United States Department of Interior
Bureau of Land Management
Arizona State Office

March 2004

Proposed

Arizona Statewide Land Use Plan Amendment for Fire, Fuels and Air Quality Management

Finding of No Significant Impact (FONSI) and Environmental Assessment

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Arizona State Office
222 North Central Avenue
Phoenix, AZ 85004
www.az.blm.gov

TAKE PRIDE® IN AMERICA

In Reply Refer To:
9210 (AZ-934)

March 25, 2004

Dear Reader:

The Bureau of Land Management (BLM), Arizona State Office has analyzed a proposal to amend its six Resource Management Plans (RMPs) and one Management Framework Plan (MFP). The six RMPs are the Phoenix, Kingman, Arizona Strip, Safford, Yuma and Lower Gila South. The MFP is the Lower Gila North. The Federal Wildland Fire Management Policy requires all agencies to update and include aspects of fire management into their land use plans (LUP). The Arizona Statewide LUP amendment incorporates adaptive fire management into all planning processes and provides a consistent approach to incorporating the National Fire Policy into the LUPs.

Enclosed is the Proposed Arizona Statewide Land Use Plan Amendment on Fire, Fuels, and Air Quality Management, a Finding of No Significant Impact (FONSI) and supporting Environmental Assessment (EA). The Proposed LUP Amendment, FONSI, and EA have been prepared in accordance with the Federal Land Management and Policy Act of 1976, the Bureau of Land Management's Planning Regulations (43 CFR 1610.5-5), the National Environmental Policy Act of 1969, and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR Parts 1508.9 and 1508.13).

Proposed LUP Amendment decisions may be protested by any person who participated in the planning process and who has an interest that is or may be adversely affected by the approval of the decisions. A protest should be submitted following the procedures provided in 43 Code of Federal Regulations 1610.5-2.

Protest letters must be postmarked on or before May 10, 2004, and may be sent via the U.S. Postal Service (USPS) to:

Bureau of Land Management
Director (WO-210), Mail Stop 1075LS
Attention: Brenda Hudgens-Williams, Protest Coordinator
P.O. Box 66538
Washington, DC 20035

Or, may be sent via FedEx or UPS overnight mail to:

Bureau of Land Management
Director (WO-210), Mail Stop 1075LS
Attention: Brenda Hudgens-Williams, Protest Coordinator
1620 L Street N.W.
Washington, DC 20036

A protest may raise only issues that were submitted for the record during the planning process. All protests must be complete, in writing and contain the following information:

- The name, mailing address, telephone number, and interest of the person filing the protest.
- A statement of the issue or issues being protested.
- A statement of the parts of the plan or amendment being protested.
- A copy of all documents addressing the issue or issues that were submitted during the planning process by the protesting party or an indication of the date the issue or issues were discussed for the record.
- A concise statement explaining precisely why the Arizona State Director's proposed decision is believed to be wrong.

All public comments and protests, including names and street addresses of respondents, will be available for public review at, Bureau of Land Management, 222 North Central Avenue, Phoenix, Arizona 85004, during regular business hours (9:00 a.m. to 4:00 p.m.), Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your comments. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Following the protest period and resolution of any protests submitted, a Decision Record will be issued. The Decision Record will be mailed to all participants in this planning process and all other interested people upon their request.

Sincerely,

Elaine Y. Zielinski

Elaine Y. Zielinski

Enclosure

Finding of No Significant Impact
For
Proposed Arizona Statewide Land Use Plan Amendment
Fire, Fuels, and Air Quality Management
Environmental Assessment

Introduction

The Bureau of Land Management (BLM), Arizona State Office has analyzed a proposal to amend its six Resource Management Plans (RMPs) and one Management Framework Plan (MFP). The six RMPs are the Phoenix, Kingman, Arizona Strip, Safford, Yuma and Lower Gila South. The MFP is the Lower Gila North.

The proposed statewide land use plan amendment, including desired future conditions, land use allocations and management actions, along with management common to all alternatives and any potential mitigation measures, are described and analyzed in the attached Environmental Assessment (EA) No. AZ-910-2003-0001.

Related Environmental Documents and Environmental Impact Statements (EISs)

- Proposed Arizona Strip District RMP/Final EIS - December 1990
- Proposed Phoenix RMP/Final EIS - December 1998
- Lower Gila South Proposed RMP/Final EIS - August 1985
- Kingman Resource Area Proposed RMP/Final EIS - September 1993
- Safford District Proposed RMP/Final EIS - August 1991
- Yuma District Proposed RMP/Final EIS - August 1985
- Statewide Plan Amendment of Land Use Plans in Arizona for Implementation of Arizona Standards for Rangeland Health and Guidelines for Grazing Administration EA - December 1996
- Vegetation Treatment on BLM Lands in Thirteen Western States Final EIS - May 1991
- Biological Evaluation for the BLM, Statewide LUP Amendment for Fire, Fuels and Air Quality Management, Dynamac Corporation, December 2004.

