface storage of episodic precipitation runoff that accumulates in the wash channels.

1. Chrysothamnus paniculatus, (Mojave rabbitbrush), Prunus fasciculata (Desert almond), and Happlopappus spp. (Goldenbush) are common shrubs. Lower elevations of larger washes often retain enough water to support such trees as Chilopsis linearis (Desert [False] willow), Prosopis pubescens (Screwbean mesquite) and Acacia greggii (Catclaw acacia). Dominance is difficult to categorize since species composition often significantly varies from one wash to another, and between segments of the same wash.
2. Species composition of the herbaceous vegetation very similar to that of the adjacent alluvial fan terraces, though their numbers and flowering frequency are often much higher due to water availability and periodic surface disturbance (ie, flash-flooding).

The ephemeral wash communities exhibit greater biodiversity, in comparison to the adjacent creosote bush and blackbrush communities.

CHAPARRAL

[Transzonal]

Shrub-tree community of the upper washes and escarpment canyons; with cooler, more shaded conditions than in the traversed blackbrush, juniper-pinyon and pine-fir communities. Soils are shallow and overlain with rock and gravel.

1. These dense shrub thickets are comprised of a large variety of species, but commonly include Quercus turbinella (Scrub oak), Garrya flavescens (Silk tassel), Rhus trilobata (Squaw bush), Rhamnus spp. (Coffee berry), Arctostaphylos pungens (Mexican manzanita), Cercis canadensis (Redbud), Amelanchier spp. (Service berry), Celtis reticulata (Netleaf hackberry), and Symphoricarpos longiflorus (Snowberry).
2. Herbaceous composition mirrors that of the traversed communities, though usually in fewer numbers due to soil conditions and frequent surface scouring.

Two endemic special status plants, Angelica scabrida (Rough angelica) and Astragalus remotus (Spring Mountains milk vetch) occur widely here (Appendix 1). Fire ecology is also of concern, this being another community which requires periodic disturbance (flooding, rock slides, fire) in order to maintain itself.

APPENDIX 4: Vegetative Community Types
Part B. Community Descriptions

CLIFF COMMUNITY

[Transzonal]

[This and the chaparral type are split-offs from Bradley's RIPARIAN AND CLIFF community.]

Numerous, variably distributed species adapted to crevice micro-habitats in the escarpment sandstones (canyon walls; rimrock), the Spring Range limestone (ridge crags; upper slopes) and the La Madre Mountains limestone (cliff faces; ridges; slopes). Soils thin or absent; climate typically cooler and moister than adjacent habitat types, due to shading and precipitation storage.

1. Haplopappus cuneatus (Desert rock golden bush), Agave spp. (Century plant), Petrophytum caespitosum (Rock spirea), Forsellesia spp. (Grease bush) and many fern species are present. Diverse species composition again does not lend itself to dominance/codominance categorizations.
2. Monardella odoratissima (Pennyroyal), Heterotheca spp. (Golden aster), Frasera albomarginata (White-margined frasera) and various cacti species are common representatives of the highly variable herbaceous component.

This community harbors a strong preponderance of endemic and/or special status species, as exemplified by the Bridge Mountain biodiversity hotspot (Appendix 1 & 2).

RIPARIAN COMMUNITY

[Transzonal]

[This is lumped from Bradley's DESERT RIPARIAN, DESERT SPRINGS and STREAM RIPARIAN types.]

Composed of numerous, differentially distributed species that are exclusively restricted to sites with permanent water. In RRCNCA, all such riparian areas derive from contact springs (perched water table conditions). Soils deeper, more organic; climate cooler due to canopy-provided shade.

1. Populus fremontii (Cottonwood), Fraxinus velutina (Velvet ash) and Salix spp. (Arroyo; Coyote willows) are common trees; Baccharis sergiloides (Squaw waterweed) and Pluchea sericea (Arrow weed) are typical shrubs. Vitus arizonica (Canyon grape) is a widespread woody vine. Dominance is again difficult to identify due to species compositional variability.
2. Herbaceous plants include numerous sedges (Carex spp.; Eleocharis spp.), rushes (Juncus spp.) and grasses (Agrostis spp.; Muhlenbergia spp.; Polypogon spp.). Anemopsis californica (Yerba mansa) is a common perennial forb. Also common is Equisetum spp. (Horsetail) and Typha spp. (Cat-tail). Saline sites host such species as Distichlis spicata (Desert saltgrass) and Solidago spp. (Golden rod).

Of immediate management concern is the extreme concentration of recreational and feral animal use sustained by these riparian areas, in combination with the threat posed by invasive exotic plants (particularly Tamarix spp. (Salt cedar). It is also this community which supports the greatest proportion of endemic and/or special status species in RRCNCA (Appendix 1 & 2).

APPENDIX 5: SPECIES LIST, MAMMALS (Non-bats)

ORDER	Common Name	Cited by/Yr
<u>Genus species</u>		
*Unconfirmed in RRCNCA		
RODENTIA (Rodents, Squirrels)		
<u>Tamias panamintinus</u>	Panamint chipmunk	Misc/97
<u>Tamias palmeri</u> *	Palmer's chipmunk	RRHMP/69
<u>Ammospermophilus leucurus</u>	White-tailed antelope squirrel	NDOW/93
<u>Spermophilus tereticaudus</u>	Round-tailed ground squirrel	RRHMP/69
<u>Spermophilus variegatus</u>	Rock squirrel	Misc/97
<u>Thomomys bottae</u>	Botta's pocket gopher	NDOW/93
<u>Chaetodipus formosus</u> *	Long-tailed pocket mouse	NDOW/93
<u>Chaetodipus penicillatus sobrinus</u> *	Desert pocket mouse	RREIS/75
<u>Perognathus longimembris</u>	Little pocket mouse	NDOW/93
<u>Perognathus parvus</u>	Great Basin pocket mouse	RREIS/75
<u>Dipodomys desertii</u>	Desert kangaroo rat	RRHMP/69
<u>Dipodomys merriami</u>	Merriam's kangaroo rat	NDOW/93
<u>Dipodomys microps occidentalis</u>	Chisel-toothed kangaroo rat	RREIS/75
<u>Dipodomys ordii</u>	Ord kangaroo rat	NDOW/93
<u>Neotoma lepida</u>	Desert woodrat	NDOW/93
<u>Onychomys torridus</u>	Southern grasshopper mouse	NDOW/93
<u>Peromyscus boylii</u>	Brush mouse	UNLV/96
<u>Peromyscus crinitus</u>	Canyon mouse	UNLV/96
<u>Peromyscus eremicus</u>	Cactus mouse	UNLV/96
<u>Peromyscus maniculatus</u>	Deer mouse	UNLV/96
<u>Peromyscus truei</u>	Pinyon mouse	UNLV/96
<u>Reithrodontomys megalotis</u>	Western harvest mouse	UNLV/96
<u>Erithizon dorsatum</u>	Porcupine	RRHMP/69

APPENDIX 5: SPECIES LIST, MAMMALS (except Bats)

ORDER	Common Name	Cited by/Yr
<u>Genus species</u>		
LAGOMORPHA (Rabbits, Hares)		
<u>Sylvilagus nutallii</u>	Nuttall's cottontail	RRHMP/69
<u>Sylvilagus audubonii</u>	Desert cottontail	NDOW/93
<u>Lepus californicus</u>	Black-tailed hare (jack rabbit)	NDOW/93
CARNIVORA (Carnivores)		
<u>Canis latrans</u>	Coyote	Misc/97
<u>Urocyon cinereoargenteus</u>	Gray fox	NDOW/93
<u>Vulpes macrotis</u>	Kit fox	Misc/97
<u>Taxidea taxus</u>	Badger	Misc/97
<u>Mephitis mephitis</u>	Striped skunk	RREIS/75
<u>Spilogale gracilis</u>	Western spotted skunk	RREIS/75
<u>Bassariscus astutus</u>	Ringtail (Civet Cat)	NDOW/95
<u>Felis concolor</u>	Mountain lion	NDOW1/96
<u>Felis rufus</u>	Bobcat	Misc/97
ARTIODACTYLA (Hoofed Animals)		
<u>Odocoileus hemionus</u>	Mule deer	Misc/97
<u>Cervus elaphus</u>	Elk	NDOW2/96
<u>Ovis canadensis</u>	Bighorn sheep	Misc/97
.....		
RRCNCA Total:	38 Species (non-bats)	

Key: Misc/97... Denotes commonly observed species.
 UNLV/96... Riddle, B.R. RRCNCA wildlife; personnel communication.
 NDOW1/96.. Hardenbrook, D.B. RRCNCA wildlife; personnel communication.
 NDOW2/96.. Cox, M. RRCNCA wildlife; personnel communication.

APPENDIX 6: SPECIES LIST, BATS

[Habitat Type] <u>Genus species</u>	Common Name	Cited by/Yr
[multiple habitats]		
<u>Antrozous pallidus</u>	Pallid bat	Ramsey/97
<u>Eptesicus fuscus</u>	Big brown bat	Ramsey/97
<u>Idionycteris phyllotis</u>	Lappet-eared bat	Ramsey/97
<u>Myotis californicus</u>	California myotis	Ramsey/97
<u>Myotis ciliolabrum</u>	Western small-footed myotis	Ramsey/97
<u>Myotis evotis</u>	Long-eared myotis	Ramsey/94
<u>Myotis lucifugus</u>	Little brown myotis	Ramsey/94
<u>Myotis thysanodes</u>	Fringed myotis	Ramsey/97
<u>Myotis volans</u>	Long-legged myotis	Ramsey/97
<u>Myotis yumanensis</u> [^]	Yuma myotis	Ramsey/94
<u>Tadarida brasiliensis mexicana</u>	Brazilian free-tailed bat	Ramsey/97
[tree-roosts]		
<u>Lasiurus borealis</u>	Eastern red bat	RREIS/75
<u>Lasiurus cinereus</u>	Hoary bat	O'Farrel/68
[cliff-roosts]		
<u>Euderma maculatum</u>	Spotted bat	Ramsey/97*
<u>Pipistrellus hesperus</u>	Western pipistrelle	Ramsey/97
<u>Nyctinomops macrotis</u>	Big free-tailed bat	RRHMP/69
[cave roosts]		
<u>Corvynorhinus townsendii</u>	Townsend's big-eared	Ramsey/97
.....		
RRCNCA Total: 17 Bat Species		

[^] USFS, Potosi Spring record.
* Vocalization only.

APPENDIX 7: SPECIES LIST, REPTILES & AMPHIBIANS

CLASS [Family] <u>Genus species</u>	Common Name	Cited by/Yr
REPTILIA		
[Gekkonidae: Geckos]		
<u>Coleonyx variegatus</u>	Western banded gecko	NDOW/93
[Iguanidae: Lizards]		
<u>Dipsosaurus dorsalis</u>	Desert iguana	RRHMP/69
<u>Sauromalus obesus</u>	Chuckwalla	NDOW/95
<u>Callisaurus draconoides draconoides</u>	Zebra-tailed lizard	NDOW/94
<u>Crotaphytus collaris</u>	Common collared lizard	RRHMP/69
<u>Crotaphytus insularis</u>	Desert collared lizard	NDOW/93
<u>Gambelia wislizenii</u>	Long-nosed leopard lizard	NDOW/93
<u>Sceloporus magister</u>	Desert spiny lizard	NDOW/93
<u>Sceloporus occidentalis</u>	Western fence lizard	NDOW/94
<u>Sceloporus graciosus</u>	Sagebrush lizard	NDOW/94
<u>Urosaurus graciosus</u>	Long-tailed brush lizard	RRHMP/69
<u>Urosaurus ornatus</u>	Tree lizard	RRHMP/69
<u>Uta stansburiana</u>	Side-blotched lizard	NDOW/93
<u>Phrynosoma platyrhinos</u>	Desert horned lizard	NDOW/93
[Xantusiidae: Night lizards]		
<u>Xantusia vigilis</u>	Desert night lizard	NDOW/93
[Scincidae: Skinks]		
<u>Eumeces gilberti</u>	Gilbert skink	NDOW/94
<u>Eumeces skiltonianus</u>	Western skink	NDOW/94
[Teiidae: Whiptails]		
<u>Cnemidophorus tigris</u>	Western whiptail	NDOW/93
[Helodermatidae: Venomous lizards]		
<u>Heloderma suspectum cinctum</u>	Banded Gila monster	NDOW/96
[Leptotyphlopidae: Slender blind snakes]		
<u>Leptotyphlops humilis</u>	Western blind snake	RRHMP/69

APPENDIX 7: SPECIES LIST, REPTILES & AMPHIBIANS

CLASS [Family] <u>Genus species</u>	Common Name	Cited by/Yr
[Colubridae: Snakes]		
<u>Diadophis punctatus</u>	Ringneck snake	NDOW/95
<u>Phyllorhynchus descurtatus</u>	Western leaf-nosed	RRHMP/69
<u>Masticophis flagellum</u>	Coachwhip	NDOW/93
<u>Masticophis taeniatus</u>	Striped whipsnake	NDOW/94
<u>Salvadora hexalepis</u>	Western patch-nosed	NDOW/95
<u>Arizona elegans</u>	Glossy snake	NDOW/95
<u>Pituophis melanoleucous</u>	Gopher snake	NDOW/93
<u>Lampropeltis getulus</u>	Common kingsnake	NDOW/93
<u>Rhinocheilus lecontei</u>	Long-nosed snake	NDOW/93
<u>Sonora semiannulata</u>	Ground snake	NDOW/93
<u>Chionactis occipitalis</u>	Western shovel-nosed	NDOW/94
<u>Tantilla hobartsmithi</u>	Southwestern black-headed	NDOW/93
<u>Trimorphodon biscutatus</u>	Lyre snake	NDOW/93
<u>Trimorphodon biscutatus lambda</u>	Sonoran lyre snake	RRHMP/69
<u>Hypsiglena torquata</u>	Night snake	NDOW/93
[Viperidae: Vipers]		
<u>Crotalus mitchelli</u>	Speckled rattlesnake	NDOW/93
<u>Crotalus cerastes</u>	Sidewinder	NDOW/94
<u>Crotalus scutulatus</u>	Mojave green rattlesnake	NDOW/95
[Bufonidae: True toads]		
<u>Bufo punctatus</u>	Red-spotted toad	NDOW/93
[Hylidae: Tree frogs]		
<u>Pseudacris regilla</u>	Pacific chorus frog	NDOW/93
[Testudinidae: Land tortoises]		
<u>Gopherus agassazii</u>	Desert tortoise	Misc/97
.....		
RRCNCA Total:	41 Species	

APPENDIX 8: SPECIES LIST, BIRDS

[Family] <u>Genus species</u>	Common Name	Cited by/Yr
[Anatidae: Ducks, Geese]		
<u>Branta canadensis</u>	Canada goose	RRRL/86
<u>Anas platyrhynchos</u>	Mallard	RRAS/98
[Ardidae: Herons]		
<u>Ardea herodias</u>	Great blue heron	RRAS/94
<u>Butorides striatus</u>	Green-backed heron	RRAS/94
<u>Casmerodius albus</u>	Great egret	RRAS/95
[Charadriidae: Plovers]		
<u>Charadrius vociferus</u>	Killdeer	RRAS/95
<u>Gallinago gallinago</u>	Common snipe	RRAS/97
<u>Tringa solitaria</u>	Solitary sandpiper	RRAS/94
[Phasianidae: Quail]		
<u>Alectoris chukar</u>	Chukar	NCA/97
<u>Callipepla gambelii</u>	Gambel's quail	RRAS/95
[Columbidae: Doves]		
<u>Zenaida asiatica</u>	White-winged dove	RRRL/86
<u>Zenaida macroura</u>	Mourning dove	RRAS/96
[Cuculidae: Roadrunners]		
<u>Geococcyx californianus</u>	Greater roadrunner	RRAS/96
[Picidae: Woodpeckers]		
<u>Colaptes auratus</u>	Northern flicker	RRAS/96
<u>Picoides scalaris</u>	Ladder-backed woodpecker	RRAS/96
<u>Picoides villosus</u>	Hairy woodpecker	RRRL/86
<u>Sphyrapicus nuchalis</u>	Red-naped sapsucker	RRAS/96
<u>Sphyrapicus ruber</u>	Red-breasted sapsucker	RRRL/86
<u>Sphyrapicus varius</u>	Yellow-bellied sapsucker	RRRL/86
[Alcedinidae: Kingfishers]		
<u>Ceryle alcyon</u>	Belted kingfisher	RRAS/95

APPENDIX 8: SPECIES LIST, BIRDS

<u>Genus species</u>	Common Name	Cited by/Yr
[Cathartidae: Vultures]		
<u>Cathartes aura</u>	Turkey vulture	NCA/97
[Accipitridae: Hawks, Eagles]		
<u>Accipiter cooperii</u>	Cooper's hawk	RRAS/96
<u>Accipiter gentilis</u>	Northern goshawk	RRRL/86
<u>Accipiter striatus</u>	Sharp-shinned hawk	RRAS/95
<u>Buteo jamaicensis</u>	Red-tailed hawk	RRAS/96
<u>Buteo lagopus</u>	Rough-legged hawk	NCA/92
<u>Buteo regalis</u>	Ferruginous hawk	RRRL/86
<u>Buteo swainsoni</u>	Swainson's hawk	RRRL/86
<u>Circus cyaneus</u>	Northern harrier	RRRL/86
<u>Aquila chrysaetos</u>	Golden eagle	RRAS/95
[Falconidae: Falcons]		
<u>Falco columbarius</u>	Merlin	RRRL/86
<u>Falco mexicanus</u>	Prairie falcon	RRAS/97
<u>Falco peregrinus anatum</u>	American peregrine falcon	RRAS/97
<u>Falco sparverius</u>	American kestrel	RRAS/95
[Strigidae: Owls]		
<u>Aegolius acadicus</u>	Northern saw-whet owl	RRHMP/69
<u>Asio flammeus</u>	Short-eared owl	NCA/96
<u>Asio otus</u>	Long-eared owl	RRAS/96
<u>Athene cuniculari</u>	Burrowing owl	NCA/93
<u>Bubo virginianus</u>	Great horned owl	RRAS/97
<u>Otus kennicottii</u>	Western screech owl	RRHMP/69
<u>Tyto alba</u>	Barn owl	RRRL/86
[Trochilidae: Hummingbirds]		
<u>Archilochus alexandri</u>	Black-chinned hummingbird	RRAS/96
<u>Calypte anna</u>	Anna's hummingbird	RRAS/96
<u>Calypte costae</u>	Costa's hummingbird	RRAS/96

APPENDIX 8: SPECIES LIST, BIRDS

<u>Genus species</u>	Common Name	Cited by/Yr
<u>Selasphorus platycercus</u>	Broad-tailed hummingbird	RRRL/86
<u>Selasphorus rufus</u>	Rufous hummingbird	RRRL/86
<u>Stellula calliope</u>	Calliope hummingbird	RRRL/86
[Caprimulgidae: Nightjars]		
<u>Chordeiles acutipennis</u>	Lesser nighthawk	RRRL/86
<u>Chordeiles minor</u>	Common nighthawk	RRHMP/69
<u>Phalaenoptilus nuttallii</u>	Common poorwill	NDOW/93
[Tyrannidae: Tyrant flycatchers]		
<u>Contopus sordidulis</u>	Western wood pewee	RRAS/96
<u>Contopus borealis</u>	Olive-sided flycatcher	RRAS/98
<u>Empidonax hammondi</u>	Hammond's flycatcher	RRRL/86
<u>Empidonax oberholseri</u>	Dusky flycatcher	RRRL/86
<u>Empidonax occidentalis</u>	Cordilleran flycatcher	RRAS/95
<u>Empidonax traillii</u>	Willow flycatcher	RRRL/86
<u>Empidonax wrightii</u>	Gray flycatcher	RRAS/94
<u>Myiarchus cinerascens</u>	Ash-throated flycatcher	RRAS/96
<u>Myiarchus tyrannulus</u>	Brown-crested flycatcher	RRRL/86
<u>Pyrocephalus rubinus</u>	Vermillion flycatcher	RRHMP/69
<u>Sayornis nigricans</u>	Black phoebe	RRAS/96
<u>Sayornis saya</u>	Say's phoebe	RRAS/95
<u>Tyrannus verticalis</u>	Western kingbird	RRAS/96
<u>Tyrannus vociferans</u>	Cassin's kingbird	RRRL/86
[Hirundinidae: Swallows]		
<u>Hirundo pyrrhonota</u>	Cliff swallow	RRHMP/69
<u>Hirundo rustica</u>	Barn swallow	RRRL/86
<u>Stelgidopteryx serripennis</u>	Northern rough-winged swallow	RRAS/96
<u>Tachycineta bicolor</u>	Tree swallow	RREIS/75
<u>Tachycine tathalassina</u>	Violet-green swallow	RRAS/96
[Corvidae: Jays, Crows]		
<u>Aphelocoma coerulescens</u>	Scrub jay	RRAS/96

APPENDIX 8: SPECIES LIST, BIRDS

<u>Genus species</u>	Common Name	Cited by/Yr
<u>Corvus brachyrhynchos</u>	American crow	RRHMP/69
<u>Corvus corax</u>	Common raven	RRAS/95
<u>Gymnorhinus cyanocephalus</u>	Pinyon jay	RRRL/86
<u>Nucifraga columbiana</u>	Clark's nutcracker	NCA/97
[Alaudidae: Larks]		
<u>Eremophila alpestris</u>	Horned lark	RRRL/86
[Apodidae: Swifts]		
<u>Aeronautes saxatalis</u>	White-throated swift	RRAS/96
[Paridae: Chickadees, Titmice]		
<u>Parus gambeli</u>	Mountain chickadee	RRRL/86
<u>Parus inornatus</u>	Plain titmouse	RRRL/86
[Aegithalidae: Bushtit]		
<u>Psaltriparus minimus</u>	Bushtit	RRRL/86
[Remizidae: Verdin]		
<u>Auriparus flaviceps</u>	Verdin	RRAS/96
[Sittidae: Nuthatches]		
<u>Sitta canadensis</u>	Red-breasted nuthatch	RRRL/86
<u>Sitta carolinensis</u>	White-breasted nuthatch	RRRL/86
<u>Sitta pygmaea</u>	Pygmy nuthatch	RRRL/86
[Troglodytidae: Wrens]		
<u>Thryomanes bewickii</u>	Bewick's wren	RRAS/96
<u>Troglodytes aedon</u>	House wren	RRAS/95
<u>Troglodytes troglodytes</u>	Winter wren	RRRL/86
<u>Campylorhynchus brunneicapillus</u>	Cactus wren	NCA/93
<u>Catherpes mexicanus</u>	Canyon wren	RRRL/86
<u>Salpinctes obsoletus</u>	Rock wren	RRRL/86
[Laniidae: Shrikes]		
<u>Lanius ludovicianus</u>	Loggerhead shrike	NCA/93
[Sturnidae: Starlings]		
<u>Sturnus vulgaris</u>	European starling	RRAS/95

APPENDIX 8: SPECIES LIST, BIRDS

<u>Genus species</u>	Common Name	Cited by/Yr
[Bombycillidae: Waxwings]		
<u>Bombycilla cedrorum</u>	Cedar waxwing	RRAS/96
[Ptilogonatidae: Silky flycatchers]		
<u>Phainopepla nitens</u>	Phainopepla	RRAS/96
[Muscicapidae: Gnatcatchers]		
<u>Regulus calendula</u>	Ruby-crowned kinglet	RRAS/96
<u>Regulus satrapa</u>	Golden-crowned kinglet	RRRL/86
<u>Polioptila caerulea</u>	Blue-gray gnatcatcher	RRAS/96
<u>Polioptila melanura</u>	Black-tailed gnatcatcher	RRRL/86
[Mimidae: Mimic thrushes]		
<u>Mimus polyglottos</u>	Northern mockingbird	RRAS/96
<u>Oreoscoptes montanus</u>	Sage thrasher	RRRL/86
<u>Toxostoma bendirei</u>	Bendire's thrasher	RRRL/86
<u>Toxostoma crissale</u>	Crissal thrasher	RRAS/95
<u>Toxostoma curvirostre</u>	Curve-billed thrasher	RRRL/86
<u>Toxostoma lecontei</u>	LeConte's thrasher	RRRL/86
<u>Catharus guttatus</u>	Hermit thrush	RRRL/86
<u>Myadestes townsendii</u>	Townsend's solitaire	RRRL/86
<u>Sialia currucoides</u>	Mountain bluebird	RRRL/86
<u>Sialia mexicana</u>	Western bluebird	RRRL/86
<u>Turdus migratorius</u>	American robin	RRAS/96
[Vireonidae: Vireos]		
<u>Vireo bellii</u>	Bell's vireo	RRRL/86
<u>Vireo hutoni</u>	Hutton's vireo	RRRL/86
<u>Vireo solitarius</u>	Solitary vireo	RRAS/95
<u>Vireo gilvus</u>	Warbling vireo	RRAS/96
<u>Vireo olivaceus</u>	Red-eyed vireo	RRRL/86
<u>Vireo vicinior</u>	Gray vireo	RRRL/86
[Emberizidae: Wood warblers]		
<u>Guiraca caerulea</u>	Blue grosbeak	RRAS/96

APPENDIX 8: SPECIES LIST, BIRDS

<u>Genus species</u>	Common Name	Cited by/Yr
<u>Pheucticus melanocephalus</u>	Black-headed grosbeak	RRAS/96
<u>Passerina amoena</u>	Lazuli bunting	RRAS/96
<u>Passerina cyanea</u>	Indigo bunting	RRRL/86
<u>Cardinalis cardinalis</u>	Northern cardinal	RRRL/86
<u>Amphispiza belli</u>	Sage sparrow	RRRL/86
<u>Amphispiza bilineata</u>	Black-throated sparrow	RRAS/96
<u>Chondestes grammacus</u>	Lark sparrow	RRAS/95
<u>Melospiza melodia</u>	Song sparrow	RRAS/96
<u>Melospiza lincolni</u>	Lincoln's sparrow	RRAS/96
<u>Passerculus sandwichensis</u>	Savannah sparrow	RRAS/94
<u>Spizella atrogularis</u>	Black-chinned sparrow	RRRL/86
<u>Spizella breweri</u>	Brewer's sparrow	RRAS/96
<u>Spizella passerina</u>	Chipping sparrow	RRAS/95
<u>Zonotrichia atricapilla</u>	Golden-crowned sparrow	RRRL/86
<u>Zonotrichia leucophrys</u>	White-crowned sparrow	RRAS/96
<u>Calcarius ornatus</u>	Chestnut-collared longspur	RRRL/86
<u>Pipilo aberti</u>	Abert's towhee	RRAS/95
<u>Pipilo chlorurus</u>	Green-tailed towhee	RRAS/95
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	RRAS/96
<u>Junco hyemalis</u>	Dark-eyed junco	RRAS/95
<u>Dendroica magnolia</u>	Magnolia warbler	RRRL/86
<u>Dendroica nigrescens</u>	Black-throated gray warbler	NDOW/95
<u>Dendroica occidentalis</u>	Hermit warbler	RRRL/86
<u>Dendroica petechia</u>	Yellow warbler	RRAS/95
<u>Dendroica coronata</u>	Yellow-rumped warbler	RRAS/96
<u>Dendroica graciae</u>	Grace's warbler	RRRL/86
<u>Dendroica townsendi</u>	Townsend's warbler	RRAS/95
<u>Geothlypis trichas</u>	Common yellowthroat	RRAS/95
<u>Oporornis tolmiei</u>	MacGillivray's warbler	RRAS/96
<u>Vermivora celata</u>	Orange-crowned warbler	RRAS/96

APPENDIX 8: SPECIES LIST, BIRDS

<u>Genus species</u>	Common Name	Cited by/Yr
<u>Vermivora luciae</u>	Lucy's warbler	RRAS/96
<u>Vermivora ruficapilla</u>	Nashville warbler	RRRL/86
<u>Vermivora virginiae</u>	Virginia's warbler	RRRL/86
<u>Wilsonia pusilla</u>	Wilson's warbler	RRAS/96
<u>Icteria virens</u>	Yellow-breasted chat	RRRL/86
<u>Euphagus cyanocephalus</u>	Brewer's blackbird	RRAS/94
<u>Icterus cucullatus</u>	Hooded oriole	RRAS/96
<u>Icterus galbula</u>	Northern oriole	RRAS/96
<u>Icterus parisorum</u>	Scott's oriole	RRRL/86
<u>Molothrus ater</u>	Brown-headed cowbird	RRAS/96
<u>Quiscalus mexicanus</u>	Great-tailed grackle	RRAS/96
<u>Sturnella neglecta</u>	Western meadowlark	RRRL/86
<u>Piranga flava</u>	Hepatic tanager	RRHMP/69
<u>Piranga ludoviciana</u>	Western tanager	RRAS/96
<u>Piranga rubra</u>	Summer tanager	RRAS/96
[Fringillidae: Finches]		
<u>Carpodacus cassinii</u>	Cassin's finch	RRRL/86
<u>Carpodacus mexicanus</u>	House finch	RRAS/96
<u>Carpodacus purpureus</u>	Purple finch	RRRL/86
<u>Carduelis lawrencei</u>	Lawrence's goldfinch	RRRL/86
<u>Carduelis pinus</u>	Pine siskin	RRAS/96
<u>Carduelis psaltria</u>	Lesser goldfinch	RRAS/96
<u>Carduelis tristis</u>	American goldfinch	RRAS/95
<u>Coccothraustes vespertina</u>	Evening grosbeak	RRRL/86
<u>Loxia curvirostra</u>	Red crossbill	RRRL/86
[Passeridae: Weaver finches]		
<u>Passer domesticus</u>	House sparrow	RRAS/95
.....		
RRCNCA Total:	170 Bird Species	

APPENDIX 9: SPECIES LIST, INVERTEBRATES

CLASS:

Order
Family

Genus species
Common Name

Sites of Occurrence

CRUSTACEA:
Crustaceans

Ostracoda
Unidentified

Unidentified
Ostracod

Mormon Green #1; Bootleg; Rainbow;
Lone Pine; Mud #1 & Moonshine Springs

GASTROPODA:
Molluscs; Snails

Limnophila
Physidae

Physella virgata

Calico & Lone Pine Springs

Mesogastropoda
Hydrobiidae

Pyrgulopsis sp.?
Springsnail

Rainbow Spring

Pyrgulopsis turbatrix
SE NV Springsnail

Lost Creek; La Madre & Willow* Springs
[*Pending reintroduction]

Pyrgulopsis deaconi
Spring Mtns Springsnail

Red; Willow* Springs
[*Pending reintroduction]

INSECTA:
Insects

Coleoptera
Dytiscidae

Agabus sp.
Predacious diving beetle

Calico; Sheep; South Fork and Lone Pine Springs

Hydroporus sp.
Predacious diving beetle

Bootleg; Rainbow; Sheep; Moonshine; Red Rock Seep; South Fork & Lone Pine Spgs

Laccophilus sp.
Predacious diving beetle

Mud Spring #1

Hydrophilidae

Cymbiodyta sp.
Water scavenger beetle

Bootleg; Rainbow; Sheep; Red Rock Seep; Schumacher & Lone Pine Springs

Agabinus sp.
Water scavenger beetle

Sheep Spring

Enochrus sp.
Water scavenger beetle

Schumacher Spring

APPENDIX 9: SPECIES LIST, INVERTEBRATES

CLASS: Order Family	<u>Genus species</u> <i>Common Name</i>	Sites of Occurrence
INSECTA: (Cont.)		
Hydraenidae	<u>Hydraena sp.</u>	Red Rock Seep & Bootleg Spring
Diptera Chironomidae	<u>Unidentified sp.</u> <i>Midge</i>	Calico; Bootleg; Rainbow; Shovel; Moonshine; Red Rock Seep (3 spp.); Mud #1; Mormon Green #1; Schumacher; South Fork & Lone Pine Springs
Stratiomyidae	<u>Unidentified sp.</u> <i>Soldier fly</i>	Calico Spring
	<u>Odontomyia sp.</u> <i>Soldier fly</i>	Bootleg; Rainbow; Red Rock Seep; Schumacher & South Fork Springs
	<u>Stratiomys sp.</u> <i>Soldier fly</i>	Mormon Green #1 & Sheep Springs
Psychodidae	<u>Pericoma sp.</u>	Red Rock Seep & Bootleg Springs
Simuliidae	<u>Unidentified sp.</u> <i>Black fly</i>	Bootleg; Rainbow; Moonshine; Red Rock seep; Mormon Green #1; South Fork & Lone Pine Springs
Ceratopogonidae	<u>Unidentified sp.</u> <i>Punkies</i>	Sheep; Shovel; Schumacher; South Fork; Mormon Green #1 & Lone Pine Springs
Tabanidae	<u>Tabanus sp.</u> <i>Horse fly</i>	Sheep & Moonshine Springs
Dixidae	<u>Dixella sp.</u>	Mormon Green #1 & Moonshine Springs
Culicidae	<u>Unidentified sp.</u> <i>Mosquito</i>	Moonshine Spring
Tipulidae	<u>Unidentified sp.</u> <i>Crane fly</i>	Schumacher Spring
Ephemeroptera Ameletidae	<u>Ameletus sp.</u> <i>Mayfly</i>	South Fork Spring
Baetidae	<u>Baetis sp.</u> <i>Mayfly</i>	Calico; Mormon Green #1; Rainbow; Bootleg & Lone Pine Springs
	<u>Unidentified sp.</u> <i>Mayfly ?</i>	Schumacher Spring
	<u>Callibaetis sp.</u> <i>Mayfly</i>	Mormon Green Spring #1
Hemiptera Corixidae	<u>Hesperocorix laevigata</u> <i>Water boatman</i>	Calico Spring

APPENDIX 9: SPECIES LIST, INVERTEBRATES

CLASS: Order Family	<u>Genus species</u> <i>Common Name</i>	Sites of Occurrence
Gerridae	<u>Unidentified sp.</u> <i>Water Strider</i>	Bootleg & Moonshine Springs
	<u>Gerris sp.</u> <i>Water Strider</i>	South Fork Spring
Veliidae	<u>Microvelia sp.</u> <i>True Bug</i>	Mud #1; Schumacher; Bootleg; South Fork & Lone Pine Springs
Odonata Coenagrionidae	<u>Argia sp.</u> <i>Damselfly</i>	Calico; Sheep; Rainbow; Moonshine; Bootleg; Mud #1; Mormon Green #1 & Lone Pine Springs
Trichoptera Hydroptilidae	<u>Ochrotrichia sp.</u>	Bootleg; South Fork; Rainbow; Sheep & Lone Pine Springs
Limnephilidae	<u>Limnephilus sp.</u> <i>Northern caddisfly</i>	Bootleg & South Fork Springs
	<u>Hesperophylax sp.</u> <i>Northern caddisfly</i>	Sheep Spring
Hydropsychidae	<u>Hydropsyche sp.</u>	Lone Pine Spring

Reference cited:

Sada, D. and J. Nachlinger. 1998. Spring Mountains Ecosystem: Vulnerability of Spring-fed Aquatic and Riparian Systems to Biodiversity Loss. Part II, Springs Surveyed in 1997. Contract report prepared for U.S. Bureau of Land Management, Las Vegas, NV.

APPENDIX 10: INVENTORY OF SPRINGS (Conducted 1993-1998)

Part A. Confirmed Springs

SPRING NAME	Twon, Rng, Sec, Qtrs	Type (*)	Discharge (Gal/min)	Survey Date	N-No.
*P=Perennial; I=Intermittent					
SCHUMACHER	18S 58E 33 NW SW	P	00.10	01/96	N-01
GRASSY	18S 58E 32 NW SE	P	10.00	01/96	N-02
GRAPEVINE	19S 58E 16 SW NW	P	00.30	01/96	N-03
SHEEP	20S 57E 36 SW SW	P	05.00	05/97	N-08
SOUTH FORK	20S 57E 36 SE SE	P	50.00	01/96	N-09
UNNAMED	20S 58E 29 SW SW	P	05.00	01/96	N-14
LA MADRE	20S 58E 29 SE NW	P	100.0	01/96	N-15
WILLOW	20S 58E 33 SW SW	P	04.50	05/95	N-17
LOST CREEK	21S 58E 04 NW NW	P	50.00	01/96	N-18
WHITE ROCK	20S 58E 33 NE NE	P	00.50	05/95	N-19
ASH CREEK	21S 58E 01 NW NE	P	00.10	05/95	N-25
LITTLE CREEK	21S 58E 01 SE NE	I	00.10	01/96	N-26
LONE PINE	21S 58E 07 NW NW	P	10.00	01/96	N-27
[or UPPER SWITCHBACK]					
SWITCHBACK	21S 58E 07 NW NW	P	15.00	05/95	N-28
[or LOWER SWITCHBACK]					
ICEBOX CANYON	21S 58E 08 SE NW	?	03.50	09/79	N-29
CLAY BANK #2	20S 57E 25 NW SW	P	05.00	08/98	N-30
PINE CREEK	21S 58E 16 NW SE	P	25.00	05/95	N-31
OAK CREEK	21S 58E 21 SE SE	P	30.00	05/95	N-32
FIRST CREEK	21S 58E 33 SW NE	P	10.00	05/95	N-33
CALICO	21S 59E 06 NW SW	I	00.10	12/96	N-34
RED	21S 59E 06 SW SW	P	07.40	05/95	N-35
OLIVER RANCH	22S 58E 01 SE SW	P	40.00	05/96	N-36
[or INDIAN SPRING]					
LONE WILLOW	22S 58E 02 SE NE	I	00.10	05/96	N-37
RAINBOW	22S 58E 07 SE NE	P	25.00	05/97	N-40
BOOTLEG	22S 58E 07 NE SE	P	25.00	05/97	N-41
MORMON GREEN #1	22S 58E 12 NW NW	P	30.00	01/96	N-43
MORMON GREEN #2	22S 58E 01 SW SW	I	00.10	08/74	N-44
MORMON GREEN #3	22S 58E 12 NW NW	I	00.10	12/96	N-61
POINT #2	22S 58E 10 NW NW	I	00.10	??/79	N-42
POINT	22S 58E 11 NW NW	?	00.30	01/96	N-45
SANDSTONE #2	22S 58E 14 NW SE	I	00.01	10/96	N-46
MUD #1	22S 58E 14 SE SW	P	00.40	01/96	N-47
[or LOWER MUD SPRING]					
L.M.	22S 58E 14 NW SW	I	00.01	10/96	N-48
[or UPPER MUD SPRING]					
MOONSHINE	22S 58E 22 SW SE	P	05.00	01/96	N-52
RED ROCK SEEPS	22S 58E 22 NW NE	P	02.00	01/96	N-53
LONE GRAPEVINE	22S 58E 22 NE SE	P	00.50	05/95	N-54
MUD SPRING #2	22S 58E 23 NW NE	I	04.50	01/96	N-55
SHOVEL SPRING	22S 58E 22 SW SE	P	01.00	01/96	N-56
WHEELER CAMP	22S 59E 07 NW NW	P	30.00	05/95	N-57
WILSON TANK	23S 58E 24 NE SW	P	00.01	01/96	N-58
[or TUNNEL SPRING]					
BIRD	24S 59E 04 SW NE	P	00.01	01/96	N-59
COTTONWOOD (private?)	22S 58E 03 SE SE	P	00.50	01/96	N-60

APPENDIX 10: INVENTORY OF SPRINGS (Conducted 1993-1998)

Part B. Deleted Springs (Springs listed in prior planning documents but now reclassified on the basis of a 1993-1998 status verification inventory).

N-No./SITE NAME	T_S,R_E,S._,1/4s	Date	Status Determination
N-** UNNAMED	20,58,S.29 SE NW	01/96	Seep within La Madre Spring drainage.
N-04 UNNAMED	20,57,S.36 SE NE	04/98	Seep within South Fork Spring drainage.
N-05 UNNAMED	20,57,S.36 SE NW	04/98	Upland habitat site (dry).
N-06 UNNAMED	20,57,S.36 NE SE	04/98	Seep within South Fork Spring drainage.
N-07 UNNAMED	20,57,S.36 NE SE	04/98	Seep within South Fork Spring drainage.
N-10 UNNAMED	21,58,S.06 SE NW	04/98	Seep within South Fork Spring drainage.
N-11 DJ SPRING	20,58,S.18 NW SW	05/98	Upland habitat site (dry).
N-12 UNNAMED	20,58,S.19 SW SW	08/98	Upland habitat site (dry).
N-13 UNNAMED	20,58,S.25 SE NW	04/97	Damp soil below CCC masonry reservoir.
N-16 UNNAMED	20,58,S.30 SW SW	04/98	Upland habitat site (dry).
N-20 UNNAMED	21,57,S.01 NW NW	04/98	Upland habitat site (dry).
N-21 UNNAMED	21,57,S.01 NW NE	04/98	Seep within South Fork Spring drainage.
N-22 UNNAMED	21,57,S.01 NW NE	04/98	Seep within South Fork Spring drainage.
N-24 SOUTH SPRING	21,57,S.25 NW SW	06/97	Subsurface water-retaining location in a major ephemeral wash.
N-** ICEBOX SPRING	21,58,S.09 NW NW	01/96	Waterfall pool downstream from the actual Icebox Canyon Spring location.
N-** PINE CREEK SPRING (3)	21,58,S.16 NW SW 21,58,S.17 NE NW 21,58,S.17 SE	04/97 04/97 04/97	One point in the PINE CREEK drainage. One point in the PINE CREEK drainage. One point in the PINE CREEK drainage.
N-23 UNNAMED	21,57,S.12 SW NE	08/98	Upland habitat site (dry).
N-38 SANDSTONE SEEP #2	22,58,S.05 NE NE	05/97	Scant water & rush/sedge vegetation, but is just one site in a canyon-length zone of diffuse, ephemeral discharge seepage.
N-39 UPPER SANDSTONE SEEPS	22,58,S.05 NW SE	05/97	Identical status as for site N-38.
N-49 UNNAMED	22,58,S.15 SE NE	07/98	Persistent pool from ephemeral run-off.
N-50 RED ROCK SEEPS	22,58,S.15 NW SE	07/98	Upland habitat site (dry).
N-51 UNNAMED	22,58,S.16 NE NE	07/98	One site in a major ephemeral canyon.

APPENDIX 11: SPRING DISCHARGE MEASUREMENTS

SPRING NAME	Flow Type	Discharge Volume (Gal/min) by Author/Year Surveyed:		
		Hughes/ 1965 Gal/min (GPM)	VanDerPuy/ 79 GPM (Month)	Sada/ 95 & 97 GPM (MM/YY)
	P=Perennial; I=Intermittent			
SCHUMACHER	P	N/a	Dry (Aug)	0.52 (05/97)
GRASSY	P	18.70	0.25 (Aug)	0.52 (08/95)
GRAPEVINE	P	Dry	0.25 (June)	Tank (08/95)
SHEEP	P	N/a	5.50 (Aug)	5.20 (05/97)
SOUTH FORK	P	N/a	20.00 (July)	7.80 (05/97)
UNNAMED [N-14]	P	N/a	N/a	Trace (05/97)
LA MADRE	P	4.50	20.00 (July)	1.56 (05/95)
WILLOW	P	1.10	0.35 (June)	4.42 (05/95)
LOST CREEK	P	N/a	15.00 (June)	49.10 (05/95)
WHITE ROCK	P	0.30	1.00 (June)	0.52 (05/95)
ASH CREEK	P	1.90	0.10 (Aug)	0.13 (05/95)
LITTLE CREEK	I	Trace	0.10 (Aug)	N/a
LONE PINE	P	N/a	1.50 (Aug)	1.30 (05/97)
SWITCHBACK	P	Dry	3.00 (Aug)	14.82 (05/95)
ICEBOX CANYON	?	N/a	3.50 (Sept)	N/a
CLAY BANK #2	P	N/a	6.00 (Sept)	N/a
PINE CREEK	P	12.80	25.00 (July)	24.70 (05/95)
OAK CREEK	P	14.20	15.00 (July)	29.64 (05/95)
FIRST CREEK	P	1.30	10.00 (July)	9.88 (05/95)
CALICO	I	Trace	0.20 (Aug)	0.03 (05/95)
RED	P	11.60	8.00 (June)	7.28 (05/95)
OLIVER RANCH	P	1.00	N/a	N/a
LONE WILLOW	I	Dry	N/a	N/a
RAINBOW	P	Dry	Dry (July)	7.80 (05/97)
BOOTLEG	P	Dry	0.50 (July)	3.90 (05/97)
MORMON GREEN #1	P	0.50	7.00 (June)	0.26 (07/95)
MORMON GREEN #2	I	Dry	N/a	N/a
MORMON GREEN #3	I	N/a	N/a	N/a

APPENDIX 11: SPRING DISCHARGE MEASUREMENTS

SPRING NAME	Flow Type	Discharge Volume (Gal/min) by Author/Year Surveyed:		
		Hughes/ 1965 Gal/min (GPM)	VanDerPuy/ 79 GPM (Month)	Sada/ 95 & 97 GPM (MM/YY)
P=Perennial; I=Intermittent				
POINT	?	N/a	N/a	N/a
POINT #2	I	0.10	N/a	N/a
SANDSTONE #2	I	N/a	6.00 (7/83)	N/a
MUD #1	P	0.30	0.20 (July)	0.03 (05/97)
L.M.	I	N/a	Dry (Sept)	N/a
MOONSHINE	P	N/a	2.00 (July)	0.26 (05/97)
RED ROCK SEEPS	P	0.70	2.00 (Sept)	0.52 (05/97)
LONE GRAPEVINE	P	N/a	10.00 (July)	0.52 (05/95)
MUD SPRING #2	I	Dry	1.50 (July)	1.60 (05/95)
SHOVEL SPRING	P	Trace	N/a	0.52 (05/97)
WHEELER CAMP	P	Pool	18.00 (June)	29.64 (05/95)
WILSON TANK	P	N/a	0.12 (8/78)	N/a
BIRD	P	N/a	1.00 (July)	N/a
COTTONWOOD	P	N/a	N/a	N/a

Citations:

- Hughes, J.L. 1966. Some Aspects of the Hydrogeology of the Spring Mountains and Pahrump Valley, Nevada, and Environs, as Determined by Spring Evaluations. University of Nevada, Reno, School of Mines. Master's Thesis.
- Sada, D. and J. Nachlinger. 1996. Spring Mountains Ecosystem: Vulnerability of Spring-fed Aquatic and Riparian Systems to Biodiversity Loss. Contract report prepared for U.S. Fish & Wildlife Service, Reno, NV.
- Sada, D. and J. Nachlinger. 1998. Spring Mountains Ecosystem: Vulnerability of Spring-fed Aquatic and Riparian Systems to Biodiversity Loss. Part II, Springs Surveyed in 1997. Contract report prepared for U.S. Bureau of Land Management, Las Vegas, NV.
- VanDerPuy, M. and D. Sparks. 1984. Water Resources of the Las Vegas District. Las Vegas District BLM. Unpublished report.

APPENDIX 12: SPRING DEVELOPMENTS

N-No. Structure	SPRING NAME Specifications	Type Agency/Yr	Gal/Min Status	% Impounded Project No.
N-01 Pipe/Trough	SCHUMACHER Iron; Cement 3'x3' (Headbox?)	Perennial Unknown	0.10 Abandoned	000 % Unknown
N-02 Exclosures	GRASSY Steel pole; 560'/175' circum.	Perennial BLM/91	10.0 Functional	000 % R5230
N-03 Headbox Pipeline Trough Corral Exclosure	GRAPEVINE Rock, unmortared; 4'x 4'x 3' Iron, 1.5"; 90'; 0.25 gpm Masonry; 12'x12'x2'; 1560 gal. Wire-strand & steel pole Steel pole; 125' span	Perennial CCC/41 CCC/41 CCC/41 BLM/83 BLM/91	0.30 Functional Functional Functional Functional Functional	100 % C558/R0726 C559/R0726 C560/R0726 R4794 R5229
N-15 Dam	LA MADRE [Outflow=springbrook] Cement; 20'x6'	Perennial Unknown	100.0 Functional	001 % Unknown
N-17 Headbox Pipeline Trough Exclosure	WILLOW Rock, mortared; 4'x 4'x 3' Iron, 1.5"; 100'; 1.25 gpm Cement; 10'x10'x2'; 1020 gal. Wood pole; 20'x 100'	Perennial CCC/41 CCC/41 CCC/41 BLM/97	4.50 Functional Functional Functional Functional	095 % C567/JR0731 C568/JR0731 C569/JR0731 Unknown
N-19 Head/pipe Pipeline Trough	WHITE ROCK Mortar 4'x4'x3' Iron 1.5"x100' Cement; 10'x10'x2'; 1020 gal.	Perennial CCC/41 CCC/41 CCC/41	0.50 Functional Functional Functional	099 % C???.JR0767 C???.JR0767 C651/JR0786
N-25 Excavation	ASH CREEK Hand-shoveled (Now reverted)	Perennial Krupp/54	0.10 Abandoned	000 % JR0170
N-26 Excavation	LITTLE CREEK Hand-shoveled (Now reverted)	Intermitt. Krupp/54?	0.10 Abandoned	000 % JR0178
N-27 Headbox Pipe/Trough	LONE PINE [*Destroyed in Unknown flood, pre-1986] Iron 1.5"; Masonry 10'x10'x2'	Perennial Unknown Unknown	10.0 Abandoned* Abandoned*	000 % J0086 Unknown
N-28 Headbox Pipe/Trough	SWITCHBACK Cement [*Same flood as N-27] Iron 150'; Masonry 15'x15'x2'	Perennial Hughes/69 Hughes/69	15.0 Abandoned* Abandoned*	000 % J3542 J3542
N-32 Excavation	OAK CREEK Hand-shoveled (Now reverted)	Perennial Krupp/56	30.0 Abandoned	000 % JR0162
N-33 Excavation	FIRST CREEK Hand-shoveled (Now reverted)	Perennial Krupp??/??	10.0 Abandoned	000 % J0096
N-34 Excavation	CALICO Hand-shoveled (Now reverted)	Intermitt. Krupp/56	0.10 Abandoned	000 % JR0183
N-35 Excavation Exclosure Exclosure	RED Rock-drilled tunnel Wood pole; 400' circumf. Wood pole; 140' circumf.	Perennial Krupp?/55 BLM/96 BLM/97	7.40 Functional Functional Functional	000 % JR0172 Unknown Unknown
N-36 Pumphouse	OLIVER RANCH Residential use + springbrook	Perennial Unknown	40.0 Functional	025 % Unknown

APPENDIX 12: SPRING DEVELOPMENTS

N-No. Structure	SPRING NAME Specifications	Type Agency/Yr	Gal/Min Status	% Impounded Project No.
N-37 Excavation	LONE WILLOW Hand-shoveled (Now reverted)	Intermitt. Krupp/54	0.10 Abandoned	000 % JR0159
N-40 Pipe/Trough Corral	RAINBOW (Now reverted) Plastic; Unknown (Headbox?) Wood post & wire-strand	Perennial Unknown Krupp?/59	25.0 Abandoned Abandoned	000 % Unknown JR0362
N-41 Box/Pipe Trough Corral	BOOTLEG (Now reverted) Wood barrel; 1" plastic, 400' Steel, 4'x4' [*After 1975] Wood post & wire-strand	Perennial Krupp/58 Krupp/58 Krupp?/59	25.0 Abandoned* Abandoned* Abandoned*	000 % JR4132 J3542 JR0361
N-47 Headbox Headbox Pipeline Trough Exclosure	MUD #1 Unknown Steel casing Iron, 1.5"; 500' Steel, 8'x2'x2' Wire-strand; 5 acres	Perennial CCC/41 BLM/68 CCC/41 BLM/68 BLM/??	0.40 Replaced Functional Functional Functional Pending	075 % C735/JR0796 J0792 C736/JR0796 J0792 Pending
[J0792= Wildlife project no. J0672]				
N-48 Headbox Pipe/Trough	L.M. Unknown (Now reverted) Plastic, 1"; Steel, 700 gal.	Intermitt. BLM/68 BLM/68	0.01 Abandoned Abandoned	000 % J0792 (=0672) J0792
N-54 Headbox Box/Trough Pipeline Trough Exclosure	LONE GRAPEVINE Unknown Unknown; Steel 8'x2'x2' Iron, 1.5"; 100' Unknown Wood pole & wire-strand	Perennial CCC/41 BLM/68 CCC/41 CCC/41 BLM/97	0.50 Replaced? Functional Functional Replaced Functional	050 % C729/JR0795 J0792)=0672 C730/JR0795 C731/JR0795 Unknown
N-55 Excavation	MUD #2 Hand-shoveled (Now reverted)	Intermitt. Krupp/54	4.50 Abandoned	000 % JR0191)=J791?
N-57 Head box Exclosure	WHEELER CAMP Cement, 6'x6'x4' Wire-strand; 5 acres	Perennial Unknown BLM/94	30.0 Functional Funtional	000 % Unknown N/A
N-58 Excavation Pipe/Trough Exclosure Tank	TUNNEL Rock-drilled Plastic 1"x500'; Steel 200-gal Wire-strand; 40' circumf. Plastic; 1000 gallon	Intermitt. Krupp/54 Unknown Unknown Unknown	0.01 Functional Functional Functional Functional	095 % J0094/R0199 Unknown Unknown Unknown
[Krupp trough/3-mile pipe abandoned]				
N-59 Headbox Pipe/Trough Tanks Exclosure	BIRD Unknown Plas. 1"x1500'; Steel 200-gal Plastic; 1000 & 1500 gallons Wire-strand; 1 acre	Intermitt. Krupp/56 BLM/?? BLM/?? BLM/??	0.01 Functional Functional Functional Functional	100 % J0092/R0197 Unknown Unknown Unknown
[Krupp trough/2-mile pipe abandoned]				

Project No. key: C = Civilian Conservation Corps
 J = BLM Job Document Report
 R = BLM Range Improvement Project System file

APPENDIX 13: ARTIFICIAL WATERS

<u>STRUCTURE</u> Component	<u>SITE NAME</u> Specifications	T,R,S,Qtr Agency/Yr	Project No.	Condition Status
<u>RESERVOIR</u>	<u>BROWNSTONE</u>	20S58E23SE		Marginal (dry in summer)
	(= <u>RED SANDSTONE</u>)			
Dam	Masonry; 120'x12'	CCC/41	C650/JR0785	Retains 7" (due to leaks)
Pipeline	Iron, 1.5" x 125'	CCC/41	C703/JR0785	Removed (year unknown)
Trough	Masonry	CCC/41	C694/JR0785	Removed (year unknown)
<u>RESERVOIR</u>	<u>UNNAMED</u> ("white")	20S58E25NW		Non-operational
Dam	Masonry; 40'x 15'	CCC/unknown	Unknown	Does not retain water
<u>GUZZLERS</u> (bird)	[Each unit: Metal apron, 15'x16'; Fiberglass tank (1), 750-gal]			
	<u>SM-63</u>	23S58E03NW NDOW/87	JR5174	Fully operational -Water depth 9" (07/94)
	<u>SM-64</u>	22S58E26SE NDOW/87	JR5175	Fully operational -Water depth 9" (07/94)
	<u>SM-65</u>	23S58E14NW NDOW/87	Unknown	Fully operational -Water depth 5" (07/94)
	<u>SM-68</u>	23S58E03SW NDOW/87	JR5177	Fully operational -Water depth 9" (07/94)
	<u>SM-69</u>	23S58E36NW NDOW/87	JR5178	Fully operational -Water depth 6" (09/94)
	<u>SM-70</u>	22S58E25SE NDOW/87	JR5176	Fully operational -Water depth 5" (09/94)
<u>GUZZLERS</u> (mammal)	[Each unit: Metal apron, 30'x16'; Fiberglass tanks (2), 500-gal]			
	<u>Big Game #3</u>	19S59E32NW BLM/74	JR4922	Marginal (as of 09/97) -Needs float valve, etc
	{These three identical projects failed due to chronic vandalism.}			
	<u>Big Game #1</u>	20S59E08NW BLM/74	N5-WHA-T10	Removed in 1984
	<u>Big Game #2</u>	20S59E18SE BLM/74	Unknown	Removed (year unknown)
	<u>Big Game #4</u>	20S58E21SW BLM/74	Unknown	Removed in 1977

Project No. key: C = Civilian Conservation Corps
 J = BLM Job Document Report
 R = BLM Range Improvement Project System file

APPENDIX 14: IMPORTANT HABITAT AREAS

□ HABITAT AREA NAME	[Reference Appendix #]
1) Ranked Attribute/Use	:Key Species *Special Status
□ LA MADRE SPRING	[Appendix 1;2]
1) Springsnail habitat	:Pyrgulopsis turbatrix*
2) Bighorn water source	:Ovis canadensis
□ LOST CREEK SPRING	[Appendix 1;2]
1) Springsnail habitat	:Pyrgulopsis turbatrix*
2) Special Status plants	:Angelica scabrida*; Astragalus remotus*; Castilleja martinii clokeyi*
□ RAINBOW SPRING	[Appendix 1;2]
1) Springsnail habitat	:Pyrgulopsis deaconi*
2) Special Status plant	:Penstemon thompsoniae ssp. jaegeri*
□ WOUNDED KNEE CAVE	[Appendix 1]
1) Bat maternity roost	:Plecotus townsendii pallescens*
□ WHITE ROCK SPRING	[Appendix 1;5]
1) Bat water source	(Ramsey/94: greatest use in Spring Range) :Plecotus townsendii pallescens*; Euderma maculatum*; Idionycteris phyllotis*; Myotis lucifugus; M. volans*; M. evotis*; Myotis ciliolabrum*; M. californicus; Myotis thysanodes*; Antrozous pallidus Eptesicus fuscus; Pipistrellus hesperus
2) Bighorn water source	:Ovis canadensis
□ PINE CREEK CANYON, South	[Appendix 1;5]
1) Bat water source	:Idionycteris phyllotis*; M. thysanodes*; M. californicus; P. hesperus; E. fuscus
2) Special Status plants	:Astragalus remotus; Asplenium resiliens

APPENDIX 14: IMPORTANT HABITAT AREAS

□ HABITAT AREA NAME	[Reference Appendix #]
1) Ranked Attribute/Use	:Key Species *Special Status
<hr/>	
□ CALICO HILLS	[Appendix 1;5]
1) Bat roost habitat	: <i>Plecotus townsendii pallescens*</i> ; <i>Myotis thysanodes*</i> ; <i>M. volans*</i> ; <i>M. californicus</i> ; <i>Idionycteris phyllotis*</i> ; <i>Eptesicus fuscus</i> ; <i>Antrozous pallidus</i> ; <i>Pipistrellus hesperus</i>
2) Special Status plant	: <i>Calochortus striatus*</i>
<hr/>	
□ LA MADRE MOUNTAIN	[Appendix 1;3;4]
1) Special Status plants	: <i>Pedicularis semibarbata charlestonensis*</i> ; <i>Penstemon bicolor bicolor*</i> ; <i>Glossopetalon pungens glabra*</i> ; <i>Ivesia jaegeri*</i> ; <i>Erigeron uncialis conjugans*</i>
2) Sole RRCNCA occurrence	: <i>Cystopteris fragilis</i> (Brittle fern);
<hr/>	
□ GRAPEVINE SPRING	[Appendix 1;5]
1) Bat water source	: <i>Myotis thysanodes*</i> ; <i>Myotis californicus</i> ; <i>Eptesicus fuscus</i> ; <i>Antrozous pallidus</i> ; <i>Pipistrellus hesperus</i>
2) Wildlife water	(One of only 3 sources in northern RRCNCA)
<hr/>	
□ MT. WILSON	[Appendix 1]
1) Special Status plants	: <i>Townsendia jonesii tumulosa*</i> ; <i>I. jaegeri*</i> <i>A. scabrida</i> ; <i>P. bicolor bicolor*</i> ; <i>Erigeron uncialis conjugans*</i>
<hr/>	
□ SANDSTONE CANYON	[Appendix 1;3]
1) Special Status plants	: <i>Angelica scabrida*</i> ; <i>Astragalus remotus*</i> ; <i>Glossopetalon p.glabra*</i> ; <i>Ivesia jaegeri*</i>
2) Sole RRCNCA occurrence	: <i>Pellaea mucronata</i> (Bird's foot fern)
<hr/>	
□ CALICO SPRING	[Appendix 1]
1) Special Status plants	: <i>Calochortus striatus*</i> ; <i>Arctomecon merriamii</i>

APPENDIX 14: IMPORTANT HABITAT AREAS

□ HABITAT AREA NAME	[Reference Appendix #]
1) Ranked Attribute/Use	:Key Species *Special Status
□ VELVET CANYON	[Appendix 1]
1) Special Status plants	: <i>Ivesia jaegeri</i> *; <i>Angelica scabrida</i> *; <i>Astragalus remotus</i> *
□ POTOSI FOOTHILLS	[Appendix 1]
1) Special Status plants	: <i>Townsendia jonesii tumulosa</i> *; <i>I. jaegeri</i> * <i>Glossopetalon pungens glabra</i> *; <i>Erigeron uncialis conjugans</i> *
2) Wildlife browse/cover	{Largest low elevation brushfield habitat}
□ BROWNSTONE BASIN	[N/a]
1) Bighorn water/cover	{Key habitat in La Madre Mtn vicinity, due to gated protection; tenajas; reservoir}
□ WHEELER CAMP SPRING	[Appendix 8]
1) Bird habitat	{Highest bird species diversity in NCA}
□ MORMON GREEN SPRING #1	[Appendix 5]
1) Riparian habitat	{Greatest biodiversity/system integrity of NCA low elevation riparian areas, due to historical exclusion of feral animals}
2) Mule deer forage/cover	{Area not open to general recreation use}
□ 10-MILE CANYON	[Appendix 1]
1) Wildlife burrowing habitat	{Deep-soiled basin has unusual density of large burrows (ie, badger, fox, coyote)}
2) Special Status wildlife	: <i>Gopherus agassazii</i> * (Desert tortoise)

APPENDIX 15: DISTURBED HABITAT AREAS

Part A. Tamarix sp. Encroachment

SITE NAME	Location	Severity
GRASSY SPRING	-at spring source	Moderate
GRAPEVINE SPRING	-at spring source	Low
SOUTH FORK SPRING	-along both upper canyons	Moderate
LONE PINE SPRING	-at spring source	Low
PINE CREEK	-south fork canyon at 4200'	Low
MUD SPRING #1	-at source and along wash	Moderate
MUD SPRING #2	-at source and along wash	Heavy
SANDSTONE SPRING #2	-at spring source -along bisecting dry wash	Low
SANDSTONE CANYON	-upstream of spring at 4900'	Low
LONE WILLOW SPRING	-at spring source	Low
WHEELER CAMP SPRING	-at source and along wash [*After 1997-98 eradications]	Low*
MORMON GREEN SPRING #1	-at source; dispersed along wash	Heavy
MORMON GREEN SPRING #2	-at source; dispersed along wash	Moderate
OLIVER RANCH SPRING	-pump ditch; scattered dry sites	Heavy
BLUE DIAMOND WASH	-near town, either side of SR 159	Heavy
BOOTLEG SPRING	-at spring source	Low
RAINBOW SPRING	-including downslope upland sites	Moderate
"SOUTH SPRING" SITE	-at "spring"; also 600' up wash	Moderate
OAK CREEK	-from Oak Creek Knoll to forks	Moderate

APPENDIX 15: DISTURBED HABITAT AREAS

Part B. Post-fire Bromus sp. Invasions

SITE NAME	Burn Reburn	-Landmarks -Landmarks	Cause Cause	Acres Acres
DEER PASTURE CANYON	07/94 06/96	-north end of basin floor -basin, to La Madre ridge	Fireworks Shooting	25.0 774.0
LA MADRE MTN	07/96	-on north ridgeline	Lightning	75.0
WHITE ROCK HILL	??/?? 06/95	-terrace slopes, southeast -below Scenic Drive @ 4500'	Unknown Lightning	300.0 20.0
RED ROCK WASH	??/86	-below Icebox Canyon	Fireworks	125.0
BLUE DIAMOND HILL (north)	1979? ??/80 06/94 06/96	-from SR 159 to ridgeline, on slopes and canyons -basin below Desert Cave -in canyon, at Desert Cave -basin below Desert Cave	Fireworks? Campfire Lightning Man-caused	1100.0 10.0 5.0 20.0
PINE CREEK CYN	??/??	-canyon mouth; on terrace into JUNIPER CANYON mouth	Unknown	200.0
OAK CREEK CYN	??/??	-canyon mouth; on terrace up to base of escarpment	Unknown	300.0
OAK CREEK, area	07/93	-along SR 159, across from designated campground	Fireworks	40.0
FIRST CREEK CYN	1979?	-canyon mouth and terrace	Unknown	1250.0
BIRD SPRING RANGE	1981?	-on ridges, south of SR 160	Unknown	300.0
COTTONWOOD VALLEY	1980? 06/93	-basin floor west ridgeline -junction of powerline with Goodsprings Road	Unknown Fireworks	2000.0 100.0

APPENDIX 15: DISTURBED HABITAT AREAS
 Part C. Feral Horse & Burro Impacts

SITE NAME	Impact	Comments
GRASSY SPRING	Exclosure (presence of)	May deter wildlife usage
GRAPEVINE SPRING	Pipeline/trough/exclosure	Lost riparian habitat
SCHUMACHER SPRING	Soil churning & compaction; vegetative loss	Primarily burro impacts
PINE CREEK	Soil compaction; vegetative loss; trailing	Compounds recreation-use pressure on the area
OAK CREEK	Soil compaction; vegetative loss; trailing	Compounds recreation-use pressure on the area
FIRST CREEK	Vegetative loss; Trailing	Trail proliferation
SANDSTONE CANYON	Heavy grazing; trailing	Affects bighorn sheep
LONE WILLOW SPRING	Soil churning & compaction; loss of riparian vegetation	Primarily burro damage
MORMON GREEN SPRING 1	Soil churning & compaction	Adds to Tamarisk problem
WHEELER CAMP SPRING	Soil compaction; trailing	Outside the exclosure
VELVET CANYON	Heavy grazing; trailing	Affects bighorn sheep
MUD SPRING #1	Pipeline/trough (presence); Soil churning; compaction	Reduced surface flow; Compounds impacts from mtn bikers/equestrians
MUD SPRING #2	Soil churning; compaction	Adds to Tamarisk problem
MUD SPRING CANYON	Heavy grazing; soil damage	Affects bighorn sheep
LONE GRAPEVINE SPG	Pipeline/trough (presence); heavy grazing; soil damage	Reduced surface flow; Compounds impacts from mtn bikers/equestrians
SHOVEL SPRING	Exclosure (presence of); Severe grazing/trampling; soil churning/compaction	May deter wildlife use; Lost riparian habitat; Degraded surface flow
BIRD SPRING RANGE	Soil compaction; grazing	Leads to <u>Bromus</u> invasion
BIRD SPRING	Pipe/trough (presence of)	Lost riparian habitat
WILSON TANK SPRING	Pipe/trough (presence of)	Lost riparian habitat

APPENDIX 15: DISTURBED HABITAT AREAS
 Part D. Recreation Impacts

Site Name	Resources Impacted	Activity
LEE CANYON	Soils; vegetation	Target shooting; off-roading
LUCKY STRIKE CANYON	Soils; vegetation	Target shooting; off-roading
KYLE CANYON	Soils; vegetation	Target shooting; off-roading
DEER PASTURE CANYON	Soils; vegetation	Target shooting; off-roading
LITTLE RED ROCK CYN	Soils; vegetation	Target shooting; off-roading
BROWNSTONE CANYON	Soils; vegetation	Off-roading
13-MILE CANYON	Soils; vegetation	Target shooting; off-roading
RED SPRING	Soils; vegetation	Day-use
CALICO HILLS	Soils; vegetation	Climbing; hiking; day-use
BLUE DIAMOND HILL	Soils; vegetation	Commercial horseriding
WOUNDED KNEE CAVE	Bat maternity roost	Exploration, by general public
DESERT CAVE	Bat roost habitat	Visitation; day-use
WILLOW SPRING	Soils; vegetation	Day-use
LOST CREEK	Soils; vegetation	Hiking (trail-braiding)
ROCKY GAP ROAD	Soils; vegetation	Off-roading (spur routes)
VELVET CANYON, North	Soils; vegetation	Steep trail causing erosion
VELVET CANYON, Knoll	Soils; vegetation	Overnight camping; off-roading
BRIDGE MOUNTAIN	Soils; vegetation	Hiking (steep trail = erosion)
MUD #1, SHOVEL, LONE GRAPEVINE SPRINGS	Soils; vegetation	Mountain-biking; horseriding (trail proliferation/erosion)
PINE CREEK, FIRST CREEK, OAK CREEK	Riparian habitat; soils; vegetation	Climbing; hiking; horseriding (Trail proliferation)
WILD HORSE LOOP	Soils; vegetation	Off-roading (spur routes)
RAINBOW SPRING	Riparian habitat; soils; vegetation	Horseriding; off-roading
BOOTLEG SPRING	Riparian habitat; soils; vegetation	Horseriding (trail= erosion); off-roading

APPENDIX 16: FIRE OCCURRENCE HISTORY, 1980-1997

Part A. Annual Occurrence and Acres Burned, by Vegetative Type and Source of Origin

Overall Occurrence:			Shrubland vs Woodland:		Lightning vs Human-cause:	
Year	Fires	Acres	Fires (Yr%)	Acres (Yr%)	Fires (Yr%)	Acres (Yr%)
1980	19	30	[S] 17 (89%) [W] 02 (11%)	23 (77%) 07 (23%)	[L] 07 (37%) [H] 12 (63%)	14 (47%) 16 (53%)
1981	27	49	[S] 23 (85%) [W] 04 (15%)	19 (39%) 30 (61%)	[L] 01 (04%) [H] 26 (96%)	00 (--) 49 (100)
1982	19	*00 (1.0)	[S] 18 (95%) [W] 01 (05%)	00 (--) 00 (--)	[L] 06 (32%) [H] 13 (68%)	00 (--) 00 (--)
1983	14	1252	[S] 12 (86%) [W] 02 (14%)	1252 (100) 00 (--)	[L] 00 (--) [H] 14 (100)	00 (--) 1252 (100)
1984	14	00	[S] 09 (64%) [W] 05 (36%)	00 (--) 00 (--)	[L] 04 (29%) [H] 10 (71%)	00 (--) 00 (--)
1985	16	15	[S] 11 (69%) [W] 05 (31%)	06 (40%) 09 (60%)	[L] 07 (44%) [H] 09 (56%)	13 (87%) 02 (13%)
1986	23	127	[S] 21 (91%) [W] 02 (09%)	127 (100) 00 (--)	[L] 11 (48%) [H] 12 (52%)	01 (--) 126 (100)
1987	23	00	[S] 15 (65%) [W] 08 (35%)	00 (--) 00 (--)	[L] 12 (52%) [H] 11 (48%)	00 (--) 00 (--)
1988	10	00	[S] 00 (--) [W] 10 (100)	-- (--) 00 (--)	[L] 02 (20%) [H] 08 (80%)	00 (--) 00 (--)
1989	08	02	[S] 07 (87%) [W] 01 (13%)	00 (--) 02 (100)	[L] 00 (--) [H] 08 (100)	-- (--) 02 (100)
1990	13	04	[S] 12 (92%) [W] 01 (08%)	04 (100) 00 (--)	[L] 04 (31%) [H] 09 (69%)	00 (--) 04 (100)
1991	10	00	[S] 10 (100) [W] 00 (--)	00 (--) -- (--)	[L] 04 (40%) [H] 06 (60%)	00 (--) 00 (--)
1992	03	00	[S] 02 (67%) [W] 01 (33%)	00 (--) 00 (--)	[L] 02 (67%) [H] 01 (33%)	00 (--) 00 (--)
1993	19	173	[S] 15 (79%) [W] 04 (21%)	167 (96%) 06 (04%)	[L] 03 (16%) [H] 16 (84%)	05 (03%) 168 (97%)
1994	23	37	[S] 20 (87%) [W] 03 (13%)	36 (97%) 01 (03%)	[L] 12 (52%) [H] 11 (48%)	09 (33%) 28 (67%)
1995	11	26	[S] 10 (91%) [W] 01 (09%)	26 (100) 00 (--)	[L] 07 (64%) [H] 04 (36%)	21 (81%) 05 (19%)
1996	25	873	[S] 17 (68%) [W] 08 (32%)	798 (91%) 75 (09%)	[L] 12 (48%) [H] 13 (52%)	77 (09%) 796 (91%)
1997	17	17	[S] 06 (35%) [W] 11 (65%)	01 (06%) 16 (94%)	[L] 14 (82%) [H] 03 (18%)	17 (100) 00 (--)
TOTAL	294	2605	S: 225 (77%) W: 69 (23%)	2459 (94%) 146 (06%)	L: 108 (37%) H: 186 (63%)	157 (06%) 2448 (94%)
MEAN	16	145	S: 12 (75%) W: 04 (25%)	137 (94%) 08 (06%)	L: 06 (37%) H: 10 (63%)	09 (06%) 136 (94%)

APPENDIX 16: FIRE OCCURRENCE HISTORY, 1980-1997

Part B. Individual Fires ≥ 10 Acres [Size Class C]

Year	Fire	Fire Name	Location TxxS, RxxE, S. xx	Veg Type / Origin	Acres	*Largest Fire, Proportion (% Yr Fires/ % Yr Acres)
1980	4234	No record	21,58,S.13	S / H	10*	*05% fires (01/19)/ 33% acres
1981	4313	No record	21,58,S.25	W / H	30*	*04% fires (01/27)/ 61% acres
	9116	No record	20,58,S.20	S / H	10	
1982	None	-----	-----	-----	---	-----
1983	4322	No record	21,58,S.30	S / H	1250*	*07% fires (01/14)/100% acres
1984	None	-----	-----	-----	---	-----
1985	None	-----	-----	-----	---	-----
1986	K389	No record	21,58,S.05	S / H	125*	*04% fires (01/23)/ 98% acres
1987	None	-----	-----	-----	---	-----
1988	None	-----	-----	-----	---	-----
1989	None	-----	-----	-----	---	-----
1990	None	-----	-----	-----	---	-----
1991	None	-----	-----	-----	---	-----
1992	None	-----	-----	-----	---	-----
1993	Y357	SR160,mm17	22,58,S.34	S / H	100*	*05% fires (01/19)/ 58% acres
	Y384	Oak Creek	21,58,S.26	S / H	40	
	Y514	Sportsman	21,59,S.03	S / H	20	
1994	K389	SR157	19,58,S.25	S / H	25*	*04% fires (01/23)/ 68% acres
1995	Y319	Willow	20,58,S.34	S / L	20*	*09% fires (01/11)/ 77% acres
1996	K329	Cave 2	21,58,S.13	S / H	20	
	K335	Deer	19,58,S.36	S / H	774*	*04% fires (01/25)/ 89% acres
	K370	La Madre	20,58,S.16	W / L	75	
1997	K372	Border	21,57,S.36	W / L	15*	*06% fires (01/17)/ 88% acres

MEAN: 0.8 Fires 140 =05% Fires (0.8/16)/ 97% Acres

TOTAL: 14 Fires 2514 =05% Fires (14/294)/ 97% Acres

By Vegetative Type / Origin:

Shrubland/Human-caused (S/H)	10 Fires	2374	=03% fires (10/294)/ 91% acres
/Lightning (S/L)	01 Fires	20	=.5% fires (01/294)/ 01% acres
Woodland /Human-caused (W/H)	01 Fires	30	=.5% fires (01/294)/ 01% acres
/Lightning (W/L)	02 Fires	90	=01% fires (02/294)/ 04% acres

APPENDIX 16: FIRE OCCURRENCE HISTORY, 1980-1997
 Part C. Human-Caused Fires by Source of Origin

Year	Number of Human-caused Fires [Acres Burned, by Individual Source of Origin:									
	Camp Fire	Car Fire	Trash Fire	Fire- works	Smoking	Playing w/ Fire	Other Misc*	Arson	Unknown	TOTAL
*Vehicle exhaust (4); Firearms, Powerline, Equipment use, Blasting, Plane crash, Burning Building (1 each)										
Pre-NCA Land Status (Minimal BLM law enforcement presence):										
1980	04[10	02[00	03[02	01[00	01[00	00[00	01[04	00[00	00[00	12[16
1981	04[00	07[00	07[09	07[40	00[00	00[00	01[00	00[00	00[00	26[49
1982	02[00	02[00	07[00	01[00	00[00	00[00	01[00	00[00	00[00	13[00
1983	03[00	01[00	00[00	06[02	01[00	00[00	01[00	01[00	01[1250	14[1252
1984	02[00	01[00	02[00	02[00	01[00	01[00	00[00	01[00	00[00	10[00
1985	02[00	01[00	02[00	02[00	00[00	00[00	02[02	00[00	00[00	09[02
1986	05[01	02[00	00[00	01[125	00[00	03[00	00[00	00[00	01[00	12[126
1987	02[00	04[00	00[00	01[00	00[00	00[00	00[00	00[00	04[00	11[00
1988	03[00	02[00	02[00	00[00	00[00	00[00	00[00	00[00	01[00	08[00
1989	04[02	03[00	00[00	00[00	00[00	01[00	00[00	00[00	00[00	08[02

TOTAL	31[13	25[00	23[11	21[167	03[00	05[00	06[06	02[00	07[12501	23[1447
MEAN	03[1.3	2.5[0	2.3[1	02[17	.3[00	.5[00	.6[.6	.2[00	.7[125	12[145

Post-NCA Land Status (Increased BLM law enforcement presence):										
1990	03[00	02[00	01[00	02[04	00[00	00[00	00[00	00[00	01[00	09[04
1991	03[00	01[00	00[00	00[00	00[00	00[00	00[00	00[00	02[00	06[00
1992	00[00	01[00	00[00	00[00	00[00	00[00	00[00	00[00	00[00	01[00
1993	06[01	01[00	00[00	02[140	02[22	00[00	00[00	00[00	05[05	16[168
1994	02[00	01[00	00[00	02[25	00[00	00[00	01[01	00[00	05[02	11[28
1995	00[00	00[00	00[00	01[01	00[00	01[01	02[03	00[00	00[00	04[05
1996	02[00	00[00	02[00	01[20	02[00	00[00	01[774	00[00	05[02	13[796
1997	00[00	01[00	00[00	00[00	00[00	00[00	00[00	00[00	02[00	03[00

TOTAL	16[01	07[00	03[00	08[190	04[22	01[01	04[778	00[00	20[09	63[1001
MEAN	02[.1	.9[00	.4[00	01[24	.5[03	.1[.1	.5[97	00[00	2.5[1	08[125

1980-97										
TOTAL	47[14	32[00	26[11	29[357	07[22	06[01	10[784	02[00	27[1259	186[2448
As %	25/01	17/00	14/00	16/15	04/01	03/00	05/32	01/00	15/51	100%/100%
MEAN	03[01	02[00	01[00	01[20	00[01	00[00	01[44	00[00	02[70	10[136
As %	30/01	20/00	10/00	10/15	00/01	00/00	10/32	00/00	20/51	100%/100%

APPENDIX 17

RED ROCK CANYON NATIONAL CONSERVATION AREA ESTABLISHMENT ACT OF 1990

--H.R.4559— Public Law 101-621 --- November 16, 1990
101st Congress

An Act

To establish the Red Rock Canyon National Conservation Area.

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 'Red Rock Canyon National Conservation Area Establishment Act of 1990'.

SEC. 2. DEFINITIONS.

For the purposes of this Act, the term--

- (a) 'conservation area' means the Red Rock Canyon National Conservation Area established pursuant to section 3 of this Act;
- (b) 'public lands' has the meaning stated in section 103(e) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1702(e)); and
- (c) 'Secretary' means the Secretary of the Interior.

SEC. 3. ESTABLISHMENT OF THE CONSERVATION AREA.

(a) IN GENERAL-

(1) In order to conserve, protect, and enhance for the benefit and enjoyment of present and future generations the area in southern Nevada containing and surrounding the Red Rock Canyon and the unique and nationally important geologic, archeological, ecological, cultural, scenic, scientific, wildlife, riparian, wilderness, endangered species, and recreation resources of the public lands therein contained, there is established the Red Rock Canyon National Conservation Area.

(2) The conservation area shall consist of approximately 83,100 acres of generally depicted on a map entitled 'Red Rock Canyon National Conservation Area--Proposed' numbered NV-RRC-NCA-001, and dated June, 1990.

(3) The map referred to in paragraph (2) shall be on file and available for inspection in the appropriate offices of the Bureau of Land Management, Department of the Interior.

(b) LEGAL DESCRIPTION-

(1) As soon as practicable after the date of enactment of this Act, the Secretary shall file a legal description of the conservation area established by subsection (a) with the Committee on Energy and Natural Resources of the United States Senate and the Committee on Interior and Insular Affairs of the United States House of Representatives, and such legal description shall have the same force and effect as if included in this Act, except that the Secretary may correct clerical and typographic errors in legal description.

(2) The legal description described in paragraph (1) shall be on file and available for public inspection in the office of the Director of the Bureau of Land Management, Department of the Interior.

(c) DISCREPANCIES-

In case of any discrepancy between or among the map described in subsection (a), the amount of acreage stated in subsection (a), or the legal description filed by the Secretary pursuant to subsection (b), the map described in subsection (a) shall control any question concerning the boundaries of the conservation area.

SEC. 4. MANAGEMENT.

(a) **IN GENERAL-** The Secretary, acting through the Director of the Bureau of Land Management, shall, subject to valid existing rights, manage the conservation area to conserve, protect, and enhance the resources described in section 3 in accordance with this Act, the Federal Land Policy and Management Act of 1976, and other applicable laws. The Secretary shall only allow such uses of the conservation area as he finds will further the purposes for which the conservation area is established.

(b) HUNTING-

(1) Subject to paragraph (2), the Secretary shall permit hunting within the conservation area in accordance with the laws of the State of Nevada.

(2) The Secretary, after consultation with the Nevada Department of Wildlife, may issue regulations designating zones where and establishing when hunting shall not be permitted for reasons of public safety, administration, or public use and enjoyment.

(c) **PREVENTIVE MEASURES-** Nothing in this Act shall preclude such measures as the Secretary deems necessary to prevent devastating fire or infestation of insects or disease within the conservation area.

(d) **MECHANIZED VEHICLES-** Except when needed for administrative or emergency purposes, the use of mechanized vehicles in the conservation area shall be allowed only on roads and trails

specifically designated for such use as provided in the management plan prepared pursuant to section 5.

(e) **LIMITS ON VISITATION AND USE-** The Secretary may limit visitation and use of the conservation area as the Secretary finds appropriate for the protection of the resources of the conservation area.

SEC. 5. MANAGEMENT PLAN.

(a) IN GENERAL-

- (1) Within 3 full fiscal years following the fiscal year in which the date of enactment of this Act occurs, the Secretary shall develop and transmit to the Committee on Energy and Natural Resources of the United States Senate and the Committee on Interior and Insular Affairs of the United States House of Representatives, a general management plan for the conservation area, which shall describe the appropriate uses and development of the conservation area consistent with the purposes of this Act.
- (2) The management plan described in paragraph (1) shall be developed with full public participation and shall include--
 - (A) an implementation plan for a continuing program of interpretation and public education about the resources and values of the conservation area;
 - (B) a proposal for administrative and public facilities to be developed, expanded, or improved for the conservation area including the Red Rock Canyon visitors center, to accommodate visitors to the conservation area;
 - (C) a cultural resources management plan for the conservation area prepared in consultation with the Nevada State Historic Preservation Officer, with emphasis on the preservation of the resources in the conservation area and the interpretive, educational, and long-term scientific uses of these resources, giving priority to the enforcement of the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa et seq.) and the National Historic Preservation Act (16 U.S.C. 470 et seq.) within the conservation area;
 - (D) a wildlife resource management plan for the conservation area prepared in consultation with appropriate departments of the State of Nevada and using previous studies of the area; and
 - (E) a recreation management plan, including nonmotorized dispersed recreation opportunities for the conservation area in consultation with appropriate departments of the State of Nevada.

(b) **WILDERNESS STUDY AREAS-** Subject to section 7 of this Act, nothing in this Act is intended to alter the requirements of section 603 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1782), or section 5(a) of the National Forest and Public Lands of Nevada Enhancement Act of 1988 (102 Stat. 2751), as those requirements apply to the lands within, or adjacent to the conservation area as of the date of enactment of this Act.

.SEC. 6. ACQUISITIONS

(a) IN GENERAL-

(1) Within the conservation area, and subject to the provisions of this section, the Secretary is authorized to acquire lands, interests in lands, and associated water rights, by donation, purchase with donated or appropriated funds, exchange for Federal lands outside the conservation area, or transfer from another Federal agency with the concurrence of the head of the appropriate agency thereof.

(2) Lands or interests therein owned by the State of Nevada or a political subdivision thereof may be acquired by donation or exchange only.

(3) No privately owned lands, interests in lands, or associated water rights, may be acquired without the consent of the owner thereof unless the Secretary determines that, in his judgment, the property is subject to, or threatened with, uses which are having, or would have, an adverse impact on the resource values for which the conservation area was established.

(4) Any lands, waters, or interests therein within the boundaries of the conservation area which after the date of enactment of this Act may be acquired by the United States shall be incorporated into the conservation area and be managed accordingly, and all provisions of this Act and other laws applicable to conservation areas shall apply to such incorporated lands.

(b) **LAND EXCHANGES-** All exchanges pursuant to subsection (a) shall be made in a manner consistent with section 206 of the Federal Land Management and Policy Act of 1976 (43 U.S.C. 1716).

SEC. 7. WITHDRAWAL.

Except as specifically authorized in this Act, and subject to valid existing rights, all Federal lands within the conservation area and all lands and interests therein which are acquired by the United States after the date of enactment of this Act for inclusion in the conservation area are withdrawn from all forms of entry, appropriation, or disposal under the public land laws, from location, entry, and patent under the mining laws, and from operation under the mineral leasing and geothermal leasing laws, and all amendments thereto.

SEC. 8. COOPERATIVE AGREEMENTS.

In order to encourage unified and cost-effective management and interpretation of natural and cultural resources in the conservation area, the Secretary is authorized and encouraged to enter into cooperative agreements with other Federal, State, and local agencies and nonprofit entities providing for the management and interpretation of natural and cultural resources in the conservation area.

SEC. 9. COORDINATED MANAGEMENT.

The Secretary shall coordinate the management of the conservation area with that of surrounding State and Federal lands in such a manner as best to meet the present and future needs of the American people.

SEC. 10. WATER.

(a) Within the conservation area designated by this Act, there is hereby reserved a quantity of water sufficient to fulfill the purposes for which the conservation area is established.

(b) The priority date of the water rights reserved in paragraph (a) shall be the date of enactment of this Act.

(c) The Secretary shall take all steps necessary to protect the water rights reserved by this section, including the filing of a claim for quantification of such rights in any appropriate water adjudication in the courts of the State of Nevada in which the United States is or may be joined and which is conducted in accordance with the McCarren Amendment (43 U.S.C. 666).

(d) The Federal water rights reserved by this Act shall be in addition to any water rights which may have been previously secured by the United States for purposes other than for the conservation area.

(e) The Federal water rights reserved by this Act are specific to the conservation area designated by this Act. Nothing in this Act shall be construed as establishing a precedent with regard to any future designations, nor shall it constitute an interpretation of any other Act or any designation.

SEC. 11. NO BUFFER ZONES.

The Congress does not intend for the establishment of the conservation area to lead to the creation of protective perimeters or buffer zones around the conservation area. The fact that there may be activities or uses on lands outside the conservation area that would not be permitted in the conservation area shall not preclude such activities or uses on such lands up to the boundary of the conservation area to the extent consistent with other applicable law.

SEC. 12. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated such sums as are necessary to carry out this Act.

Speaker of the House of Representatives.

Vice President of the United States and

President of the Senate.

END

APPENDIX 18

RED ROCK CANYON NATIONAL CONSERVATION AREA BOUNDARY EXPANSION

--H.R.3050— Public Law 103-450 ---November 2, 1994
103rd Congress

An Act

To expand the boundaries of the Red Rock Canyon National Conservation Area.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. BOUNDARY EXPANSION.

Section 3(a)(2) of the Red Rock Canyon National Conservation Area Establishment Act of 1990 (16 U.S.C. 460ccc-1(a)(2)) is amended to read as follows:

(2) The conservation area shall consist of approximately 195,610 acres as generally depicted on a map entitled 'Red Rock Canyon National Conservation Area--Proposed Expansion', numbered NV-RRCNCA-002, and dated July 1994.'

SEC. 2. OTHER AMENDMENTS TO THE RED ROCK CANYON NATIONAL CONSERVATION AREA ESTABLISHMENT ACT OF 1990.

(a) DEADLINE FOR MANAGEMENT PLAN- Section 5(a)(1) of the Red Rock Canyon National Conservation Area Establishment Act of 1990 (16 U.S.C. 460ccc-3(a)(1)) is amended by striking 'Within 3 full fiscal years following the fiscal year in which the date of enactment of this Act occurs,' and inserting in lieu thereof 'No later than January 1, 1997,'.

(b) EXCHANGE AUTHORITY- Section 7 of the Red Rock Canyon National Conservation Area Establishment Act of 1990 (16 U.S.C. 460ccc-5) is amended--

(1) by striking 'Except as specifically authorized' and inserting in lieu thereof '(a) Except as specifically authorized'; and

(2) by adding at the end thereof a new subsection, as follows:

“(b) The Secretary may transfer to the owner of the Old Nevada recreation facility the approximately 20 acres of Federal lands within the conservation area which, on March 1, 1994, were used to provide parking for visitors to such facility, in exchange for lands of

equal or greater value within the conservation area acceptable to the Secretary.”.

(c) **PRIORITY DATES-** Section 10(b) of the Red Rock Canyon National Conservation Area Establishment Act of 1990 (16 U.S.C. 460ccc-8(b)) is amended by striking `Act.' and by inserting in lieu thereof `Act, except that as related to rights associated with lands added to the conservation area after such date, the priority date shall be the date of enactment of the Act adding such lands to the conservation area.'

SEC. 3. POTENTIAL CONSERVATION LANDS.

(a) **WITHDRAWAL-** Subject to valid existing rights, the lands identified in subsection (b) are hereby withdrawn from all forms of entry under the public land laws, including the mining laws, and from operation of the mineral and geothermal leasing laws: Provided, That nothing in this subsection shall limit the issuance of any necessary licenses or public land rights-of-way for any hydroelectric project involving such lands.

(b) **LANDS-** The lands referred to in subsection (a) are the approximately 1,280 acres of public lands as generally depicted on the map entitled `Potential Conservation Lands: Possible Hydroelectric Project' dated July, 1994.

(c) **FUTURE STATUS-** (1) Effective on the date 5 years after the date of enactment of this Act, the lands described in subsection (b) shall be added to the Red Rock Canyon National Conservation Area unless before such effective date all necessary licenses and public land rights-of-way have been issued for a hydroelectric project involving some or all of such lands.

(2) For purposes of section 10(b) of the Red Rock Canyon National Conservation Area Establishment Act of 1990, as amended by this Act, the date on which the lands identified in subsection (b) of this section are added to the Red Rock Canyon National Conservation Area shall be deemed to be the date of enactment of an Act adding such lands to the conservation area.

SEC. 4. AUSTIN, NEVADA MUSEUM.

(a) **LANDS-** The Austin Historic Mining District Historical Society (hereafter referred to as `the Historical Society') shall be permitted to use the lands located in Austin, Nevada, identified as township 19 North, range 44 East, section 19, block 38, lots 1 through 16, assessor's parcel number 01-147-01, amounting to approximately 0.59 acres, in accordance with the requirements of this section.

(b) **USES-** The Historical Society's use of the lands identified in subsection (a) shall be subject to the requirements of this section and shall be limited to use for a museum or other facility to illustrate the history of the Austin Historic Mining District.

(c) TERMS AND CONDITIONS- (1) The Secretary of Agriculture shall permit the Historical Society to use the lands identified in subsection (a) for a period of 20 years after the date of enactment of this Act. After such period, the Historical Society may continue to use such lands, at the discretion of the Secretary of Agriculture.

(2) During the period of 20 years after the date of the enactment of this Act, the Historical Society, if it elects to use the lands identified in subsection (a), shall pay to the Secretary of Agriculture, on behalf of the United States, an annual rental of \$100.

(3) If the Secretary of Agriculture permits continued use of the lands identified in subsection (a) after the end of the period of 20 years after the date of enactment of this Act, the Secretary of Agriculture shall require payment of such annual rental as the Secretary determines reasonable.

(4) At all times that the lands identified in subsection (a) are used by the Historical Society, the Historical Society shall be solely responsible for all necessary maintenance and repairs of all structures and improvements on such lands and for all necessary payments for utilities or other services.

(5) All rentals received by the Secretary of Agriculture under this section shall be deemed to have been deposited with such Secretary pursuant to the Act of December 4, 1967 (16 U.S.C. 484a).

APPENDIX 19

LIST OF ACRONYMS AND ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
AFFIRMS	Administrative and Forest Fire Information Retrieval System
AML	Appropriate Management Level
AMS	Analysis of the Management Situation
ARPA	Archeological Resource Protection Area
BLM	Bureau of Land Management
CCC	Civilian Conservation Corps
CFS	Cubic Feet Per Second
CFR	Code of Federal Regulations
CR	Creek
CRM	Cultural Resource Management
CRMP	Cultural Resource Management Plan
DRI	Desert Research Institute
DSN	Desert Side-notched
DUI	Driving Under the Influence (of alcohol)
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEMA	Federal Emergency Medical Agency
FLPMA	Federal Land Policy and Management Act
FMAP	Fire Management Activity Plan
FMZ	Fire Management Zone
FORRC	Friends Of Red Rock Canyon
FWS	Fish and Wildlife Service
GMP	General Management Plan
GPM	Gallons Per Minute
HMA	Herd Management Area
HMP	Herd Management Plan
IGMP	Interim General Management Plan
LC	Liaison Council
LWCFA	Land and Water Conservation Fund Act
MEA	Management Emphasis Area
MFP	Management Framework Plan
MSHCP	Multiple Species Habitat Conservation Plan
NAS	National Archaeological Survey
NCA	National Conservation Area
NDOT	Nevada Department of Transportation
NDOW	Nevada Division of Wildlife

NDSP	Nevada Division of State Parks
NEPA	National Environmental Policy Act
NNREC	Nevada Natural Resource Education Council
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
OHV	Off Highway Vehicle
ORV	Off Road Vehicle
ORWAG	Outdoor Recreation and Wilderness Assessment Group
PCRNA	Pine Creek Resource Natural Area
PFC	Proper Functioning Condition
PLAD	Public Lands Appreciation Day
PM10	Particulate Matter (suspended particles less than 10 microns in size)
RAC	Resource Advisory Council
RAWS	Remote Automatic Weather Station
RMP	Resource Management Plan
ROS	Recreation Opportunity Spectrum
RRC	Red Rock Canyon
RRCIA	Red Rock Canyon Interpretive Association
RRCNCA	Red Rock Canyon National Conservation Area
RRCRL	Red Rock Canyon Recreation Lands
RS	Revised Statute
SAR	Search and Rescue
SHPO	State Historic Preservation Officer
SMA	Spring Mountains Association
SMNRA	Spring Mountains National Recreation Area
SNRAE	Southern Nevada Rock Art Enthusiasts
SNWA	Southern Nevada Water Authority
SR	State Route
SRA	Stateline Resource Area
SRP	Special Recreation Permit
T&E	Threatened and Endangered
UA	Use Authorization
UNLV	University of Nevada Las Vegas
USDI	United States Department of the Interior
USFS	United States Forest Service
VQO	Visual Quality Objective
WSA	Wilderness Study Area

APPENDIX 20

TRAIL OPTIONS

EXISTING DESIGNATED TRAILS
(same for all alternatives)

TRAILS	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
Cottonwood Valley (single track)	59.8 miles - 18.1 acres				
Grand Circle Loop	11.0 miles - 3.2 acres (CTF)				
Moenkopi Loop	2.0 miles - .72 acres (CTF)				
Entrance Lot to Calico I	.5 miles - .18 acres				
Cave Canyon	.7 miles - .3 acres				
Escarpment Base	5.2 miles - 1.9 acres				
White Rock Loop	6.1 miles - 1.8 acres (CTF)				
La Madre	1.5 miles - .4 acres (CTF)				
Keystone Thrust	1.0 miles - .3 acres (CTF)				
Lost Creek/Childrens Discovery	.7 miles - .3 acres				
Willow Springs Loop	1.3 miles - .5 acres				
Ice Box Canyon	1.0 miles - .4 acres				
Pine Creek	1.9 miles - .7 acres				
Arnight	1.6 miles - .4 acres (CTF)				
N & S Oak Creek	3.5 miles - 1.3 acres				
First Creek	1.5 miles - .5 acres				
North Peak/Bridge Mountain	2.0 miles - .7 acres				
Brownstone	1.7 miles - .6 acres				
Totals	103.0 miles - 32.27 acres				

CTF - Common Trail Factor - The acres for trail sections in common to more than one trail are counted only once.

EXISTING ROUTES CONSIDERED FOR TRAIL DESIGNATION

TRAILS	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
Old road along E-W ridge just south of Pine Creek 1.5 mi/.6 ac	yes	no	no	no	no
Old E-W road just north of Oak Creek Knoll 1.0 mi/.4 ac	yes	no	no	no	no
Horse trail spanning from First Creek to Lost Creek 7.0 mi/2.5 ac	yes	no	yes	yes	yes
Section between N & S Oak Creek legs only 1.7 mi/.6 ac	no	Yes	no	no	no
Connector horse trails going north & south from Scenic Drive exit lot 1.0 mi/.4 ac	yes	no	yes	yes	yes
Horse loop trail directly north of Red Rock Vista 5.8 mi/2.1 ac	yes	no	yes	yes	yes
Old road running due south from White Rock turn-off 1.3 mi/.5 ac	yes	no	no	no	no
Old road between Sandstone Quarry and Willow Spring turn-offs 2.0 mi/.7 ac	yes	no	yes	no	yes
Twilight Zone trails 18.1 mi/5.5 ac	yes	no	yes	yes	yes
Blue Diamond to Jean trail (portion within the NCA) 7.0 mi/2.1 ac	yes	no	yes	yes	yes
Totals	44.7mi	1.7mi	40.9mi	38.9mi	40.9mi
	14.7ac	.6ac	13.2ac	12.5ac	13.2ac

APPENDIX 20

TRAIL OPTIONS

PROPOSED TRAILS REQUIRING NEW CONSTRUCTION

TRAIL	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
First Creek to Oak Creek 1.3 mi/.5 ac	yes	yes	yes	yes	yes
Kraft Rocks & Gateway Canyon 1.1 mi/.8 ac	yes	yes	yes	yes	yes
Red Valley Equestrian 2.0 mi/.6 ac	yes	no	yes	yes	yes
Totals	4.4 mi	2.4 mi	4.4 mi	4.4 mi	4.4 mi
	1.9 ac	1.3 ac	1.9 ac	1.9 ac	1.9 ac

TRAILS SUMMARY

TRAILS	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
Existing designated trails	103.0mi	103.0mi	103.0mi	103.0mi	103.0mi
	32.27ac	32.27ac	32.27ac	32.27ac	32.27ac
Existing Routes (not designated)	44.7mi	1.7mi	40.9mi	38.9mi	40.9mi
	14.7ac	.6ac	13.2ac	12.5ac	13.2ac
Proposed New Construction	4.4mi	2.4mi	4.4mi	4.4mi	4.4mi
	1.9ac	1.3ac	1.9ac	1.9ac	1.9ac
Totals	152.1mi	107.1mi	148.3mi	146.3mi	148.3mi
	48.87ac	34.17ac	47.37ac	46.67ac	47.37ac

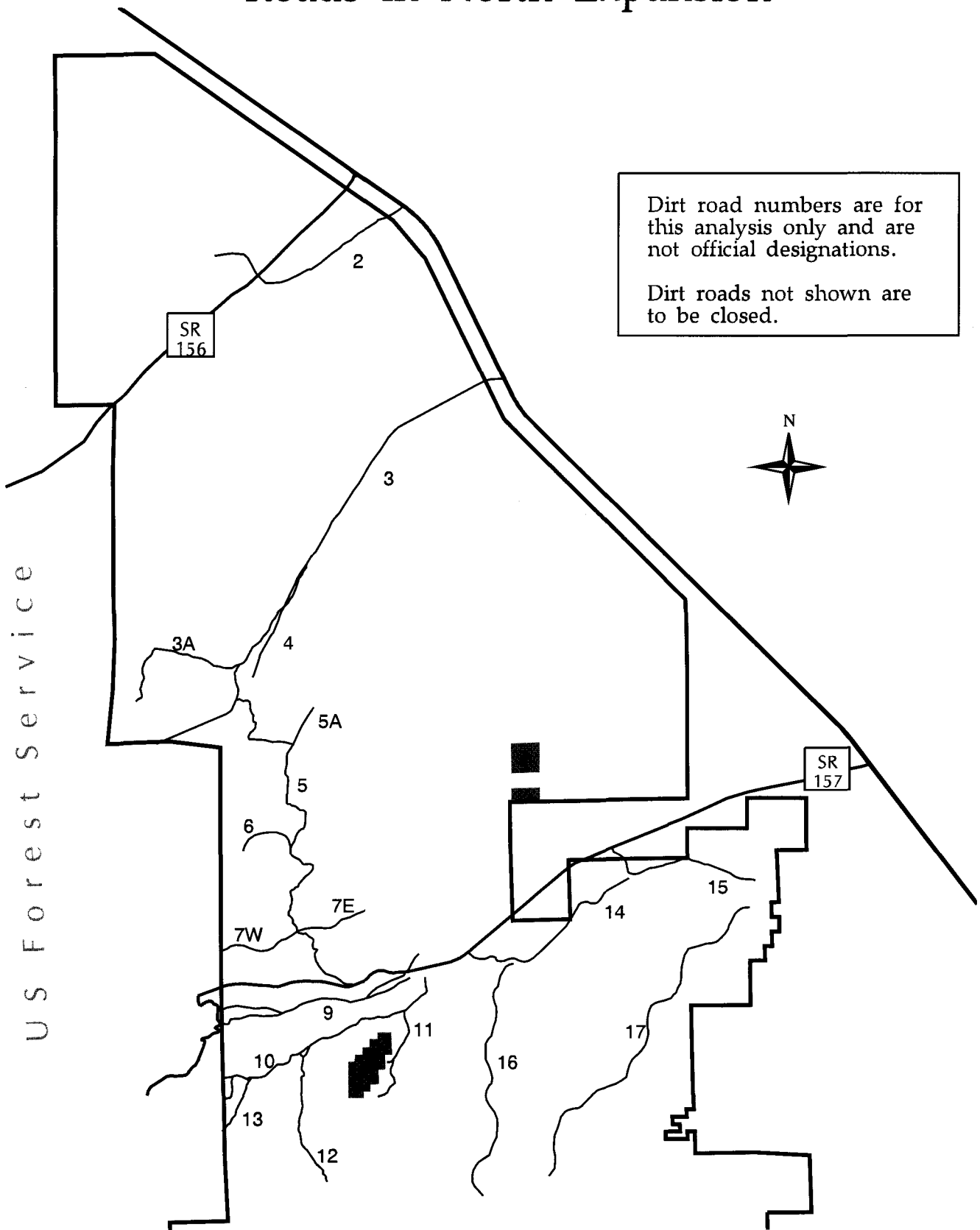
APPENDIX 20

ROAD OPTIONS

DIRT ROADS NORTH OF LA MADRE
(north expansion)

DIRT ROAD		ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
#2	2.8 mi/6.8 ac	open	open	close	close	close
#3	8.8 mi/21.3 ac	open	open	open	open	open
#3A	3.0 mi/7.3 ac	open	open	open	close	open
#4	1.8 mi/4.4 ac	open	open	close	close	close
#5	7.4 mi/17.9 ac	open	open	open	open	open
#5A	.3 mi/.7 ac	open	open	close	close	close
#6	.9 mi/2.1 ac	open	open	open	close	close
#7E	1.0 mi/2.4 ac	open	open	close	close	close
#7W	1.5 mi/3.6 ac	open	open	open	close	open
#9	8.2 mi/20.0 ac	open	open	close	close	close
#10	4.5 mi/10.8 ac	open	open	open	open	open
#11	2.2 mi/5.4 ac	open	open	open	open	open
#12	2.7 mi/6.6 ac	open	open	close	close	close
#13	1.5 mi/3.7 ac	open	open	open	open	open
#14	3.7 mi/8.9 ac	open	open	open	open	open
#15	2.9 mi/6.9 ac	open	open	open	open	open
#16	7.1 mi/17.2 ac	close	close	close	close	close
#17	9.3 mi/22.6 ac	close	close	close	close	close
Totals	leave open	53.2 mi 128.8 ac	53.2 mi 128.8 ac	36.4 mi 87.9 ac	31.0 mi 74.9 ac	35.5 mi 85.8 ac
	close	16.4 mi 39.8 ac	16.4 mi 39.8 ac	33.2 mi 80.7 ac	38.6 mi 93.7 ac	34.1 mi 82.8 ac

Roads in North Expansion



Dirt road numbers are for this analysis only and are not official designations.
Dirt roads not shown are to be closed.



U S Forest Service



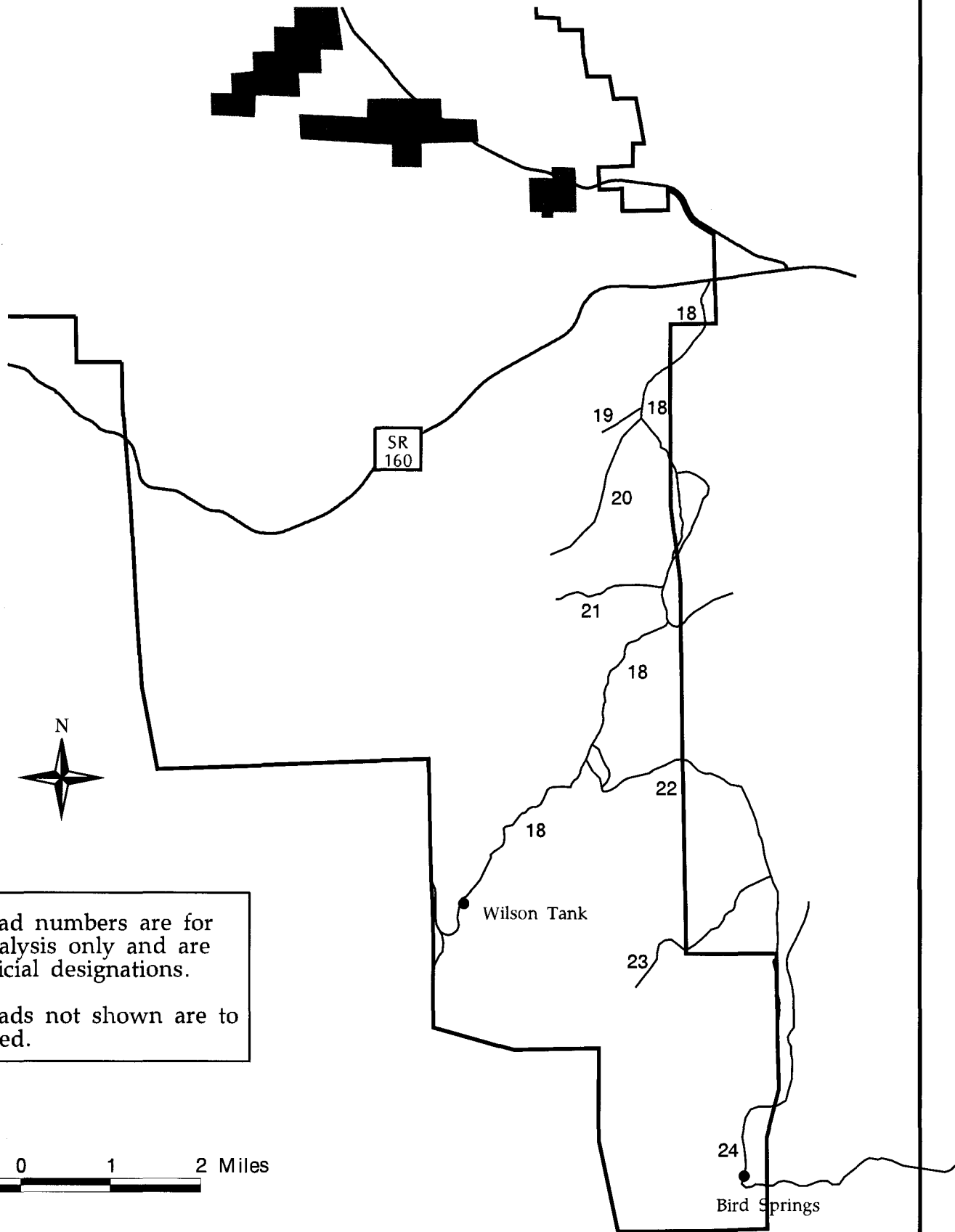
APPENDIX 20

ROAD OPTIONS

DIRT ROADS IN THE SOUTHERN NCA EXPANSION

DIRT ROAD		ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
#18	6.9 mi/16.7 ac	open	open	open	open	open
#19	.6 mi/1.4 ac	open	open	open	close	close
#20	1.8 mi/4.4 ac	open	open	close	close	close
#21	1.2 mi/3.0 ac	open	open	open	close	open
#22	1.5 mi/3.5 ac	open	open	open	open	open
#23	.9 mi/2.1 ac <u>Partial</u> .4 mi/1.0 ac	open	open	partial	close	partial
#24	2.8 mi/6.7 ac	open	open	open	open	open
Totals	leave open	15.7 mi 37.8 ac	15.7 mi 37.8 ac	13.5 mi 32.3 ac	11.2 mi 26.9 ac	12.8 mi 30.9 ac
	close	0.0 mi 0.0 ac	0.0 mi 0.0 ac	2.2 mi 5.5 ac	4.5 mi 10.9 ac	2.9 mi 6.9 ac

Roads in South Expansion



Dirt road numbers are for this analysis only and are not official designations.

Dirt roads not shown are to be closed.

1 0 1 2 Miles

ROAD OPTIONS

DIRT ROADS SUMMARY

DIRT ROADS		ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
North of La Madre	remain open	53.2 mi 128.8 ac	53.2 mi 128.8 ac	36.4 mi 87.9 ac	31.0 mi 74.9 ac	35.5 mi 85.8 ac
	close	16.4 mi 39.8 ac	16.4 mi 39.8 ac	33.2 mi 80.7 ac	38.6 mi 93.7 ac	34.1 mi 82.8 ac
Original NCA	remain open	23.9 mi 57.8 ac	23.9 mi 57.8 ac	23.9 mi 57.8 ac	23.9 mi 57.8 ac	23.9 mi 57.8 ac
	close	49.8 mi 72.5 ac	49.8 mi 72.5 ac	49.8 mi 72.5 ac	49.8 mi 72.5 ac	49.8 mi 72.5 ac
Southern Expansion	remain open	15.7 mi 37.8 ac	15.7 mi 37.8 ac	13.5 mi 32.3 ac	11.2 mi 26.9 ac	12.8 mi 30.9 ac
	close	0.0 mi 0.0 ac	0.0 mi 0.0 ac	2.2 mi 5.5 ac	4.5 mi 10.9 ac	2.9 mi 6.9 ac
Totals	remain open	92.8 mi 224.4 ac	92.8 mi 224.2 ac	73.8 mi 178.0 ac	66.1 mi 159.6 ac	72.2 mi 174.5 ac
	close	66.2 mi 112.3 ac	66.2 mi 112.3 ac	85.2 mi 158.7 ac	92.9 mi 177.1 ac	86.8 mi 162.2 ac

PAVING PROPOSALS

PAVING	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
Existing Roads, Lots & Overlooks					
Red Spring	.25 mile plus lot (1 acre)				
White Rock	.55 mile plus lot (1.75 acre)				
Willow bus turn around loop	.1 mile (.24 acre)				
Lost Creek lot	.18 acre				
N Oak Creek	.7 mile plus lot (2 acres)				
New Construction					
Calico III	pave - 1.2 acres				
Return road from Sandstone Quarry	pave 2.65 mi 5.78 ac	no road	pave 2.65 mi 5.78 ac	no road	pave 2.65 mi 5.78 ac
Sandstone to Willow trail	2.0 mi .7 ac	no trail	2.0 mi .7 ac	no trail	2.0 mi .7 ac
Sandstone/Turtlehead	pave .52 ac	Do not construct			
Red Rock Wash expansion	pave - .5 acre				
Rangers Choice	pave .47 ac	Do not construct			
Pine Creek expansion	pave - .36 acre				
Totals	6.3 mi	1.6 mi	6.3 mi	1.6 mi	6.3 mi
	14.7 ac	7.2 ac	13.7 ac	7.2 ac	13.7 ac

General Management Plan and
Draft Environmental Impact Statement
for the
Red Rock Canyon National Conservation Area:

Fire Ecology and Management

Mark (Tim) Rash

July 21, 1998

INTRODUCTION

As with most western ecosystems, the physical phenomenon of fire assumes a dual role in the Red Rock Canyon natural environment. Depending on the vegetative community involved (Appendix 4), fire can be either an agent of destructive, far-reaching consequences or a necessary process of ecologic rejuvenation and maintenance. Which affect depends on whether the various communities did or did not evolve in environments in which natural fire occurred with some regularity. Some plant assemblages have developed selective adaptations to periodic fire disturbance, and other communities have not (and with all gradations in between).

Harmful Fire Effects

At one end of this spectrum are vegetative communities which can be characterized as severely *fire-intolerant*, such as Blackbrush (and to a lesser extent, the Creosote bush community). In their native condition, these hot, dry low elevation desert communities hosted perennial bunchgrasses that typically would preclude the occasional lightning fire from spreading much beyond the point of origin, limiting the fire size to literally one or two trees or tall shrubs. Reflecting their harsh habitat, the native Mojave grasses grew in sparse densities and discontinuous arrangements that, barring strong winds or other such extenuating conditions, simply would not allow fire to carry itself from one plant to the next.

Today this situation has been drastically altered by the widespread presence of highly flammable, and fire-prone, species of non-native annual grasses. Chief among these are Red brome (*Bromus rubens*) and Cheatgrass (*Bromus tectorum*), which typically form dense, continuous and extensive stands on disturbed sites. In combination with the increased sources of ignition from human activities, the result now is that fire has become a commonplace occurrence within the non-fire adapted desert shrub communities. Especially for the Blackbrush type the biotic consequences are double-edged and fundamental in scope. Not only is fire lethal to individual plants, which lack stump-sprouting ability or other such physiological adaptations to fire disturbance, but in nearly all instances the post-fire site becomes overwhelmingly dominated by one or both of the invasive brome grasses. While not yet conclusively proven, a growing opinion among successional pattern researchers is that this species composition change is permanent. The basic explanation for this perpetual disturbance state (or, *disclimax community*) has to do with the propensity of converted brome sites to subsequently reburn, often in a cycle of relatively high frequency. With each successive fire native plants become eliminated (whether holdover survivors from previous fires or site-recolonizing individuals), creating habitat niche openings which become occupied by the exotic grasses, due to their many competitive advantages over most native plants.

Throughout the west this *type conversion* fire effect is becoming recognized as an ecological problem of the first order. In the Mojave Desert and other regions of the Southwest fire conversion of native shrublands to *Bromus* sp. dominance affects the population status of the Desert tortoise (*Gopherus agassazii*). This problem affects the Red Rock Canyon NCA, as does the threat posed by fire to the entire known global population of the Blue Diamond cholla (*Opuntia whipplei* var. *multigeniculata*).

This special status plant (Appendix 1) occupies the southern end of Blue Diamond Hill, which burned extensively over its northern portion during the early 1980's and continues to experience fires up to the present. One of these, a 40-acre fire in 1993, started less than three miles from occupied Blue Diamond cholla habitat. Another RRCNCA concern relative to fire-induced brome conversions is the loss of native biodiversity, both at the species and community level.

By somewhat fortunate coincidence, the majority of all property inholdings, visitor facilities and other improvements are located within the Blackbrush and Creosote bush vegetative communities. The BLM wildland firefighting mandate is to protect human life, property and natural resources, in that order. Wildfires occurring in this zone, whether lightning or human-caused, will be fought immediately and forcefully; the primary goal being to minimize burned acreages. Operational tactics will utilize the best available equipment, personnel, and technology consistent with Bureau wildfire policy (ie, suppression costs must be commensurate with the value of the resources protected, unless human life or property are at risk).

Beneficial Fire Effects

At the other end of the fire tolerance spectrum are those plants and communities that require periodic fires for their continued ecological health. Ponderosa pine (*Pinus ponderosa*) reproduces solely by seed, and then only under favorable seedbed conditions. Along with precipitation and soil moisture, the most critical of these requirements is a seedbed free of competing live vegetation and composed of a thin layer of organic litter (mineral soil needs to be exposed). Historically, fire disturbance has been the primary agent responsible for achieving such seedbed conditions, which is evidenced by the array of fire-survival adaptations found in this species (extremely thick bark, for example). Ecologically sound management principles, in light of the ecosystem focus on the Spring Mountains as a whole, dictate a much more flexible approach to fire management in Ponderosa pine habitats. The occupied range of this species in Red Rock Canyon essentially corresponds to the Sandstone Escarpment, including the rimrock plateau and most of the deep, east-facing canyons. The predominant vegetation found in these canyons is the Chaparral community, which also requires periodic physical disturbance for its ecological maintenance and health. Together with rockslides and wet season flashfloods, wildfire has served as one such disturbance source. Since this portion of the NCA is entirely free of private property and developments, the logical result is to treat the Escarpment rimrock and canyons as a second fire management zone. In this zone the primary fire suppression consideration is ecological appropriateness (ie, not suppressing beneficial fires) and firefighter safety.

Red Rock Canyon NCA consists of a third wildland fire management zone as well, one comprised of species and communities that can best be described as *fire neutral*. This intermediate zone coincides with the occupied range of its most representative species, the Juniper-Pinyon community. Even though neutral in the strict sense of their species-level fire ecology, fires occurring in dense, closed canopy Juniper-Pinyon woodlands do provide tangible benefits to many wildlife species, particularly Mule deer (*Odocoileus hemionus*). Whereas undisturbed Juniper-Pinyon communities tend to form monotypic, relatively sterile stands, canopy openings created by fires often are

recolonized by a variety of shrubs, forbs and grasses. Many of these shrubfield species are important as wildlife browse sources, including Bitterbrush (*Purshia* sp.), Gambel oak (*Quercus gambelii*) and Mountain-mahogany (*Cercocarpus* sp.).

The primary suppression objective in this fire zone is flexible and variable. On a case by case basis, the full range of firefighting strategies and tactics will be employed on wildfires within this upland portion of Red Rock Canyon, from all-out suppression to vigilant monitoring of those fires deemed to be beneficial to the natural resources and posing minimal threat to human life or property. Under current RRCNCA conditions, the exception to this scaled-response policy concerns the Mountain Springs vicinity. Any and all fires occurring within proximity of the township will be fought aggressively, forcefully and without delay.

Prescribed Fire

The two biological roles fire plays in the Red Rock Canyon natural environment translates into two management types of wildland fire as well. The first is the collective group of unplanned wildfires that result from lightning downstrikes and various human actions. The second type of management fires, those that transpire under strictly controlled conditions, are planned for in advance and are expected to yield specific beneficial ecological effects. These *prescribed* wildland fires are broken down further into natural ignition fires (lightning) and management ignitions (various torches and incendiary tools and devices).

The intensity, rate of spread, size and behavior of any wildland fire is dictated by a complex array of physical parameters that are unique for each given site. The term *prescribed fire* relates to the fact that these localized conditions can be measured and then assigned a range of magnitude under which a fire could be anticipated to display a behavior and intensity that would stay within the burn project prescription; thus achieving the predicted resource benefits while avoiding any undesirable control problems or safety risks.

The crucial site conditions used as burn prescription parameters are: 1) Weather variables (wind speed and direction, humidity and temperature, airmass stability, storm activity), 2) Topographical constants (slope, aspect, elevation, canyon effect ("chimneys")) and 3) Vegetative (ie, fire fuel) characteristics (plant moisture content, spatial arrangement and continuity of the available fuel plants, surface area to volume ratio of individual plants, ratio of dead to live vegetation, flammability (due to volatile oils or resins, or extreme curing (ie, drying)). In conformance with BLM Policy Manual 9200 (Fire Management), for any prescribed fire to take place, an approved burn plan must be on file, which identifies the acceptable range of numerical values for these prescription elements. The burn plan also documents the management objectives being sought, the operational methods and procedures to be used, and health and safety contingencies for both fire personnel and the public at large.

If the fire moves out of the target area or if burning conditions change in excess of the acceptable range, the project is terminated and the operation is treated as a wildfire and is suppressed. Fires that stay in prescription are allowed to burn until the objectives are attained or the fire either burns itself

out. If and when such time as prescribed fire management actions are authorized for the Red Rock Canyon NCA, their application will be restricted to the two upland elevation fire zones. No prescribed fires will occur in the Blackbrush and Creosote bush portions of RRCNCA.

Prescribed burns are formulated to address two broad categories of resource management objectives, *hazard (fuels) reduction* and *vegetative manipulation*. Hazard reduction projects utilize fire as an efficient, cost-effective means of eliminating or reducing unsafe accumulations of combustion prone vegetation, especially in locales where human safety and/or property values are at risk. Burn projects of this type are not foreseen for Red Rock Canyon, based on the lack of need and given the Conservation Area mandate to preserve the area's biological conditions in the least altered form possible. Yet at the same time, this same mandate calls for restoring natural fire to those areas of Red Rock Canyon in which periodic fire disturbance is an essential component of ecological balance and plant community maintenance.

For several decades now a policy of aggressive fire suppression has eliminated or greatly reduced this fundamental process from the Spring Range ecosystem. In turn this has created the need to conduct prescribed fires of the *vegetative manipulation* category, the purpose of which is to specifically alter (manipulate) plant characteristics such as community composition, species occurrence and density, vigor (age class proportions) and vertical structure (seral stage; species composition). Such prescribed burns are employed to mimic the desirable post-fire effects that would otherwise accrue to lightning fires if simply allowed to burn. A few of the more important of these benefits include revitalizing sites that have become dominated by overmature vegetation, setting back shrub community habitats that have become encroached by woody species, maintaining disturbance-dependent plant species and/or communities, and reducing the threat of catastrophic fires by curtailing the unnatural accumulation of vegetative fuelbeds (due to suppression actions over time).

The vast majority of all RRCNCA prescribed burn projects are anticipated to take place in the Chaparral and Ponderosa pine communities of the escarpment canyons and rimrock, and in the upland Juniper-Pinyon woodlands of both the Spring Range and the La Madre Mountains. Depending on the site, these fire applications can be designed to restore ecological balance, trigger the competitive release of shaded-out plant species, yield seedbed conditions favorable to fire-adapted species and increase the quality of wildlife habitat (forage and cover). More fundamental though, is the management objective to simply return fire to its rightful place in the natural scheme and functioning of the Spring Mountains ecosystem.

Fire Planning & Mitigation

Fire management actions fall under the direction of the Las Vegas District Fire Management Activity Plan (FMAP), in conformance with policy guidance provided under Bureau Manual 9211. The basic thrust of this direction is that BLM fire management program actions are planned and executed in harmony with fire management objectives that have been designed to achieve resource management objectives. These are described in land use plans such as the Red Rock Canyon NCA General Management Plan and the Las Vegas Resource Management Plan.

The integration of fire and resource purpose is accomplished in two ways. At the planning stage, resource specialists have input into the FMAP process during the initial FMAP planning cycle and at all subsequent annual review & revision periods. At the implementation stage of prescribed fire projects on-the-ground natural resource considerations and effects are the responsibility of the Burn Manager (typically the same specialist who designed the project). Similarly, during the implementation stage of wildfire suppression operations resource management concerns and mitigation issues are addressed through the use of a Resource Advisor position.

Mitigation factors are not limited to the potentially destructive effects of the fire. Particularly in an area with the number of sensitive species and habitats as has Red Rock Canyon fire suppression operations can also create environmental impacts, including some of greater magnitude than would be caused by the fire itself. Overall, this suppression mitigation concern predominately applies to the following types of RRCNCA resources.

1) Desert floor; Creosote/Blackbrush communities:

Low soil moisture, scant precipitation, extreme temperature and other hostile growing conditions means that vegetation and soils are exceedingly slow to recover from any surface disturbance, including the scraping of fire control lines or operating fire vehicles off-road (which can also contribute to subsequent unauthorized public off-road usage as well).

2) T&E Species and habitat (Desert tortoise):

The mitigation emphasis is on minimizing burn acreages, due to the tendency for post-fire invasion of Creosote-bursage sites with exotic annual Bromegrasses. This consideration must be balanced against the surface disturbance factors (1 above) on a case-by-case incident basis, however.

3) Wilderness Study Areas (Pine Creek WSA; La Madre Mtn WSA):

Though both WSA's are dominated by fire-adapted or tolerant species and communities all suppression actions must still be tailored to preserve wilderness suitable conditions, as per federal Interim Management Policy. These non-impairment standards are known as "light on the land" methods, tactics and strategies, due to the avoidance of surface disturbing activities (vehicle travel, handtool or dozer fireline, and even chainsaw use in some situations) in favor of handcrews and aerial forces such as helicopters and retardant planes.

4) Designated Natural Areas (Pine Creek, North Fork):

Absent of fire stipulations in the (1952) NA legislation, mitigation is covered under Interim Management Policy (Pine Creek WSA) and the RRCNCA establishment legislation.

5) Priority Management Areas (Blue Diamond Hill; Bridge Mtn):

Fire mitigation focus and effort will be redoubled for these particular locations due to the elevated sensitivity of the vegetative resources at risk, including the complete known global occurrence of two RRCNCA endemic plant species.

6) Riparian areas:

Aside from the factor that riparian areas disproportionately account for the total biodiversity of RRCNCA (endemic and/or special status species included), a unique mitigation issue concerns the chemical composition of aerial fire retardants, many of which function as fertilizers once introduced into biotic systems. Because this can lead to algae "blooms" and other aquatic ecosystem disruptions the use of retardants is prohibited within a 300' lateral buffer zone of any springs or springbrooks. In addition, only retardants of the fugitive type (biodegrading in 14-days or less) should be employed in RRCNCA firefighting operations.

7) Cultural resources; Air quality; Sensitive Species/Habitats:

The full range of resource protection and mitigation issues will be adequately addressed by the on-site presence of one or more Resource Advisors during all Red Rock Canyon fires. In this manner, the trade-off between minimal burn acreages and suppression-caused impacts can be weighed and mitigated on an incident by incident basis. Only under circumstances in which human life or property is threatened will dozer-constructed fireline be considered for use within the boundaries of the RRCNCA.

Fire Information & Public Education

An integral task in the long-term goal of restoring fire into the natural scheme of Red Rock Canyon and the Spring Range ecosystem will be to effectively offset the "fire is bad" message portrayed during five decades of Smokey The Bear fire prevention campaigns.

The challenge is further complicated by the circumstance that Red Rock Canyon lies adjacent to a major urban population, and by the related condition that the Las Vegas Valley already represents an air quality standard Non-attainment Airshed, as classified by the federal Environmental Protection Agency (EPA). Life and property concerns of the residents in Red Rock's various private in-holdings, such as Bonnie Springs, Calico Basin and Mountain Springs must be considered. For these reasons it will be imperative that all fire-related press releases, interviews, visitor brochure texts and interpretive displays and signs present a consistent, ecologically accurate and balanced depiction of fire's dual role in the Red Rock Canyon environment (ie, destructive incident versus essential ecological process).

Interagency Cooperation (Ecosystem Management)

Due to the agency ownership pattern in the Spring Mountain range and to the inherent circumstance that natural phenomena (such as fire) are completely unaffected by administrative designations or

boundary lines, in order to accomplish the objective of restoring fire on a landscape ecosystem scale, it will be imperative to maximize interagency cooperation and consultation during both the planning and implementation stage of all Red Rock Canyon NCA fire management program actions. This unified approach is required of such efforts as determining fire suppression acreage standards (FMAP zones), implementing of prescribed natural fire policies, parameters and allowable burn sizes, and in negotiating annual smoke emission threshold levels.

Fire History

Standard BLM fire incident reports from the years 1980-1997 were used to compile the Red Rock Canyon fire history and statistical summary presented in Appendix 16. Part A tabularizes the annual wildfire occurrence in terms of fire numbers (or *frequency*) and acres burned, as analyzed relative to the broad vegetative types affected (shrubland versus woodland) and their categorical source of origin (natural, lightning fires versus human-caused fires). The TOTAL and MEAN (average) figures presented in this table show the assertion that wildfire does in fact play a natural role in the Red Rock Canyon/Spring Range ecosystem. Over the eighteen year period, 294 total wildfires occurred in Red Rock Canyon. 37% (108) were lightning-originated fires, but accounted for only 06% of the total acres burned during this same span of years. This wildfire occurrence pattern is typical of the Fir-Pine and Juniper-Pinyon community types in most areas of the western U.S. Fires in this vegetative type primarily are confined to the aerial canopy and seldom generate enough heat and intensity to carry themselves through the sparse ground fuels that are typical of the Juniper-Pinyon community in particular. This expected fire occurrence pattern is further supported by the breakdown of NCA shrubland fires (225) versus woodland fires (69) reported during 1980-1997, corresponding to 77% versus 23% of the total fire occurrence. The conclusion of Appendix 16, Part A, is that the great majority of Red Rock Canyon fires over the past eighteen years have affected shrubland vegetative types and have been human-caused in origin.

This human-caused shrubland fire occurrence pattern is clearly shown in Appendix 16, Part B, which is a list of all individual wildfires greater than 10-acres in size. All but two of these larger fires were human-caused, and only one of them did not take place in shrubland vegetation. Even more revealing is four of these fires (01% of 294 total) account for 86% of all the acres burned in Red Rock Canyon from 1980 to 1997 (2,249 out of 2,605 acres, total). Besides posing a hugely disproportionate ratio of fire occurrence to cumulative acres burned this single statistic illustrates two fundamental conditions affecting the Red Rock Canyon environment in general, and the area's fire ecology in particular. First, the comparatively large size of these four wildfires is symptomatic of the overall presence, and isolated site dominance, of the invasive, non-native grasses Bromus rubens (Red brome) and Bromus tectorum (Cheatgrass). Second, these larger fires point out the increased risk of wildfire in the lower elevations of Red Rock Canyon, lands corresponding both to shrub-dominated vegetative cover and the location of the highest volume of human recreational use and visitation.

As Appendix 16, Part C shows, not all of this increase in human-caused fires is due to sources necessarily associated with either outdoor recreation or routine visitor activities. Vehicle fires (including many due to theft), fireworks, trash dump fires, children playing with fire, arson, and other

miscellaneous causes (vehicle exhaust, firearms, powerline, equipment use, blasting, plane crash and structure fire) accounted for 56%, over one-half, of all wildland fires in Red Rock Canyon from 1980 through 1997. The true percentage of fire occurrence from these sources may be as much as 71%, depending on the actual origin of those fires reported as *human-caused, source unknown*. Urban proximity itself is thus a significant wildfire risk factor affecting the RRCNCA.

APPENDIX 22:

ARCHAEOLOGY IN RED ROCK CANYON
OF SOUTHERN NEVADA A CLASS I
CULTURAL RESOURCES OVERVIEW

Cultural Resources Report 5-1991

by

Keith: Myhrer
Archaeologist

September 1990
Revised February, 1991

Bureau of Land Management
Stateline Resource Area
Las Vegas District, Nevada

DEIS-A81

ABSTRACT

The unique setting of Red Rock Canyon as an oasis within a desert environment facilitated aboriginal exploitation and continues to foster recreational uses. This Class I Inventory reviews and evaluates the previous cultural resources investigations in Red Rock Canyon Recreation Lands. Archaeological research is classified within four separate phases: 1) initial exploration and identification of significant sites from the 1930s to 1960s, 2) BLM-contracted surveys from 1968 to 1977 for anticipated recreational development, 3) compliance inventories for Federal actions from 1975 to the present, and 4) three proactive research projects in the late 1980s. Red Rock was divided into three subzones for comparative purposes. Red Rock Summit consists of several large rockshelter/roasting pit districts. North Red Rock Escarpment has a predominance of rockshelter/rock art locales. South Red Rock possesses a distribution of lithic scatters, rock art and some rockshelters. I propose a strategy to test, evaluate, complete data recovery, and then manage for public uses at sites that are within high intensive recreational use areas. Sites within less intensive use areas should be managed for conservation. I also propose a research strategy for a graduate student for the roasting pit/rockshelter districts in Red Rock Summit subzone.

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ACKNOWLEDGEMENTS

A complete Class 1 inventory of Red Rock Canyon Recreation Lands is not possible without field visits to its archaeological sites. I wish to thank the Red Rock staff members who provided me with intimate details concerning the environment, the history of Red Rock recreational uses, and initial inspections of the sites. My first field tours were given by Chris Miller, Chief Interpreter. After assuming position as Park Manager, Joel Mur guided me on a reconnaissance tour in which we discussed long-term management objectives. The following staff members also provided me with tours of cultural resource sites, Ralph Robinson, Chuck Ward and Pat Grediagin at the Lost Creek trail and site; Dave Phillips and Peggy Ahrens at Red Spring; and Joel, Chris, Peggy, Dave and Ralph at both Sandstone Quarry and Willow Spring. Also, Richard Stockton, Red Rock Volunteer and archaeologist accompanied us and provided advice on resources evaluations. Previous Park Manager Dave Hunsaker facilitated my work in Red Rock by allowing me to utilize the knowledge from his staff and giving me free reign to evaluate and work on sites in Red Rock. Finally, I appreciate the time that both Joel and Chris contributed to review the draft of this document.

INTRODUCTION TO RED ROCK CANYON

Red Rock Canyon was a desert oasis for humans during both prehistoric and historic times. It is also used by contemporary people as a center for recreation, solitude, and inspiration. The numerous springs and streams that flow within its natural boundaries provide for a variety of life. Because elevations in the canyon are 2000 feet higher than the surrounding valleys, allowing for extra moisture, a diverse assortment of edible plant resources such as agave and faunal resources like bighorn sheep is present. In addition, the contrasting colors of the sandstone and limestone formations and the various micro-environments of each canyon are aesthetically appealing.

The identification and study of artifacts, hearths, remains of occupied rockshelters, and a variety of rock art indicates that humans have utilized the Red Rock area for at least 2000 years. Principle use was concentrated near springs and other water sources, on terraces overlooking major washes, and along eroded bluffs and escarpments that allowed for physical shelter.

Recent use of Red Rock Canyon Recreation Lands (RRCRL) is primarily recreational in nature. The scenic Red Rock loop road was constructed in two phases between 1972 and 1978 and the Visitor Center was opened in 1982. Since that time, visitor use of RRCRL has massively increased, maintenance activities have continued, and trails and picnicking areas constructed. To meet the increasing demands of the growing urban population of Las Vegas Valley, some new trails and use areas have been proposed.

Red Rock is located about 10 miles west of the present edge of urban development of Las Vegas, Clark County, Nevada. Proposed commercial and residential development within the next decade is expected to meet the east boundary of the park lands. Population of the area is presently 750,000, but is expected to increase to more than a million in a few years. The recreation park presently consists of 63,110 acres and is managed by the Bureau of Land Management (BLM), Stateline Resource Area (SRA), Las Vegas District, Nevada. An additional 5,000 acres will be added to RRCRL as part of the Summa/Red Rock Land Exchange. Figure 1 is a map of southern Nevada in which SRA and RRCRL are located.

This document has two objectives. First, the previous archaeological work in the area is synthesized and evaluated in terms of the present Cultural Resource Management (CRM) requirements. Second, research strategies are proposed that provide appropriate cultural resources management for sites within heavily-used recreational areas, and for sites in the more isolated

areas in Red Rock.

The remaining part of this section delineates the methodology for this Class I inventory and describes the environment in RRCRL. The prehistory and history of the area are summarized in the following section, followed by a review of the documents that describe archaeological work in the area. Next is a discussion of the archaeological sites recorded in Red Rock and their locational distribution. Finally I make recommendations for the future CRM of the recreation lands.

Class I Inventory Methodology

An initial reason to conduct a Class I inventory for RRCRL was to offer a general plan for probing, testing, and evaluating site complexes within intensively used recreational areas. Few sites in RRCRL have been formally evaluated for eligibility for nomination to the National Register of Historic Places (NRHP) and are considered eligible pending further evaluation. Site complexes within heavily used recreational areas, such as Red Spring, Lost Creek, Willow Spring, and Sandstone Quarry, have interpretive potential but have presumably suffered impacts from 25 years of recreational uses. A strategy to evaluate the sites prior to implementation of an aggressive interpretive scheme is necessary. Another reason for the inventory was to identify sites or districts that need management for scientific research or conservation purposes.

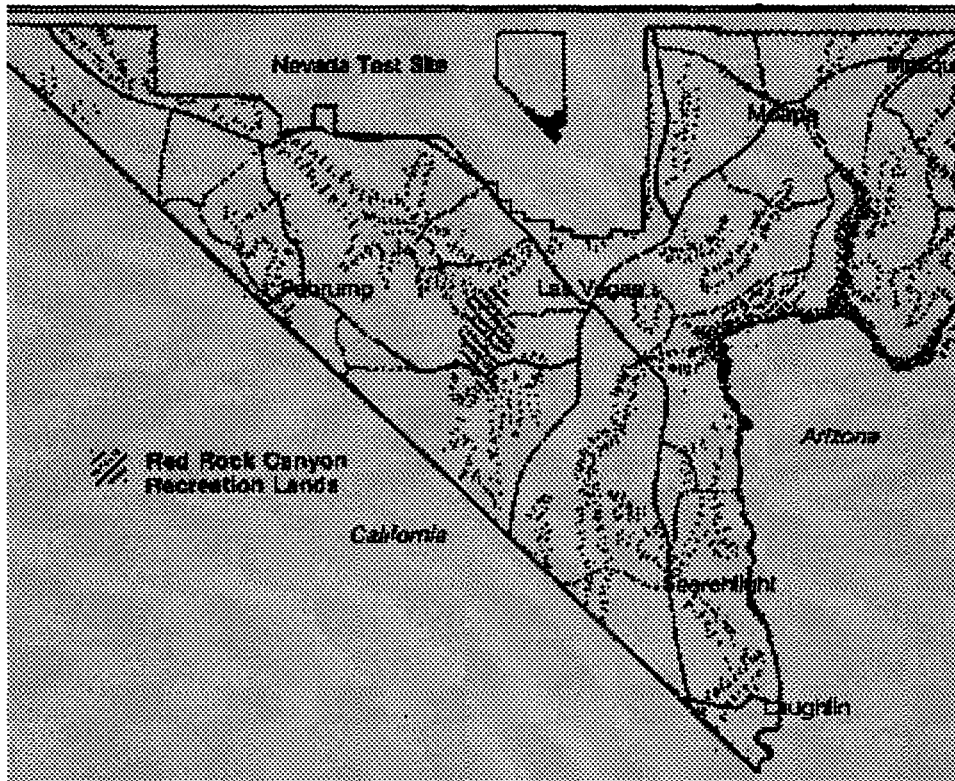


Figure 1. Location of Red Rock Canyon Recreation Lands within southern Nevada.

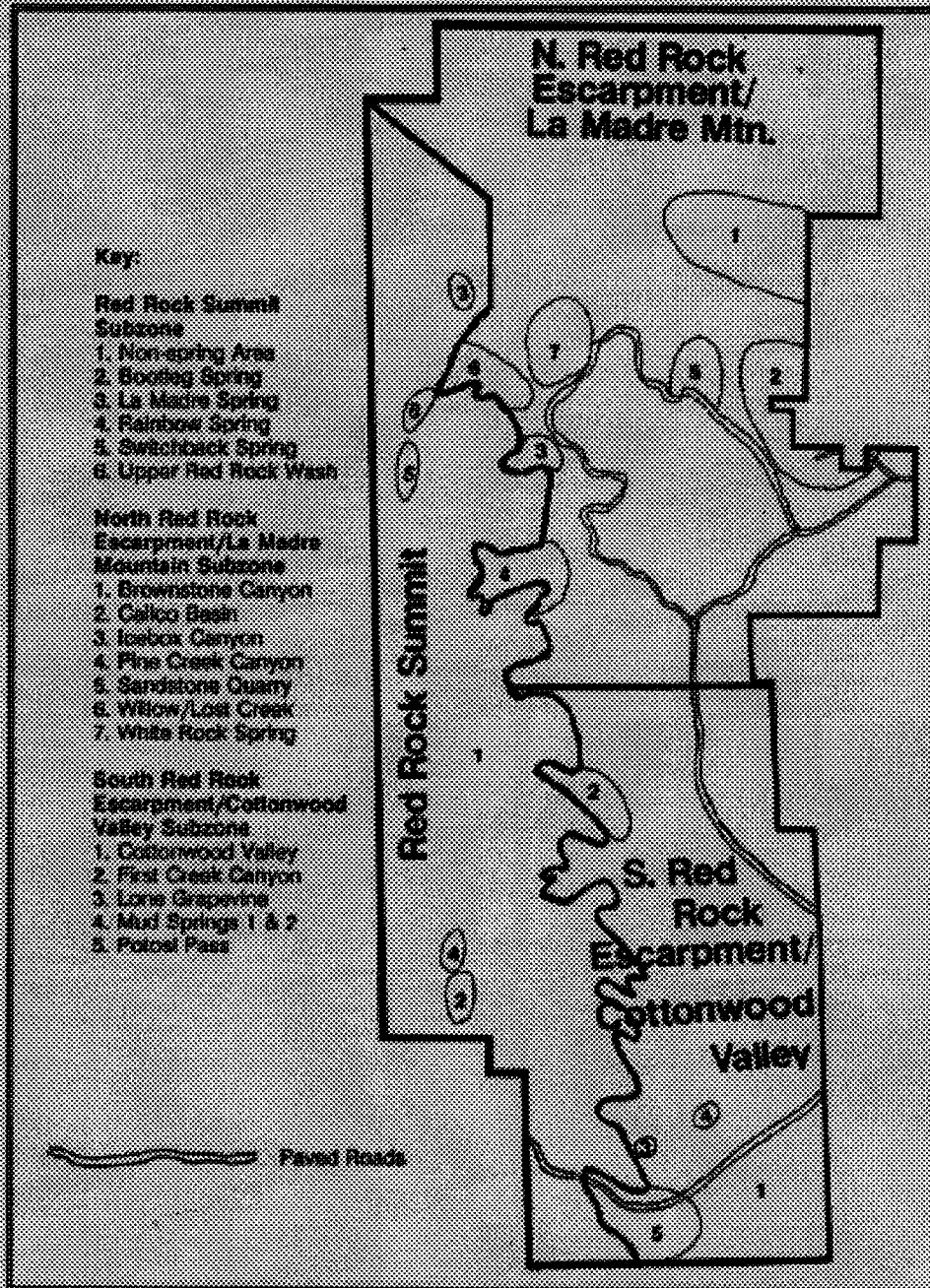


Figure 3. Delineation of subzones and locales within Red Rock Canyon Recreation Lands.

Rather than evaluating each site complex as an independent project, I felt that questions on significance should be treated for all sites in RRCRL within a holistic planning concept. Proposed treatment of each site would then be consistent with long-term objectives. I began this project in 1989. At the point that I had completed a general outline, the Washington office of BLM determined that a Resource Management Plan (RMP) was needed on an accelerated time frame for SRA of Las Vegas District, which includes RRCRL I was assigned to write the cultural resources section of the RMP. The first step was a data inventory for the entire resource area. The results of the inventory are presented in an independent document that summarizes the kind of archaeological work conducted in the resource area, the number and types of sites recorded, the amount of acres surveyed, and presents a management philosophy for future CRM in southern Nevada (Myhrer 1990). Although the RMP work postponed the Class 1 inventory for RRCRL, the summary document allows for a regional view of the archaeology of Red Rock Canyon within the region and establishes a CRM philosophy to treat individual sites within a larger conceptual framework.

The general aim of this literature review is to describe and synthesize the present amount of archaeological data and to identify several subzones of sensitivity in RRCRL. This project, as are most in Federal land management agencies such as BLM, was constrained by conceptual boundaries determined by funding ceilings and in effect time limits. A question identified prior to data collection concerned the amount of research that could be invested until efficiency was lost. For example, if 95 percent of the inventory was accomplished within one month, and another two weeks would be required to procure four or five additional percent, then application of the Law of Diminishing Returns would conclude the gathering of the final five percent as inefficient. This is especially meaningful when the researcher discovers that most of the sites identified in RRCRL were recorded prior to the mid-1970s when the number of site and environmental requirements were considerably lower than that of today. Consequently, searching for a few records that in actuality may not have even been written seemed an inefficient use of energy. The standards and quality of the data inventory for this project, described below, were considered the most useful and realistic for achieving an holistic view of the archaeology of Red Rock. The sources for the solicitation of data for the Class I Red Rock inventory were the records and base maps from Las Vegas District BLM, the Southern Nevada Site Repository.

The data collection consisted of two phases. The first step was entirely accomplished by William White, presently Preservation

Planner with Nevada State Historic Preservation Office (SHPO) and in 1989 graduate intern under my direction. As one of several assignments, White reviewed the documents describing the projects conducted in RRCRL between 1969 and 1977. His comments and analysis are incorporated into the section on previous research in Red Rock. In addition, White compiled the draft data base maps of RRCRL using records and maps from the Southern Nevada Repository of Site Records and BLM.

The second phase involved my review of White's analysis along with the review of all compliance-based projects after 1975. In conjunction with White's draft maps I examined the recordation forms and classified sites by components and types. During this process some sites were identified that had been recorded by two different archaeologists and assigned separate site numbers. For example, survey reports prior to 1975 discussed the problem of numerous sites having been recorded twice and assigned separate numbers. Although I used the information available in the reports, I did not complete the recordations for sites not formally recorded. Based on White's draft maps, several sites had been assigned Smithsonian numbers without BLM designations. Most of the number questions were resolved after additional record searches. About 20 were determined duplicates while several had never been recorded on appropriate forms.

In addition, there are certain features such as rock art panels that local avocationalists and professionals will feel were missed in this review. Some rock art sites are so "well-known" that no one has ever recorded the site. Others may have been "lumped" into a recording form as a small part of a larger site without the recorder actually noting the presence of the panel. Consequently, one of the results of this review will be identification by reviewers of "obvious" sites that have never been recorded. A contrasting problem is the method in which features such as roasting pits were recorded as individual sites rather than contributing parts to a larger complex or district. The section on proactive management in the latter portion of this document recommends treatment of site clusters as districts, a strategy that would supercede the necessity of conducting individual recordations for these unrecorded sites during resurvey projects.

Environment In Red Rock Canyon

Red Rock Canyon Recreation Lands is located on the east side of the Red Rock escarpment. The climate and resources make this locale an oasis in an arid, desert environment. Figure 2 is a map of the recreation lands.

Geology. The Red Rock escarpment rises more than 5000 feet (1525 meters) above Las Vegas Valley. Although the valley is nearly flat in its interior, rugged mountain ranges frame the exterior. The McCullough Range lines the south, Frenchman and Sunrise Mountains the east, and the Spring Mountains, edging the Red Rock escarpment on the west, stretch in a northwest-southeast direction along the west side of the valley. Blue Diamond Hill is a prominent feature that borders the east portion of Red Rock Canyon, creating a valley that is two to four miles wide and 12 miles long. Elevation within RRCRL ranges from 4000 feet (1280 meters) to 7000 feet (2130 meters).

The Red Rock escarpment, also known as the Sandstone Bluffs, is composed of Aztec Sandstone. To the west of the bluffs "...an overlying thrust plate of carbonate rocks forms a continuous cliffy slope (the Wilson Cliffs) more than 2,000 feet high and about 12 miles long" (Longwell et al. 1965:63). Soils in the canyons are composed of colluvial and alluvial limestones and sandstones. Canyon washes are strewn with large boulders.

Vegetation. Vegetation is characterized by a spring-canyon riparian complex. Common plants are blackbrush, sagebrush, Spanish bayonet, prickly pear cactus, desert almond, and some pinyon pine and juniper stands. A major source of food to the people occupying this area was agave. This plant is commonly found in the limestone substrate, but stalks also grow on sandstone and limestone terraces within some washes.

Climate. Summers in southern Nevada are long, hot and arid, and winters are mild. The average temperature in Las Vegas Valley is 46 to 47 degrees F in winter and 87 degrees F in summer. Average relative humidity is about 20 percent. Normal annual precipitation is four inches and often occurs in cloudbursts that cause flash flooding in ephemeral washes (USDA 1980:5; USDA 1985:3). Due to the 3000 foot difference in elevation at Red Rock Canyon in comparison to the valley, temperatures are about 5 to 10 degrees cooler. The individual canyons in Red Rock usually receive winter snows.

Legal Description of Red Rock Canyon Recreation Lands

The legal description of RRCRL is within T.20S., R.58E., T.21 S., R.58E., T.22S., R.58E., and T.21 S., R59E. The 7.5 minute United State Geological Survey maps on which RRCRL is located are Blue Diamond, 1972, La Madre Mountain, 1972, La Madre Spring, 1984, and Mountain Springs, 1984. State Route 159 loops through the east-central portion of RRCRL and State Route 160 cuts through the south part of the park.

GENERALIZED PREHISTORY AND HISTORY OF RED ROCK CANYON

Southern Nevada is a unique region because it is situated at the interface of three distinct geographical zones: the Colorado Plateau, Mojave Desert and Great Basin. Each zone retains evidence of several cultural groups who adapted to the natural resources of the area. References that discuss established cultural associations and chronology include Lyneis (1982a) and Rafferty (1985).

Prehistory of Red Rock Canyon and Southeastern Nevada

All prehistoric native Americans employed hunting and gathering for some portion of their resource base. Collected foods include seeds and pods from cacti, yuccas, various grasses, mesquite from marsh-like areas, and pinion nuts from the higher altitudes. Hunted animals include rabbits, coyotes and rodents from lower elevations, and bighorn sheep and deer from surrounding ranges such as the Virgin and Spring Mountains. The atlatl was used as a hunting tool to throw spear points attached to shafts.

Unique to this region is the large number of roasting or mescal pits. These are circular features primarily used to roast bulbs from the agave plant. Roasting pits are defined and discussed in the section on archaeological sites types. Hunter-gatherers lived in open camps, brush structures and caves. Based on ethnohistoric sources, they moved throughout a territory in an extended family group exploiting maturing plant resources and animals on a seasonal basis (Steward 1970).

Early hunter-gatherer occupation in southern Nevada dates to about 11,000 B.C. at Tule Springs site in northwest Las Vegas Valley (Shutler 1967). Heaviest use of the region by the Archaic and Paiute peoples occurred within the last 5000 years. Gypsum Cave, located in the Sunrise/Frenchman Mountains on the northeast edge of Las Vegas Valley, yielded evidence of continual use from about 3000 B.C. into historic times. Due to the variety of resources, availability of water, and the accessibility of shelter caves, Red Rock Canyon as a resource zone was the locus of intensive use for at least the Past 2000 years.

Two other cultural groups that utilized the area were the Virgin Anasazi and the Lower Colorado (Patayan or Yuman) peoples. Lower Colorado groups such as the Mojave conducted floodwater farming along the Colorado River about 70 miles south of Red Rock Canyon. They also exploited resources in surrounding ranges and valleys.

The Virgin Anasazi were concentrated along the Muddy and Virgin Rivers in the Moapa Valley. Population increased after A.D. 500

which coincides with the beginning of farming and introduction of the bow and arrow. The Virgin Anasazi lived in pit rooms dug into the earth or in pueblo surface structures constructed of brush and adobe. Although they supplemented their diet with hunted animals and seeds gathered from the region, much of their food came from corn, beans and squash grown in the floodplains of the rivers. The Virgin Anasazi left the region around A.D.1150. Reasons for the abandonment include an increased population size, a lengthy drought during crucial times, and a heavy dependence on farming.

Eileen Green's work (1987) on the ecological associations of rock art in the region describes petroglyph and pictograph elements in the Red Rock area. Rock art in the region is considered culturally mixed, in the sense that certain elements are attributed to the Paiute-Shoshone, others to the Patayan or Yuman, and some to the Virgin Anasazi. Green considers the red "handprints" panel at Willow Spring as extremely rare, only one of three in Clark County (Personal Communication, 1989). She considers all three panels as visually the same. Green considers the "handprints" at Willow Spring to be possibly of Virgin Anasazi origin. Patayan and Paiute rock art influences are also found at Brownstone Canyon in RRCRL, Keyhole Canyon in the Eldorado Mountains, and sites in the Newberry Mountains.

Based on the review of recorded features and artifacts, use of the Red Rock zone is considered to date to as early as 3000 B.C. This early date in Red Rock Canyon is attributed to the report of "Gypsum Cave like~ points recovered by K.K. Miller at Red Spring (Brooks 1969). Late Archaic use of the area as early as 3000 B.C. has not been abundantly demonstrated, but it is accepted that prehistoric peoples used Red Rock within the past 2,000 years.

There is contention whether the earliest users of Red Rock were the generic Archaic hunter/gatherers or more explicitly the Paiute. Lamb (1958) postulated that the Numic speakers, which include the Paiutes, spread across the Great Basin about a 1000 years ago. Lyneis (1982a) argues for an in situ development of the Numic languages. Rafferty and Blair (1984) and Rafferty (1989) contend that the late Archaic peoples in this region were actually the ancestors of the Paiute. Because a cultural change in the archaeological record that would indicate the Paiute initially entered the region between 1,000 and 2,000 B.P. has not been adequately demonstrated, I consider the contemporary Paiutes the descendants of the indigenous hunter-gatherers.

The Numic-speaking Paiute remained in the area through the historic settling of the region. The presence of Paiute and Virgin Anasazi pottery indicates that both cultural groups occupied the area,

possibly in a symbiotic relationship (Rafferty and Blair 1984). It is probable the Patayan also visited Red Rock. Table 1 lists the chronology and referenced aboriginal cultural groups that are considered to have used Red Rock Canyon.

Table 1. Chronology and cultural users of Red Rock Canyon

Timeframe	Cultural Group	Source
Prehistoric		
?3000B.C.	Archaic hunter/gatherer	Brooks 1969 et al. 1974, 1976, 1977a/b
A.D. 1	Paiute	same as above
A.D. 1000-1100	Virgin Anasazi	same as above (this report)
A.D. 1000	Patayan (in Las Vegas Valley)	see Rafferty 1985
Historic		
1826-1831	<i>Old Spanish Trail</i> Smith, Armijo, Wolkskill/Yount	Hafen and Hafen 1954
1844	<i>Mormon Road</i> , Freemont	Hafen and Hafen 1954 Warren 1974 Myhrer et al. 1990
1855	Mormon settling of Las Vegas	Hauck et al. 1979
1880	Settling of Wilson Ranch in Red Rock Canyon	Paher 1971

Historic Uses in the Area

Historic use of southern Nevada began in 1826 with blazing of the Old Spanish Trail by American and Mexican explorers. Fremont revised the route of the Old Spanish Trail through southern Nevada in 1844, for the first time cutting through the lower portion of what would become RRCRL. By 1848 this trail was abandoned for better routes north and south, but the path was used for another half century for immigration and trade from Salt Lake City to San Bernardino, and was called the Mormon Road. Recent field inspection and analysis of the remaining trail and artifacts indicates heaviest use of the Mormon Road occurred between the 1860s and the first decade of the 20th century. Archaeology of the trail is described in Myhrer et al. (1990).

Colonizing efforts by the Mormon Church initiated the settling in 1855 of a mission and ranch site near what is now downtown Las

Vegas (Paher 1971; Hauck et al. 1979). This first attempt at settlement by non-Indians in the region was abandoned in 1857, but the site was later reoccupied by ranchers in 1865. The first settlement in the Red Rock lands was the Wilson Ranch, now Spring Mountain State Park, in 1880 (Paher 1971).

PREVIOUS ARCHAEOLOGICAL WORK IN RED ROCK CANYON

The Red Rock Canyon area has seen recreational use by non-Indian settlers of Las Vegas Valley and visitors to the region for about a century. Brooks et al. (1976:2) note that Helen Stewart, owner of the Mormon Fort from 1881-1903, "...inscribed her name in a cave on the lower slopes of the Spring Mountain Ranch in 1890.~

The earliest archaeological work in Red Rock occurred in the 1930s. Mark Harrington, director of the Civilian Conservation Corps excavations for Boulder Dam, recorded the Willow Spring complex in 1939. Sometime prior to 1962 Karma Miller, an avocational archaeologist, "...received permission from the Las Vegas District BLM to carry out limited archaeological investigations at the Willow Spring complex under the auspices of the Red Rock Archaeological Association" (now Archaeo-Nevada Society) (Brooks et al. 1976:2-3). Miller is listed as having partially excavated the site complex. No maps or provenience records are referenced or found at the BLM District Office. Consequently, the extent of the digging at the site complex is unknown.

In 1962, Richard and Mary Shutler conducted a reconnaissance survey in Red Rock Canyon. Eighteen petroglyph, mesal pit and open campsites were recorded. Based on the kinds of observed cultural materials, the Shutlers determined that the Lost City Virgin Anasazi, the Lowland Patayan (Lower Colorado) and the Southern Paiute had used the area for at least 1500 years. "The lack of architectural features, the shallow deposit of the campsites and their scarcity indicate that this occupation was sporadic and temporary~ (Shutler and Shutler 1962:24). Based on the high numbers of observed rock art sites, they also guessed that the Red Rock area had been a ceremonial locale.

A series of small archaeological surveys were contracted by BLM to Dr. Richard Brooks and the Nevada Archaeological Survey (NAS) of Desert Research Institute from 1967 to 1969. NAS later became Archaeological Research Center (ARC) of the University of Nevada, Las Vegas (UNLV). Areas with cultural debris at the base of the cliffs above Red Spring (26CK22 and 458/BLM 532338 and 2380) were tested by Brooks in 1969. This was the locale from which the Shutlers collected four artifacts in 1962 (Shutler and Shutler 1962:20-21).

"Contrary to expectation, the midden is found only adjacent to the cliff and spring area and not over the whole meadow. In addition the depth of midden was not more than 30 cm, at the greatest extent tested. A total of eleven test pits were excavated during the fall in an arbitrary line along the base of the cliff area, none of which showed any depth developing. Small amounts of brown ware pottery and several late type projectile points were found near the surface~ (Brooks 1969).

Brooks (1969:4) also states in the report that K.K. Miller partially dug two Calico Basin area cave sites (26CK453 and 26CK454), that are located on private lands more than a mile north of Red Spring, with "Gypsum Cave like points" found in the latter shelter. Brooks also describes preparations for forthcoming test excavations at the Sandstone Quarry prehistoric site area (26CK300). These investigations were conducted following this 1969 report, and the excavation notes are present in the Las Vegas District BLM cultural resources files.

A series of more intensive surveys for the recreational development of RRCRL was again contracted by BLM to Brooks of ARC/UNLV (Brooks et al. 1974, 1976, 1977a, and 1977b). Conclusions of the reports were generally limited to listing of sites determined as critical based on potential of research data and imminent danger from casual collectors. Table 2 lists the archaeological projects in RRCRL conducted for BLM.

Table 2. Summary of cultural resource projects completed in Red Rock Canyon

Report No. 5-	Locality	Inventory Level	Acres	Sites
NAS Surveys (Overlaps in Acres and Numbers of Sites)				
89	General	111 N	3200	100E
89	Red Rock Summit	?	?	?
89	Red Rock Summit	III N	100E	155
231	Visitor Center La Madre Canyon, Willow Spring	III N	1530E	18
255	Nine Areas	III N	3840	4+ 7*
367	General	III N	1820	2+ 4*
728	General	III N	600E	14
Small Compliance-based Projects After 1975				
108	General	III L	15	0
202	Calico	III L	40	2
222	Blue Diamond	III N	160	0
253	Loop Road	III L	150	1
324	Blue Diamond Hill	III N	10	0
612	Blue Diamond Hill	III N	1	0
880	Highway	III L	160	0
883	Highway	III L	80	1
1175	Blue Diamond	III N	90	0
1355	Calico	III L	13	0
1361	Calico	III L	10	0
1383	Highway	III L	100	5
1400	Blue Diamond Hill	III N	1	0
Proactive CRM Projects				
1726	<i>Stripper's Cabin</i>	III N	5	1
1950	<i>Old Spanish Trail/Mormon Road</i>	III L	100	1
1952	<i>Willow Spring</i>	EXC	1	1
KEY: E=Estimated, III=Class III Survey, N=Non-linear, L=Linear, EXC=Excavation, ?=Unknown information, +=New site, *=Previously recorded site				

The next phase of work in RRCRL consisted of 13 surveys to comply with Section 106 of the National Historic Preservation Act of 1966. Finally, three proactive CRM projects in the 1980s included treatment of individual sites and areas within the park. The archaeological projects completed within RRCRL lands are discussed below in three sections: 1) those conducted by NAS that were primarily contracted by BLM for evaluative purposes, 2) small projects for compliance reasons, and 3) recent proactive CRM research. The projects are described according to the level of inventory described in Nevada BLM Guidelines (USDI 1989a), the number of acres surveyed, a brief summary of sites identified, results, and a short critique of the report. Estimations concerning level of inventory and acreages are given for reports that are not considered clear in terms of providing data or information to answer these questions.

Nevada Archaeological Survey Projects in Red Rock Canyon

Five large inventory projects from 1969 to 1977 were contracted by BLM to NAS/UNLV under the direction of Dr. Richard Brooks. The prime purpose of the surveys was the identification and evaluation of significant sites that could be affected by increased visitor use to the park. Although the number of acres surveyed and the total number of sites are not always specifically stated in the reports, an estimation is made that about 10,000 acres were inventoried and more than 100 sites initially recorded. Many of those sites were duplicate recorded, some during the following NAS surveys. It is interesting to note in the reports the chronological development of CRM methodology and increasing levels of direction from BLM.

NAS 1969-1970 Surveys. Three reports, somewhat similar in nature and all filed under Las Vegas District Cultural Resources Report Number 5-89 were written as a result of work carried out over a three-year period from 1967 to 1969, and included ground survey and some test excavations. They represent the initial inventory of archaeological sites within and adjacent to the proposed Red Rock Recreational Area. The methodology by which the surveys were conducted was not always clearly stated in the documents. Levels of inventory had not been established by BLM at that time, and it is estimated that the surveys were conducted at a Class III level of 30 meter or less transect spacing. Some artifacts were presumably collected and some sites "tested", although records of these specific actions are not present in the BLM files.

The first of the three reports was completed in Spring, 1969 (Brooks 1969). Based on the locations of sites recorded, it appears that intensive surveys were conducted in areas that were expected

to receive high degrees of visitor uses, such as Red Spring, Sandstone Quarry, Willow Spring, and Brownstone Canyon. Although the number of acres surveyed is not stated in the document, the report map shows a minimum number of 3200 acres inventoried. More than 100 sites were identified. Several sites in areas of Snyder Quarry, Brownstone Canyon, Lost Creek Canyon, and Sandstone Quarry were listed as being critically in need of salvage or protection management due to recreational impacts. Sites were concentrated around springs, dry washes, stream beds, and sandstone outcrops. The document is a progress and recommendation report rather than a detailed analysis of archaeological data recovered from ground survey and limited test excavations.

The second CR5-89 report (Rodrigues 1969) is a two-and-a-half page summary of a survey for a foot trail from Red Rock Summit to Mountain Springs along the Red Rock escarpment. The number of acres surveyed, number of sites located, and their descriptions were not given. No map is present. Site records were completed according to standards acceptable at the time. The report, though, does not offer any useful information in terms of CRM. Although the author notes that evidence of aboriginal use was not found on the trail itself, he states that numerous archaeological sites such as roasting pits, rockshelters and open camps were located near the trail alignment. A standard recommendation for salvage and protection of important sites is given.

The purpose of the final CR5-89 inventory report (Brooks 1969) was to assess the scientific value of sites, and determine their vulnerability from trail construction or increased visitor use impacts. This report is the best of the three. It describes a methodology that recorded resources one mile on either side of the trail right-of-way, and is probably a final on the Rodrigues (1969) document. Yet, maps showing locations of sites, site numbers, or areas surveyed are not present. Of the 155 sites that were stated to have been recorded, 21 were recommended for preservation or salvage actions. The report also makes some tentative observations concerning cultural chronology and affiliation of Red Rock Canyon users.

NAS 1974 Evaluation Survey. The purpose of this inventory was to identify and evaluate sites in the Pine Creek and Spring Mountain Ranch areas (Brooks et al. 1974, CR5-728). Although five sites were recommended for additional field research. The historic ranch foundation in Pine Creek was not noted, likely because it was not older than 50 years. The document establishes an initial temporal sequence for Red Rock based on diagnostic artifacts and assessment of site types.

NAS Phase 1 Evaluation Survey. The purpose of this inventory (Brooks et al. 1976, CR5-231) was to survey the proposed Visitor Center location, La Madre Canyon, and the Willow Spring/Lost Creek locale. This document marks some changes occurring in contract archaeology. A BLM memorandum specified collection of only sites with 20 or fewer artifacts. The report hints at a loose research design that notes a correlation between biotic communities and the presence of limestone that posts a high probability for roasting pit sites. A data review was also conducted, with a determination that existing site records were less than accurate. A decision was made to reevaluate old sites as encountered.

Although not stated in the report, examination of the map indicates about 1530 acres were surveyed at an estimated Class III level. The most frequently encountered archaeological site type was the roasting pit. Several roasting pit/rock art/rockshelter complexes were recorded. The surveyors noted that rock art sites and habitation locales such as the Willow Spring complex were being destroyed by recreation uses. Excellent site maps were drafted for Willow Spring and Lost Creek complexes. The recommendation was to test each site in order to obtain definitive and chronological data. There are no records in the BLM files that indicate any sites were tested.

NAS Phase 2 Evaluation Survey. Nine specific areas that were surveyed for evaluative purposes are First Creek, Oak Creek, Pine Creek, Ice Box Canyon, Willow Spring, White Rock Spring, Sandstone Quarry, Red Spring, and Brownstone Canyon (Brooks et al. 1977a, CR5-255). There is substantial overlap from earlier surveys. An existing data review was again conducted, and prescribed guidelines by BLM concerning collection and methodology were followed. Four new sites were recorded and 17 reevaluated. Recommendations were made to consider La Madre Canyon, Willow Spring, White Rock Spring, Sandstone Quarry, Red Spring, and Brownstone Canyon as archaeological National Register Districts. Yet, this survey and report provided little new information. Its purpose was likely linked to determinations that previous surveys and site recordation had been insufficient for changing needs. The only NRHP nomination following this report was that done for Brownstone Canyon (Rafferty and Rolf 1981).

NAS Phase 3 Evaluation Survey. This report (Brooks et al. 1977b, CR5-367) is of fair quality but unlike the Phase 1 and 2 surveys lacks in detailed site descriptions. Two new sites were recorded but no interpretations are given. The report mainly offers very general resource management recommendations that include midden testing and additional intensive survey for sites at Pine Creek and Willow Springs area. There is no record of any testing following

this recommendation.

Small Projects in Red Rock Canyon

Numerous small compliance-based projects for mineral actions, land projects, and recreation applications have been conducted in Red Rock Canyon and associated lands. Nine linear inventories covered 568 acres and recorded 10 new sites. A total of 262 acres were walked in five non-linear surveys with the recordation of no new sites. Table 2 also lists these projects.

Three Recent Proactive CRM Research Projects

From 1987 to 1989, three proactive CRM projects were completed within RRCRL One was an evaluation and analysis of a unique trash site east of White Rock Spring, another a linear survey of an historic trail that crosses the south end of RRCRL, and the last was data recovery of a component of a shelter site for a preservation project.

Cleanup at Stippers Cabin. In 1987 the Red Rock Park Manager requested I submit a recommendation to the Area Manager concerning archaeological significance of a unique trash site east of White Rock Spring. If the site was not considered eligible for nomination to the NRHP, the locale would become recipient of the annual Red Rock clean-up in April, 1988. The trash site was composed of four automobile hulks, the remnants of a poorly-made sandstone two-room structure, remnants of a makeshift stove and icebox, and approximately two hundred artifacts consisting of nails, ceramics, metal, and auto parts. The site was initially recorded by Kevin Rafferty in 1981 as 26CK3487/BLM 53-3461. Due to the isolated nature of the area and the potential for solitude, Rafferty named it Hermit's Cabin.

Members of the Veteran Motor Car Club of America investigated the autos and some of the associated auto parts in 1982. I examined a sample of the remainder of the objects in 1987. The combination of the results of the two analysis provided a cultural interpretation of the site (Myhrer 1987). I concluded that at some time during the 1950s the fault canyon wash east of White Rock Hills was chosen as the locus of an auto stripping operation. The secluded nature of the canyon would have provided a natural cover for the operation, after which the auto hulks were abandoned on site. The paucity of domestic artifacts and the presence of a very poorly-made structure indicated use of the site was very short, perhaps only months. The autos were likely transported from Las Vegas, stripped at the site, and the parts taken back to Vegas or other areas to sell. I felt the name "Hermit's Cabin" was no longer appropriate in view of the

new interpretation and I renamed the site "Stripper's Cabin".

An agency determination that Strippers Cabin site did not qualify for nomination to the NRHP under 36 CFR 60.4 was reviewed by the Nevada State Historic Preservation Office (SHPO). A clean-up in April, 1988 resulted in the removal of the loose trash. The auto hulks and the remains of the sandstone structure were left in place.

Inventory of the Old Spanish Trail/Mormon Road. As a result of a compliance-based inventory in 1987 of lands north of RRCRL, 1.5 miles of the Old Spanish Trail/Mormon Road were walked by BLM archaeologist Stanton Rolf and I. At this point we formulated a plan to walk the remaining trail from Las Vegas to the California border on a recordation and evaluation project. This CRM undertaking took two years to complete. A two-mile portion in the south part of RRCRL, which is part of a larger five-mile segment of the route in Cottonwood Valley, was determined to have retained integrity and is considered eligible for nomination to the NRHP under 36 CFR 60.4 (a). Artifacts collected from this section of trail were incorporated into an heritage display and the document describing the survey was published by the BLM Nevada State Office (Myhrer et al. 1990).

Excavation at Willow Spring. In 1987, Red Rock Rangers noted that a pictograph panel composed of five red handprints was being defaced by recreational climbers. The pictograph panel is located above a shelter midden in the Willow Spring archaeological complex (26CK370/BLM 53486). As a method to deter people from climbing on this particular rockface, rangers suggested planting a cactus beneath the panel. This plan was adopted and a treatment plan (Myhrer 1988) that included excavation of the midden beneath the shelter/panel was written and submitted to SHPO and the Advisory Council on Historic Preservation. Concurrence on the plan was received from both agencies. The treatment plan was designed to obtain data on chronology and the cultural associations of prehistoric users of Red Rock.

In May, 1989, Stanton Rolf and I excavated a unit measuring 0.5 X 1.5 meters to bedrock at 75 centimeters below datum. Las Vegas District Cultural Resources Report 5-1950 (Myhrer 1989) describes the work and results. From this relatively small excavation exercise, 23 ceramic sherds, five projectile points (whole and incomplete), two grinding implements, four lithic tools, and 247 flakes were recovered. Three research questions were addressed in this investigation. First, concerning cultural tradition, the presence of 21 Paiute sherds of 23 total implies most use at this site complex was by Numic-speakers. The remaining two sherds are

Virgin Anasazi. Second, concerning chronology, three of the points are Desert Side-notched (DSN) and the remaining two are either DSN or Rose Spring. The diagnostic analysis of the both the points and the sherds fit with established time frames for occupation by both the Virgin Anasazi during and after A.D. 1000 and the Paiute after A.D.1000. Third, the presence of obsidian flakes and mica material presumably used for tempering Paiute pottery indicates that the aborigines were carrying materials for distances up to 40 miles, probably on their routes of seasonal rounds.

Using the information gained from the excavation exercise at Willow Spring in combination with the field descriptions from the test pits by Brooks at Red Spring (1969), I ranked in this excavation report (Myhrer 1989) three research questions by priority for future work at Red Rock Canyon. Because it appears that most use of Red Rock may have occurred within the last 1000 years, a priority research question yet remains to identify earliest use of Red Rock Canyon. Was there indeed use of the zone as far back as 3000 B.C.? Second, was exploitation of the Canyon confined to the Paiute and Virgin Anasazi? If so, were the Paiutes the principal users? Although we know the Virgin Anasazi were in the Canyon around A.D.1000, the Paiutes seem to have most intensively exploited the area over the past 2,000 years. Recent mitigation work on BLM lands in north Las Vegas Valley indicates the mesquite dune environment on the Eglington Escarpment may have been primarily used by the Virgin Anasazi (White et al. 1990). Perhaps the Paiute stayed closely to seasonal rounds that in this specific area used major water sources such as Big Springs, Duck Creek, Las Vegas Wash in Las Vegas Valley and the Red Rock environment. These two questions can be studied both in surface and subsurface work. The third research question concentrates on ceramic manufacture in Red Rock. Were the Paiute obtaining local or non-local tempering minerals and clays and firing their wares on-site? Recovery of unfired ceramics and other tempering minerals to explore this question would likely be limited to excavations.

Summary of Archaeological Research in Red Rock Canyon

There have been sixty years of archaeological research in the area defined as RRCRL. It is estimated that in Red Rock 10,800 acres were inventoried at Class III level standards. This is based on an estimation that about 10,000 acres were inventoried during the NAS surveys, and another 820 acres covered in small, compliance-based projects after 1975. Of the total 63,110 acres in RRCRL, 17 percent were surveyed for cultural resources.

The purposes and direction for archaeological work have changed

through the past 25 years due to the maturity of CRM and as a response to the dramatically increasing use of the area for recreation needs. Harrington's 1930 recordation of Willow Spring and the Shutlers' (1962) documentation of sites served to tantalize professional and avocational archaeologists into further exploration of the rich cultural heritage in the canyon. The late 1960s surveys by NAS attempted to continue the previous interest-oriented desires of their forerunners. The later 1970s NAS reports show that the perceived needs had changed, and that the initial direction of CRM as we know it today was beginning to influence archaeological research. Recordation of sites for informative purposes had taken second place to evaluation of cultural resources in terms of preservation and protection from recreational impacts.

The decade of the 1980s was directed by CRM for compliance purposes. Construction of an interpretive Visitor's Center required a surface survey and evaluation. Horse endurance rides and the paving of the loop road required linear inventories. Proposed trails needed survey by qualified archaeologists prior to surface disturbance.

The evaluation for clean-up of Stripper's Cabin, the walking inventory of the Old Spanish Trail/Mormon Road, and excavation at Willow Spring by BLM archaeologists in 1989 indicates there is a new trend for the 1990s. This direction is one of detailed evaluation, testing, data recovery, and proactive management for preservation. Although a minimal number of new surface-disturbing actions should be required for management of RRCRL, evaluation and preservation activities should be increased.

The management direction prescribed for RRCRL is the same as that for SRA as described in the data review document of 1990 (Myhrer 1990). BLM Manual 8111.21 provides direction for assigning uses of cultural resources for management direction. Significant sites in isolated areas that are not presently in danger of impacts will be managed for conservation. Districts or sites that may be adversely impacted from Federal actions and are not likely to qualify as representative samples will be managed for information uses such as data recovery efforts. Sites that are in areas of high recreational impacts, have interpretive potential, but lack integrity or have been subjected to data recovery exercises, will be managed for public uses such as interpretive exhibits-in-place. Some sites may qualify for more than one purpose, but in such cases a leading use will be assigned.

The following section discusses in a general sense the number and kinds of sites recorded in RRCRL This information was obtained from

a thorough data review of BLM archaeological base maps and site records.

RECORDED ARCHAEOLOGICAL SITES IN RED ROCK CANYON RECREATION LANDS

A total of 153 recorded sites were identified in Red Rock Canyon Recreation Lands from a review of base maps and records filed in SRA of Las Vegas District BLM. The sites were categorized by type and their locations plotted on surface management maps at a scale of 1 :100,000. The maps and the list of categorized sites are in the cultural resources files of SRA. A description of subzoning for locational distribution, site type ranking, and site type definition is presented below.

Subzoning and Locales

The concept of site patterning is used in archaeology to aid in predicting areas of sensitivity. Delineation of a region into smaller areas based on geographic variables provides a basis for comparison. SRA was divided into 19 "zones", of which RRCRL was one, in the summary of the SRA data review (Myhrer 1990). As a means of comparison for this document, RRCRL is subdivided into three "subzones", consisting of Red Rock Summit, North Red Rock Escarpment/La Madre Mountain, and South Red Rock Escarpment/Cottonwood Valley. Red Rock Summit includes the top of the Red Rock escarpment and the land on its west side. North Red Rock Escarpment/La Madre Mountain and South Red Rock Escarpment/Cottonwood Valley zones are on the east side of the escarpment and divided north/south by Oak Creek Canyon. These subzones are further divided into 18 "locales". Figure 3 illustrates these divisions in RRCRL

Site Types

The recorded sites in RRCRL were categorized under seven major types: 1) Roasting Pits/Complexes, 2) Rockshelters, 3) Rock Art, 4) Camp sites, 5) Prehistoric Structures, 6) Historic Structures or trash scatters, and 7) Rock Features such as a rock rings or alignments. Many sites possess more than one feature, for example, roasting pits are often found in association with rockshelters. A few sites have features of all categories. The information from the recording forms was used to place each site into only one category based on a ranking, described below, that primarily selected for the best management potential.

Because a rockshelter is considered to have the most potential for management uses, its presence at a site dominates the ranking of all other types. Roasting pit sites are ranked second, primarily due to the unexplored potential, especially considering the plethora of roasting pits in RRCRL. Due to its high potential for

public uses, rock art is third ranked. Rock art that is associated with a rockshelter site is also highly ranked. A pit structure is fourth ranked. An open site with artifacts or hearths is called a camp site and is ranked fifth. Historic remnants are placed into the sixth type. Finally, a rock feature is ranked seventh. Table 3 lists the distribution of sites by type, subzones, and locales.

Roasting Pits. Sixty-five sites possess one or more features that reflect distinctive cooking activities, called roasting pits. These circular pits, constructed mainly of limestone rocks, were primarily used to roast bulbs from the agave plant. A hole was dug into the ground, the food placed within, a fire started above the edibles, and limestone rocks placed on top. Limestone is ideal for retaining heat but once used turns white and will no longer function as an efficient heat-conductor. Consequently, each time new foods were roasted fresh limestone had to be gathered and the pile of rocks that comprised the roasting pits grew through time.

Table 3. Distribution of site types by subzones and locales in Red Rock Canyon Recreation Lands zone.

Subzones/Locales*	Site Types								Total
	RP	RS	RA*	RA	CP	ST	HT	RR	
RED ROCK SUMMIT SUBZONE									
1. Non-Spring Area	25	4			17				46
2. Bootleg Spring	1	1			4				6
3. La Madre Spring						1			1
4. Rainbow Spring	10	1			4				15
5. Switchback Spring	1								1
6. Upper RR Wash	3	2	2						7
Number in Subzone	40	8	2		25	1			76
Percent of Subzone	53%	11%	3%		33%	1%			
Percent of Site Type	62%	31%	20%		78%	17%			
Percent of Total Red Rock Sites								50%	
NORTH RED ROCK ESCARPMENT/LA MADRE MOUNTAIN SUBZONE									
1. Brownstone Canyon	7	3		2					12
2. Calico Basin			2	3	1			1	7
3. Icebox Canyon		1			1	5			7
4. Pine Creek Canyon	1				1				2
5. Sandstone Quarry	4	2	4	2			2		14
6. Willow/Lost Creek	2	4			2			8	8
7. White Rock Spring	3	1					1		5
Number in Subzone	17	11	6	7	5	5	3	1	55
Percent of Subzone	31%	20%	11%	13%	9%	9%	6%	2%	
Percent of Site Type	25%	42%	50%	76%	18%	83%	75%	100%	
Percent of Total Red Rock Sites								36%	
SOUTH RED ROCK ESCARPMENT/COTTONWOOD VALLEY SUBZONE									
1. Cottonwood Valley	5	5		1			1		12
2. First Creek Canyon					1				1
3. Lone Grapevine			1		1				2
4. Mud Springs 1 & 2		2	1	1					4
5. Potosi Pass	3								3
Number in Subzone	8	7	2	2	2		1		22
Percent of Subzone	36%	32%	9%	9%	9%		5%		
Percent of Site Type	12%	27%	20%	22%	6%		25%		
Percent of Total Red Rock Sites							14%		
ALL RED ROCK TOTALS									
Total Quantity	55	26	10	9	32	6	4	1	153
Total Percentage	42%	17%	7%	6%	21%	4%	3%	1%	

Key: * = Locales within subzones are numbered to correspond with divisions shown in Figure 3; RP = Roasting Pit, RS = Rockshelter, RA* = Rock Art component, RA = Rock Art, CP = Camp site, ST = Structure, HT = Historic, RR = Rock Feature.

Blair (1986) notes that in California Wash, an area presently lacking agave, other plant resources and animals were cooked in roasting pits. Milling or food processing equipment, lithic materials and ceramics are often associated with these features. Excavations conducted on roasting pits in Hidden Valley west of Valley of Fire and in the Virgin Mountains yielded numerous artifacts but the pits generally lacked internal structure (Ellis et al. 1981, 1982). This is considered a problem for stratigraphic recordation. Because charcoal was mixed by the aborigines during repetitive cooking episodes, radiocarbon analysis can yield questionable single-use dates. Other methods of providing chronological data must be used, such as ceramic correlation studies, possible dendrochronological analysis, or alternate ways of using the mixed charcoal dates. Roasting pits have best potential for yielding scientific data on subsistence practices and chronology and will be managed for information uses until such studies are completed.

Rockshelter. A total of 26 rockshelter sites are present in RRCRL. A rockshelter is a cave-like opening in rock that has resulted from erosional or faulting processes. Aborigines commonly used caves for shelter from the natural elements. Evidence of their fires can be found in the blackened staining on the walls and ceilings of the caves. Many cave openings are partially blocked by walls constructed of brush and boulders. Intensively occupied caves contain midden deposition within the floor and in the apron surrounding the entrance consisting of carbon-blackened soil filled with artifacts and bones. An undisturbed midden has excellent potential for yielding significant information on the prehistory of the region. Potential for stratigraphic interpretation and the yielding of charcoal for radiocarbon dates is high. The remnants of cooking, food processing, and toolmaking activities are found in the forms of ceramic sherds, seeds, remnants of corn, grinding implements, and lithic stone materials such as flakes and formed bifaces. Pieces of basketry and rope have also been recovered from shelters.

Rock Art. Nine rock art sites were recorded in RRCRL. There are some unrecorded sites that are presently being investigated by members of Archaeo-Nevada Society, in particular Grace Burkholder and LaRae Bringhurst. Rock art panels are common in certain areas, usually associated with water sources such as springs or catchments. Rock art is one of the earliest types documented in this region. Shutler and Shutler (1962) illustrate several petroglyph sites in RRCRL. Cunningham (1978) conducted research work at Lone Grapevine Spring in the south portion of RRCRL. Green (1986) discusses rock art at Willow Spring and other Red Rock complexes. Rock art is defined as the modification of a rock wall or face by pecking or painting

figures or designs. Sandstone with a patinated surface is perhaps the best vehicle for illustrating this type of aboriginal visual creativity, but limestone and basalt were also commonly used. Some rock art panels are associated with rockshelters, roasting pits, artifacts, or other features. Although rock art designs have been attributed on a general level to all groups over a long period of time, there is at present no positive method of dating individual sites. Rockshelter sites with associated rock art are placed into a Rockshelter/Rock Art site type. Ten sites are classified as Rockshelter/Rock Art.

Camp Sites. There are 32 sites classified as Camp Sites in Red Rock. Camp site locales possess lithic material such as flakes or formed bifaces, ceramics, faunal bone, or milling equipment, and are often associated with stained soil from years of repeated habitation. These often reflect relatively temporary stops on a path from spring to spring, -resource to resource. Potential for yielding important data varies from low to high depending on the presence or absence of diagnostic artifacts and subsurface deposition. The Paiute, Virgin Anasazi, and Lower Colorado aborigines all manufactured distinctive kinds of pottery within the past 1500 years. Camp sites and lithic scatters are found in all areas but are most prevalent on terraces overlooking major washes and surrounding springs.

Prehistoric Structures. Six unverified Structure sites were recorded in this area. Structures were presumably dug or constructed by the Anasazi but it is possible they could have also been built and occupied by hunter-gatherers. Rooms for storage or cooking and sleeping that were dug wholly or partially into the ground are called pit structures. Stratigraphy is excellent in undisturbed pit rooms. Rooms constructed with the floor on the surface are referred to as pueblos. Potential for obtaining significant information is high at such sites. Analysis of data from buried strata on floors of pueblos has yielded significant information on room size, artifacts, and plant remains at sites in the Lost City region of southern Nevada (Shutler 1961; Myhrer and Lyneis 1985; Lyneis et al. 1989). All six unverified structure sites were recorded by one archaeologist as "pithouses" in Icebox Canyon.

Rock Features. One recorded site is composed of undefined stone features, a site type that may have potential for scientific uses. Ferraro (1982:42) refers to these rock features as fragile pattern sites. Because rock rings are usually found near locales of resource concentrations including the terraces above Meadow Valley and Las Vegas Washes, and artifacts such as milling equipment and flaked lithic materials are sometimes found in association, it

seems plausible to suggest they may have been used for caching plant resources. Determinations have been made in some circumstances that such undefined sites be preserved for times when better scientific techniques are present to retrieve data. Although there is a paucity of such sites in RRCRL, a massive complex of more than 50 rock rings (26CK3373/BLM 53-5369) was recorded by Nevada Department of Transportation archaeologists about one mile east of the southeast RRCRL boundary. It is likely that the habitants of Red Rock Canyon were making base camps at the shelters in the canyons and conducting collection activities along the major washes east of the escarpment.

Historic. Four Historic sites are present in Red Rock. Historic rock foundations from a mining site at Sandstone Quarry and the remains of a ranch in Pine Creek Canyon are present. What appears as an old dirt road in the south portion of the park is actually the remnant of the Old Spanish Trail/Mormon Road. The remaining site is an historic isolate. Potential is often high for the yielding of important data on chronology, subsistence and other cultural processes.

Distribution of Site Types in Red Rock

Inspection of Table 3 reveals some interesting points concerning distribution of site types within Red Rock as a whole. Of the 153 recorded sites, 42 percent are composed of one or more roasting pits, classified as roasting pit sites. Rockshelter sites comprise 17 percent of the total. Rock art sites without rockshelters account for six percent, while rock art/rockshelter sites constitute seven percent of the total number of sites. Camp sites comprise 21 percent of the total. Four percent are unverified structure housepits. Only one site is composed of rock features. Finally, three percent of the sites are historic. None of the recorded sites are isolate artifacts.

Examination of Table 3 also yields a view of site types by subzones. The greatest percentage of roasting pit sites (61 percent) are in the Red Rock Summit subzone. Rockshelter sites are somewhat evenly divided among the three subzones, with a slightly larger percentage in the North Red Rock Escarpment subzone. The highest percentage (68 percent) of both rock art/rockshelter and rock art site types are present in the North Red Rock Escarpment subzone. Most camp sites were recorded in the Red Rock Summit. And as could be expected, most historic sites are in the North Red Rock subzone surrounding Sandstone Quarry.

A general summary is that roasting pit sites are most prevalent in the Red Rock Summit subzone, rockshelter and rock art sites in the

North Red Rocks, and a variety of sites are found in the South Red Rocks subzone. All subzones show a tendency for users to favor water sources, but other factors must be linked to the differential placements of roasting pit and rock art/rockshelter sites. The most obvious explanation is attributed to specific geologic areas. The presence of a high number of roasting pits in Red Rock Summit is linked to a limestone alluvium, an abundance of agave, the presence of several springs, and an elevation above 5000 feet. The sandstone cliffs with their shallow caves and patinated faces on the east side of the escarpment likely facilitated the occupation of rockshelters and the creation of rock art. I interpret the data on the distribution of site types in RRCRL as an indication that future CRM should place priority on the research of roasting pits and rockshelter/rock art sites in these two subzones.

RECOMMENDATIONS FOR CULTURAL RESOURCES MANAGEMENT IN RED ROCK CANYON RECREATION LANDS

There are three questions to be encountered before planning for the future CRM in RRCRL. First, does the 17 percent total area surveyed in Red Rock represent a biased or non-biased sample? For example, can we expect to multiply by six the number and kinds of recorded sites to assume a projected total for Red Rock, or does the sample represent an intuitive bias on the part of the surveyors and an assumption that most sites have been found and recorded? Second, how well were the sites recorded? Recordation standards and styles have changed immensely since the late 1960s and inspection of the site records for this data review indicates certain environmental and site descriptive information is missing. Can present workers use those site records to address questions on National Register nomination eligibility? Third, how much has recreational use of Red Rock changed or impacted archaeological sites?

Sampling Accuracy and Value

What kind of sample inventory was taken of RRCRL? An estimated 10,000 acres were inventoried during the 1969 to 1977 NAS/ARC surveys, and another 820 acres sampled for compliance-based surveys after 1975, for a total of 17 percent inventoried.

The NAS/DRI reports indicate those projects had objectives to record and evaluate sites in areas proposed for increasing recreational uses. They are considered intuitive in the sense that archaeologists chose areas for inspection that had potential for visitor use, but areas that also were selected for prehistoric occupation. The assumption is accepted that the kinds of attributes that make certain locales appealing for recreationalists today are the same traits that attracted prehistoric hunter-gatherers in the past. These attributes include the abundance of floral and-faunal resources, water sources, relatively cooler temperatures in summer, and aesthetic beauty. Consequently, I consider the Pre-1975 surveys to have been intuitively biased, but with positive results.

The post-1975 compliance surveys in RRCRL were also biased, but in a different fashion. Areas that required inventory were those proposed for surface disturbance. For the most part, these areas are not ideal for contemporary visitors and results of the surveys indicate they were also not chosen for prehistoric uses. The areas include locales of alluvial deposits for sand and gravel pits, an area in Red Rock Wash for a detention basin, and segments of land for roads and off-highway trails. Two factors facilitated the selection of these areas for recent construction projects. First, the designation of Red Rock Canyon as a park and recreation area

prohibited most surface-disturbing projects in user-friendly areas. Second, the design of roads, gravel pits, and detention basins generally require flat, low-lying areas that are easily accessible by machines, areas that are not ideal for recreationalists or aboriginal users.

I conclude that the sample inventoried in Red Rock reflects a bias, but one that has been checked and balanced through time. The pre-1975 intuitive surveys were designed to record the bulk of sites in the most sensitive areas in Red Rock Canyon. The post-1975 surveys were directed by Federal actions that were restricted to areas determined as non-sensitive through preliminary RRCRL planning designations. The latter inventories validated the accuracy of the intuitive surveys because only 4 of the 153 recorded sites in RRCRL were found during these actions. In a general sense, the inventories that covered 16 percent of the land in RRCRL are considered valid in terms of having identified most, if not all, of the sensitive locales.

The question that follows concerns quality and accuracy of the surveys on a locale-specific scale. For instance, the clustering of several roasting pits and complexes around springs in the Red Rock Summit zone implies that these features may be better analyzed in terms of archaeological districts.

Additional recordation of the sizes of individual roasting pits and distances between individual features in conjunction with data on present numbers of agave plants may provide information for analysis on the length of use of sites and districts.

I conclude that on a broad scale the Red Rock zone has been adequately sampled to identify most areas of sensitivity. But within these areas, or subzones, there is a need for consistency and accuracy in recordation.

Site Recordation: Quality Control

How well were the sites in Red Rock Canyon recorded? During the first twelve years of inventory in Red Rock sites were poorly recorded, at least in terms of contemporary standards. Emphasis at the time was centered on noting the locations of sites on maps, not on obtaining accurate measurements of features. Inspection of the site recording forms from the Red Rock Summit surveys shows a lack of consistency in recorded data. Evidence of a shift in emphasis on recordation techniques occurred around 1982 when Sandstone Quarry received intensive documentation, and a CRMP and a NRHP nomination for Brownstone Canyon were prepared under the initiative of Kevin Rafferty, Area Archaeologist at the time. Because few additional

sites have been discovered in Red Rock since the early 1980s, and agency funding for proactive work to update files has been severely limited, recording forms from 20 years ago remain the principal records for most sites in Red Rock.

How useful are the recording forms for most sites in Red Rock? Beyond providing relative locational information, they only identify site types~ Also, the records are not worthwhile in terms of research nor do they address questions helpful for evaluating for eligibility for nomination to the NRHP.

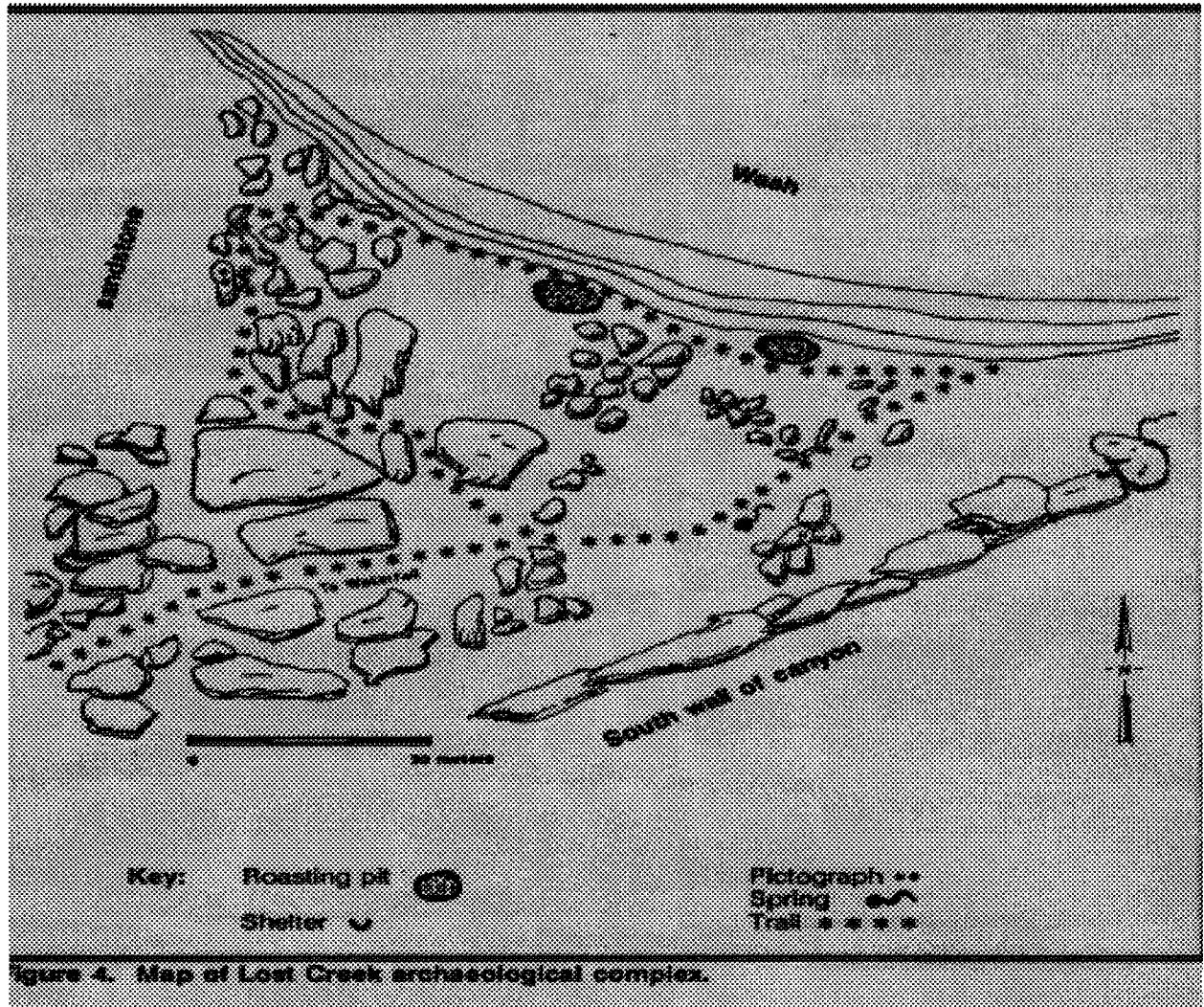
Recreation Management and Impacts to Archaeological Sites

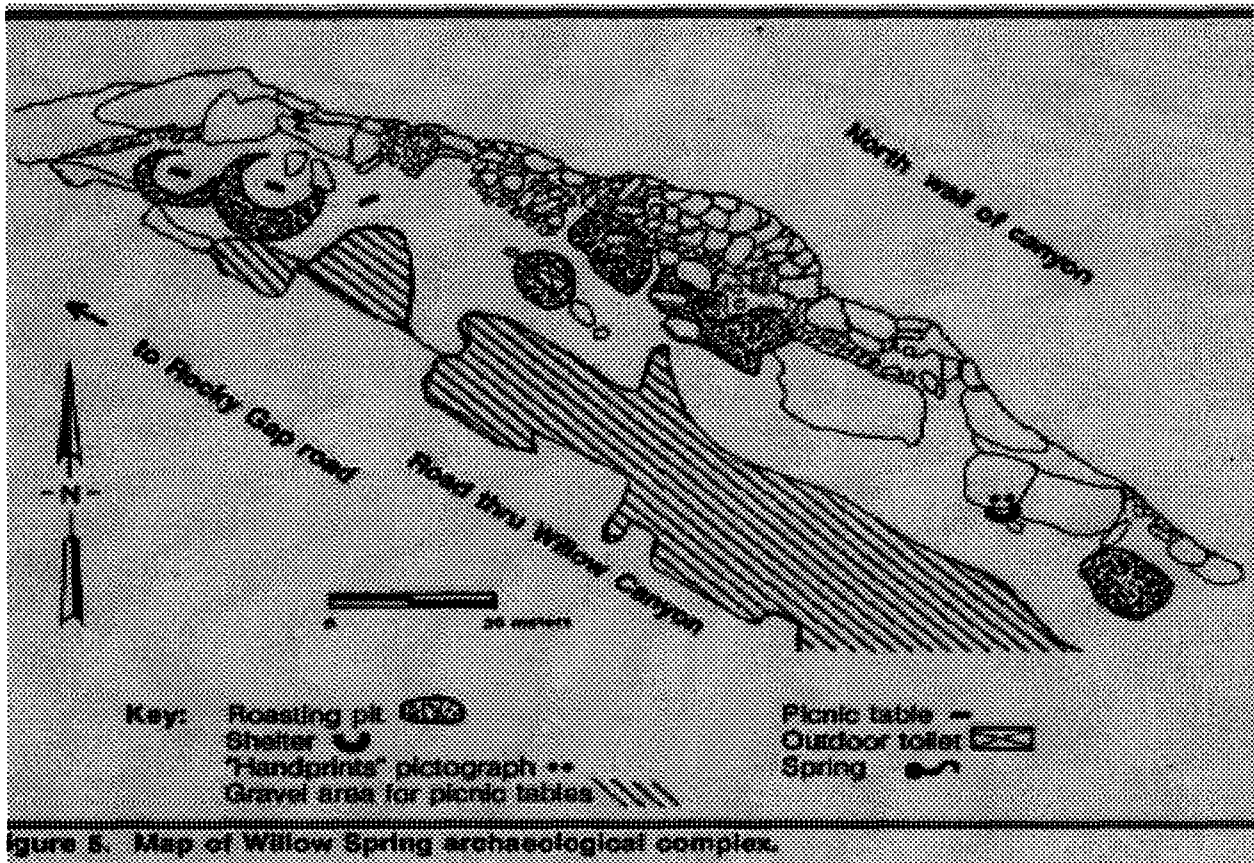
How has recreational use of Red Rock changed or impacted archaeological sites? The initial management actions for RRCRL incorporated recreational use patterns that had been established prior to the implementation of a CRM program in 1975 and before the development of the Red Rock Master Plan in 1978. Established trails and roads were designated and maintenance programs developed without the benefits of review by cultural resources specialists. In particular, two existing trails and two recreational areas that cut across and wind through complex archaeological sites were accepted and improved. The sites in which these trails and picnic/parking areas are located are described below.

Lost Creek (26CK1394/BLM 53-371). This prehistoric archaeological complex recorded in 1976 during the Red Rock Archaeological Inventory (Brooks et al. 1976) consists of two roasting pits, one shelter with red pictograph staining, and a midden in the apron of the shelter. Figure 4 is a map of the site initially created by the survey archaeologists (Brooks et a/. 1976). I redefined the map in 1990 based on present trail uses. The trail winds around the roasting pits and through the midden-deposited apron of the shelter, and back into the wash of the canyon. The site was built by aborigines onto the sloping colluvial Willow Canyon wall escarpment. Roasting pits erode naturally in this kind of environment. Maintenance of the trail has actually shored up one of the pits and in a manner aided in preservation. In contrast, placement of the trail through the midden in the apron in front of the shelter has likely impacted the top layers of deposits. The midden locus has not been explored and its depths are unknown.

Willow Spring (26CK486/BLM 53 370). This site is composed of six roasting pits, a shelter with five red-stained aboriginal handprints, and a midden, and is situated at the base of the north escarpment wall of Willow Spring Canyon. Figure 5 is a site map initially drafted in 1976 (Brooks et a/. 1976), updated by Archaeo-Nevada volunteers in 1988 under my direction, and revised

after my reevaluation of the site in September, 1990.





According to Brooks et al. (1976:2-3), an avocational archaeologist partially excavated the site complex in the 1960s. Later in the decade the site was incorporated into a picnic area. Two roasting pits at the west end were leveled for picnic tables and an outdoor toilet was placed into the subsurface of another large roasting pit. There have been attempts to proactively manage the intensive recreational use at Willow Spring site complex in terms of turning the site into an interpretive exhibit-in-place. The last endeavor in 1985 was the placement of numbered posts that corresponded to information on a handout. The bulletin was not professionally written and the posts placed into the ground were destroyed by visitors.

As a result of noted defacement of the shelter handprints from recreational climbing, RRCRL staff members proposed planting cactus at the base of the pictograph panel to discourage this kinds of activity on this rock. Because the cactus was proposed to be planted in a midden, I wrote a research design for data recovery, conducted consultation, excavated the midden, and documented the results (Myhrer 1989). The cactus was planted in 1990 and the defacement from rock climbing stopped.

Red Spring (26CK458/BLM 53-2380). Red Spring prehistoric complex is composed of small shelters, a possible midden area, a rock ring feature, a meadow that might have been used for ceremonial purposes, and numerous petroglyphs. Shutler and Shutler (1962) collected two manos, a chopper, and a hammerstone from the complex, and designated the artifact locus as 26CK224/BLM 53-2338. The site was tested in 1969 with 11 pits excavated along the base of the escarpment (Brooks 1969), but the notes are not in the files. Other shelters and rock art loci around the spring were given Smithsonian numbers of 26CK449-452. Three to four circular rock features (BLM 53-377) were recorded during a powerline inspection in 1976. This locale is intensively used for recreational purposes. Figure 6 is a map of the site created from a composite of topographic maps, my sketch maps, an aerial photo, and an on-site revision by Susan Murphy of Archaeo-Nevada Society working under my direct supervision.

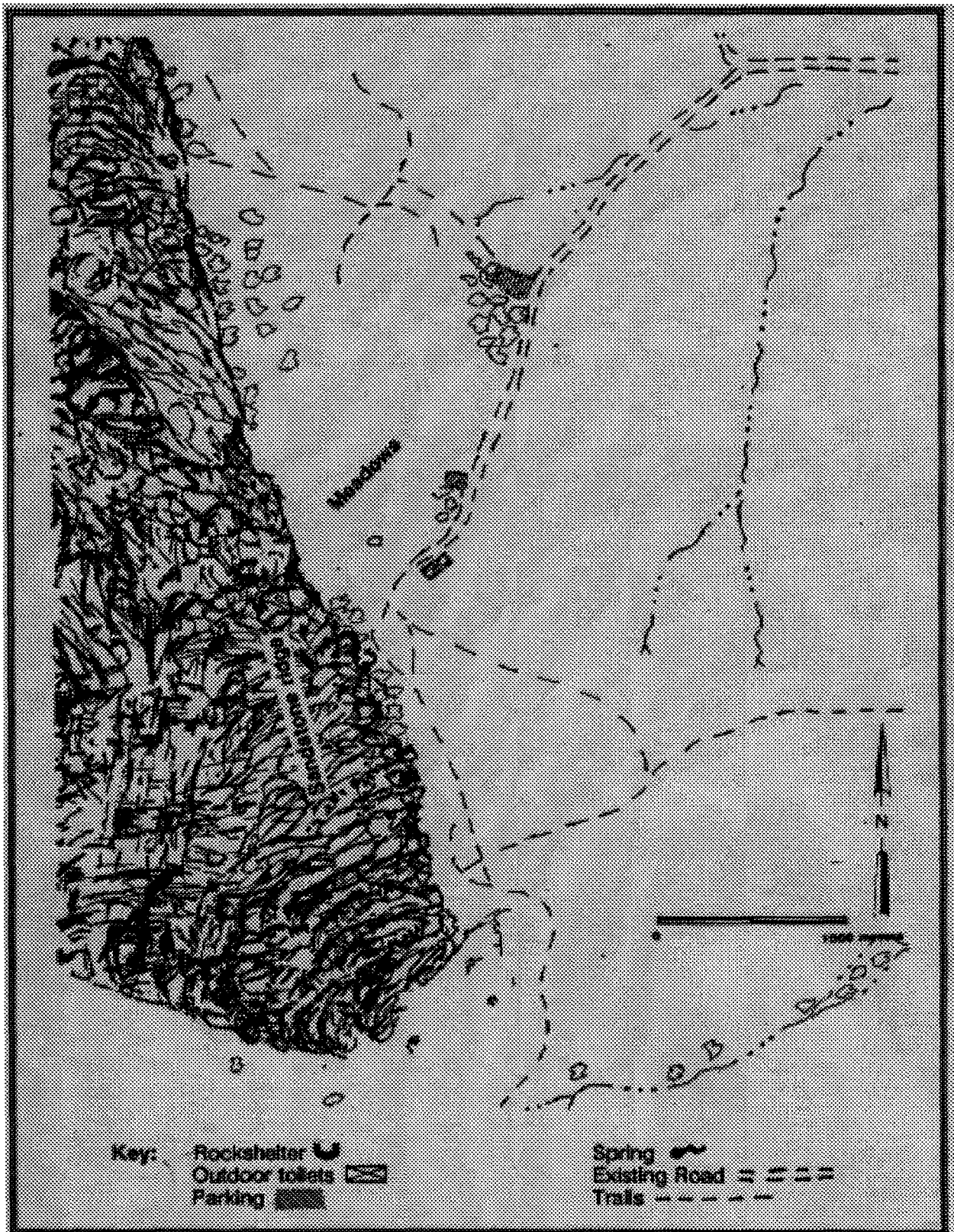


Figure 8. Map of Red Spring archaeological complex.

Picnic tables have been placed into the meadows, two small parking areas cut and graveled, outdoor toilets installed on the east edge of the site, and thousands of visitors every year climb the west rock wall that exhibits numerous petroglyph panels. In August, 1990, I conducted eight trowel probes into the site to determine exact locations for further probing/testing activities. In September, 1990 I spoke with Richard Brooks concerning his 1969 test pits. He noted that although the pits were sterile at about 30 centimeters below datum, there is the possibility that deeper test units could reveal evidence of earlier occupational episodes buried beneath years of spring riparian soil deposition.

Sandstone Quarry (26CK1427/BLM 53-455). Sandstone Quarry was an historic sandstone-block mine that operated from 1905 to 1912, and was recorded by Rafferty in 1982. A short road leading to a parking area with an outdoor toilet cuts through the site. The road is the widened trail used in 1905. Edges of two structural foundations, originally along the historic road are presently flush with the wider, contemporary road cut. Although it has not been documented, it is likely that deterioration to the foundations along the road cut is occurring. Another historic trails a quarry, and the foundations of three additional structures are situated on the east side of the access road. The remnant of another structure is located north of the others. Several of the structural foundations have been dug by unauthorized people. Figure 7 is a composite map of the site created from topographic maps, my notes and sketches, a sketch map by Rafferty, and an aerial photo.

Other Recreational Impacts. Visitor use of RRCRL has tremendously increased in the past ten years, with projected increases for the next decade. In addition to the designated roads and trails within site complexes, described above, impacts have occurred from other recreational uses such as hiking. Although consequences of this activity have not been investigated, it is likely that minor impacts to isolated roasting pits, lithic scatters and other features have occurred in subzones such as the Red Rock Summit. The historic house foundation and associated trash scatter in Pine Creek is another resource that may have suffered impacts. Yet, due to the fact that vehicles are not permitted on most of the trails it is actually possible that only a small degree of impact has occurred.

Recommendations for Proactive Management

The answers to the questions directed above indicate that the sample inventories have located most areas or locales of sensitivity in RRCRL. Although the recording forms are not adequate for most sites, they have value in the sense they provide baseline

information on locations and site types. Recreational uses of two trails and two activity areas have impacted in varying degrees certain cultural complexes in Red Rock, but the nature of these impacts cannot be ascertained without knowing more about the subsurface depositions of each site. In the absence of studies on impacts to cultural resources in RRCRL from general recreational use, I estimate that cultural resources outside of the designated trails discussed above have suffered relatively little.

A Management Strategy for Lost Creek, Willow Spring, Red Spring, and Sandstone Quarry. There are two immediate management alternatives for the trails and recreational areas at the associated archaeological sites. One choice is to close the trails both administratively and physically due to the acceptance that impacts have and will continue to occur to the sites. This alternative is unacceptable. These are widely-known, established trails that attract thousands of people every year. The agency does not have the resources to effectively close popular trails of this kind. Also, there is high potential that disgruntled visitors would walk the trails in trespass and vandalize the sites out of a sense of irritation or revenge.

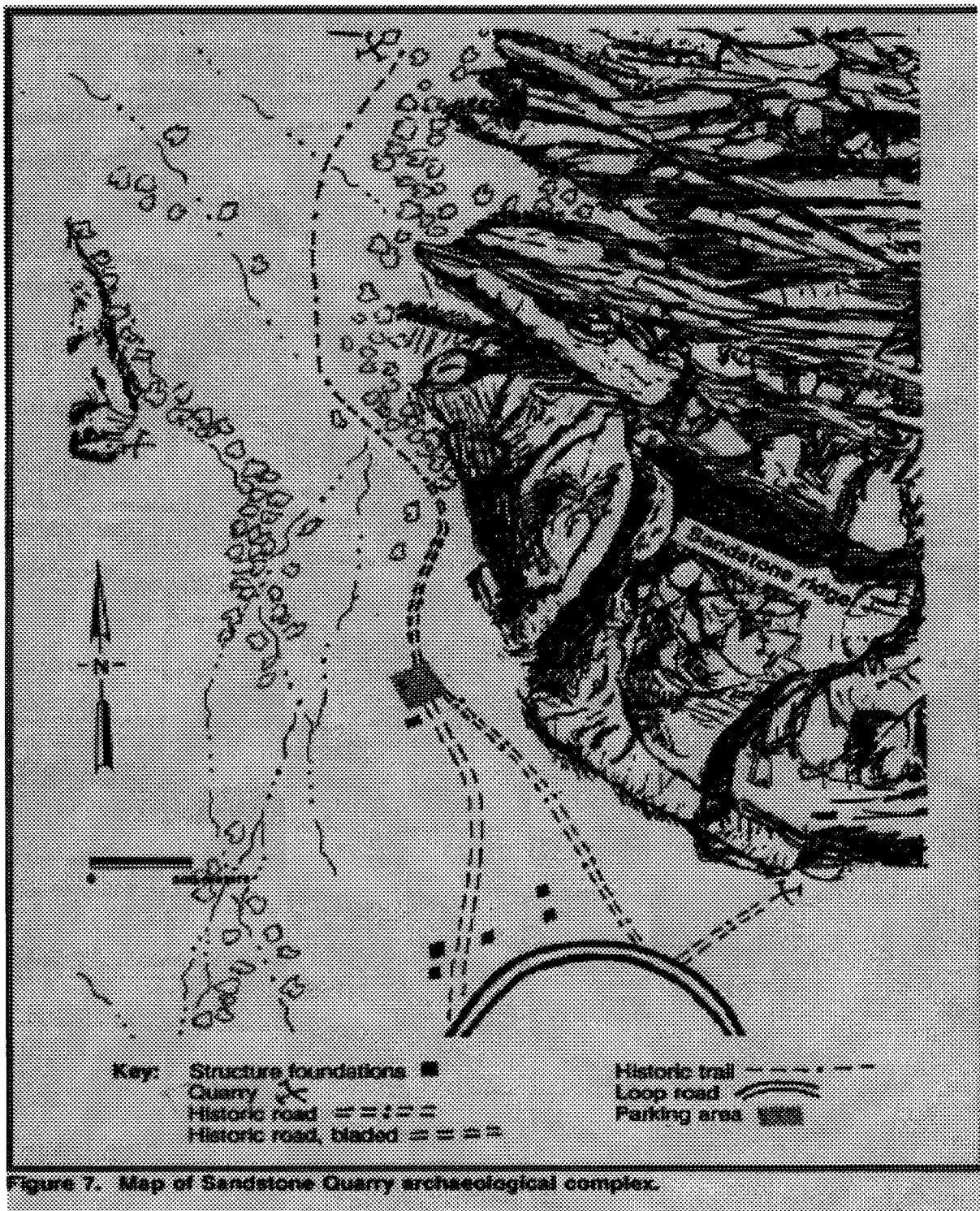
The four sites have not been formally evaluated by BLM. Until the consultation process has been completed, the sites are considered eligible for nomination to the National Register of Historic Places under criteria in 36 CFR 60.4. Lost Creek, Willow Spring, and Red Spring complexes are eligible under criterion (d), the potential to yield information important in the prehistory of the region. Sandstone Quarry is eligible under (a), associated with a unique regional mine, and is also eligible under (d). Further investigation at each site is necessary to complete a formal determination on significance. Whatever the determinations become, these sites additionally qualify for management for public values described in BLM Manual 8111.

Due to the present degree of high intensive public uses, the sites should be treated under Section 106 consultation as if adverse effects are occurring. The management strategy should consist of the following steps: 1) test for eligibility, 2) consult on initial determinations, 3) conduct a data recovery program if needed, 4) complete consultations on final determinations, and 5) develop project plans to manage for public uses. Project plan could be relatively simple and similar for each site.

In order to make determinations on eligibility, three of the sites require further probing and testing, and one should be determined not eligible without any further work. Based on the lack of remaining stratigraphic deposition documented during excavation of

a midden unit (Myhrer 1989), and the fact that the site has been severely impacted from recreational uses including installation in the 1960s of an outdoor toilet in a roasting pit, and leveling of two other pit features for picnic tables, the Willow Spring complex is considered to lack integrity and should be formally determined as not eligible for nomination to the NRHP. If SHPO concurrence on this determination is received, the site should then be managed for public uses.

The midden outside the apron of the shelter at Lost Creek should be



probed and tested for subsurface deposition under Nevada BLM guidelines (USDI BLM 1989). If stratigraphic deposition is found and integrity is present, then a data recovery plan should be written and implemented for the entire site. Although Red Spring was tested in 1969, there are no detailed results present in the BLM files, consequently, the site should be probed. An evaluation that may include testing is also needed at Sandstone Quarry. If analysis indicates that intact structural foundations are present at the site, a determination of eligibility should be written. At that point a decision should be made to determine whether additional protection measures are necessary or possible, or if data recovery or even reconstruction of the foundations is the most manageable alternative.

Until probing, testing and evaluation procedures are implemented, and formal determinations are submitted for SHPO review, educational interpretation should be continued. I propose that an existing draft interpretive brochure that describes cultural resources and associated Federal laws be finalized for distribution at the Visitor's Center. A great deal of recreational climbing is also conducted in the park and the first stages of an interpretive program for the organized climbing group members was initiated in 1990 by Red Rock Rangers. This program should be continued and expanded.

A Research Strategy for the Red Rock Summit Subzone. Based on analysis of the site recording forms written during the 1970s surveys for RRCRL, a large district or several smaller prehistoric districts are present in this canyon. The Rocky Gap/Potato Ridge road follows the canyon west of Willow Spring with numerous roasting pits, camp sites, and a few rockshelters located along its sides. The road is presently impassable for motorized vehicles. I propose that the Rocky Gap road be managed as a primitive hiking trail without any future maintenance. Another canyon runs north from Mountain Springs and contains numerous rockshelter/roasting pit complexes associated with Rainbow and Bootleg Springs.

The archaeological resources of the Red Rock Summit subzone are in many ways archaeologically similar to those in the South Virgin Peak Ridge in the Virgin Mountains, a canyon that holds several prehistoric roasting pit and rockshelter complexes. Both settings provide an excellent research potential to compare and contrast roasting pit complexes in different mountain ranges. Based on the results from the present amount of archaeological work in the RRCRL zone, I propose that most occupation in the Red Rock zone was by the Paiute with only limited use by the Virgin Anasazi and Lower Colorado groups. Occupation in the Virgin Mountains area was presumably dominated through time by the Paiutes, with intensive

uses by the Virgin Anasazi from about A.D. 700 to 1150. The locus of the Anasazi occupation was the lower Moapa Valley, located about 25 miles west of the South Virgin Peak Ridge. A research topic that focuses on interrelationships among the Paiute, Virgin Anasazi and the Patayan in both Red Rocks and the Virgin Mountains can be studied by a graduate student for a master's thesis. Fieldwork would consist of resurvey and recordation of sites identified during previous surveys in each of those areas. The sites should be analyzed in conceptual terms of archaeological districts. Roasting pits could be subjected to a variety of investigations using some examples of methods that are discussed in the section on archaeological site types in this document.

Following the distribution of the draft of this document in September, 1990, UNLV graduate intern Connie VonSleichter conducted a reconnaissance survey of the Rainbow/Bootleg Springs locales in the Red Rock Summit subzone. The results of her survey (VonSleichter 1990), in which sites were relocated and recorded as an archaeological district on an IMACS form, indicate that there has been only moderate impacts, as a result of recreational activities, to archaeological sites near Rainbow and Bootleg Springs.

Uses for Brownstone Canyon National Register District. Brownstone Canyon (26CK462 through 470/BLM 53-476 through 485) is already listed on the National Register of Historic Places. I propose two management uses for this district. First, those features that are highly visible by the public, such as the roasting pits, Civilian Conservation Corps (CCC) dams, and the pictograph panel should be managed for public uses. This includes signing and interpreting the importance of the dams, the roasting pits, and the rock art panel. Second, the shelter and midden site located on the north edge of the east-west trending canyon should be probed or tested to determine depth and information potential. If testing indicates that integrity has been lost, or if the deposition has limited information potential, then the shelter should be managed for public interpretive uses. If the midden shows potential to yield significant scientific information, then the site should be managed for conservation and monitored on a weekly basis. If monitoring indicates the shelter is being impacted, then additional protection measures or evaluation for a data recovery plan should be implemented.

Summary of Recommendations

Red Rock Canyon Recreation Lands have been intensively used for recreational purposes for at least 25 years. Inventories for cultural resources have been conducted within the past 20 years.

Although those surveys have located most areas of sensitivity, present uses for the site records are limited to locational and site typing information.

Management of the area as a park setting has fostered certain kinds of use by recreationalists. Existing trails run through sites that are significant for public uses, and possibly for information potential. The trails will not be abandoned, consequently, I recommend probing, testing, and evaluation of each site, and for those sites determined eligible, implementation of data recovery programs. Finally, those sites should be managed for public uses under BLM Manual 8111. With the exception of new recreational proposal projects, all presently sanctioned activities in RRCRL are non-destructive in nature. Continuing education for cultural resources preservation should be adequate to inhibit impacts to archaeological sites from recreational activities such as climbing and hiking.

I propose a research strategy that compares and contrasts the roasting pit/rockshelter sites in the canyons of Red Rock Summit with those in South Virgin Peak Ridge. The canyons are similar in terms of the kinds of sites present, but were presumably used by a slightly different mix of cultural groups. This project is ideal for a thesis project by a graduate student.

Brownstone Canyon National Register District should be managed in two parts. The rock art panel, roasting pits, and CCC dams should be signed for interpretation. The shelter should be tested and if there is potential for scientific research the feature should be managed for conservation.

Red Rock Canyon Recreation Lands is a unique geologic and biologic inset into the juxtaposition of the Mojave Desert and Great Basin. The environment was and is rich in resources including those cultural or human-caused in nature. RRCRL is one of only two designated geographic zones in SRA that are highly significant for cultural resources and that have also received an adequate amount of inventory to determine most areas of sensitivity. Although the recordation of most of the sites in the park was accomplished in the early 1970s and with methods that no longer meet most needs of CRM, the documents do provide baseline data sufficient for making general strategic management recommendations. I recommend that sites that are in heavily utilized areas in RRCRL be tested, evaluated, and subjected to data recovery procedures, then managed for public uses. Sites or features in less utilized areas that have potential for information uses should be managed for conservation.

Review by Interested Parties

Copies of the draft version of this document were submitted for review in November, 1990 to interested parties that included local professional archaeologists and the Moapa Band of Paiutes. The designated representatives of the Moapa Paiutes, the Cultural Committee, agreed that the intent of the document was a positive and constructive approach to preservation of representative samples. Although no written responses were received from local professionals, there were several positive oral responses. There were no negative responses.

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