Reasons for Finding No Significant Impact

- Both beneficial and adverse effects have been considered, (see EA pages 4-1 thru 4-34). The potential adverse effects would be limited to acceptable levels by Standard Operating Procedures and implementation of listed mitigation measures. Therefore, beneficial effects depicted in the analysis far out weight potential adverse effects from implementing the proposed action.
- Overall safety for the general public and potential fire hazard conditions facing fire personnel will be greatly improved on approximately 12 million acres of BLM-administered public lands due to the reduction of hazardous fuels build up over time and overall reduced potential for destructive wildland fire. The actions selected were designed to increase firefighter and public safety and decrease the

costs of fire suppression efforts, and continued damage from no action that would occur to facilities and structures, water quality on approximately 12 million acres of public lands. Hazardous fuel loads would be reduced thereby allowing direct suppression methods by fire fighters. The implementation of this project would reduce the risk of a wildland fire reaching catastrophic levels and crossing boundaries onto private lands or public lands administered by other agencies.

- The proposed action would not adversely affect any special designation areas, particularly when compared to the No Action Alternative (see EA pages 4-31 thru 4-32). As the Desired Future Conditions are achieved, improvements in species biodiversity, plant composition, structure, and productivity, plant health and vigor, and wildlife habitat would improve ecosystem health throughout special designation areas (National Monuments, National Conservation Areas, National Trails, Wild & Scenic Rivers, Wilderness Areas, Wilderness Study Areas or Areas of Critical Environmental Concern).
- There is no substantial controversy over the effects of this proposal (see EA page 1-3 and Appendix A). No controversy or significant concerns were identified during public comment or agency reviews and therefore none were disclosed in the EA (see pages 1-3 to 1-4 of the EA).
- The BLM has considerable experience with these types of projects and actions, and their effects are not uncertain, therefore a unique or unknown risk is not being taken by implementing the proposed action. Recent projects have exhibited the need for change in vegetation structure by reducing vegetation accumulation and invasive species, thereby reducing catastrophic wildfire risk. These past projects have benefited wildlife, and domestic livestock by creating a mixed age class structure with improved forage production (see EA pages 4-7 to 4-19).
- The LUP Amendments are a response to-- and are consistent with--recent Congressional legislation, current Federal and BLM fire management policies, are therefore are not precedent setting or unique actions.
- Cumulative effects from the proposed action were analyzed in conjunction with anticipated fire management activities by other Federal, state and county agencies on adjacent lands. The EA discloses that over the long-term the proposed action would improve environmental conditions, particularly when compared to continuing current fire management practices under the "no action alternative." The EA discloses that the proposed action would result in a cumulative improvement in air quality; visual resources; soil erosion; vegetation; wildlife habitat; and to social, economic and cultural resources. Adverse cumulative impacts to water quality would be short-term and not significant. Maintaining a mosaic of habitats across the landscape and across administrative boundaries would minimize any cumulative effects to fish and wildlife resources. Based on the effects disclosed in the EA and additional documentation in the supporting project planning record, there are no significant adverse cumulative impacts. (See EA pages 4-1 to 4-34.)
- No or minimal impacts to paleontological, cultural or historic resources would occur from treatment methods or prescribed fire (see EA pages 4-27 to 4-31), and therefore would be less under the proposed action compared to the effects of no action.

- Within the project area, 33 endangered species, 13 threatened species, 2 species proposed for listing, and 4 species that are candidates for listing inhabit either BLM-administered lands in Arizona (or has habitat) or adjacent Federal, state, reservation, or private lands that could be affected by fire suppression or the proposed fire management activities. Although the proposed action has the potential to affect some species, it would however have no significant direct, indirect or cumulative impacts. We anticipate a biological opinion from FWS that the proposed LUP amendment would not jeopardize any of the Federally listed species (see EA pages 4-20 to 4-26). A Biological Evaluation has been prepared and submitted to the FWS, and consultation on schedule is anticipated. Specific Conservation Measures have been developed to reduce or eliminate adverse effects, and would be implemented as described (see EA Appendix C).
- The proposal is consistent with applicable state and federal laws, Federal Wildland Fire Management Policy, and BLM Fire Management and Planning Policy (see EA pages 1-1 to 1-4).

Determination

On the basis of the information contained in the attached Environmental Assessment, public involvement throughout the development of the EA level analysis process, and all other information available to me as summarized above, it is my determination that the proposed amendment is not a major Federal Action and will have no significant effect on the quality of the human environment, other then those previously addressed in the aforementioned EISs. Therefore a new EIS or supplement to an existing EIS is unnecessary and will not be prepared.

Elaine Y. Zielinski

Elaine Y. Zielinski
State Director, Arizona

March 25, 2004
Date

Proposed
Arizona Statewide Land Use Plan Amendment For Fire, Fuels and Air Quality Management

Environmental Assessment

U.S. Department of the Interior
Bureau of Land Management

Arizona State Office

_____

March 2004

EA-AZ-910-2003-0001

Prepared by

DYNAMAC CORPORATION

1551 Del Mar Circle
Idaho Falls, Idaho 83404

The Bureau of Land Management is responsible for the stewardship of our public lands. It is to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times. Management is based on the principles of multiple use and sustained yield for our nationís resources within a framework of environmental responsibility and scientific technology. These resources include: recreation; rangelands; minerals; timber; watersheds; fish and wildlife; wilderness; air; and scenic, and cultural values.

ENVIRONMENTAL ASSESSMENT
TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ACEC	Areas of Critical Environmental Concern
ADEQ	Arizona Department of Environmental Quality
AGFD	Arizona Game and Fish Department
BE	Biological Evaluation
BLM	Bureau of Land Management
CAA	Clean Air Act
CCC	Civilian Conservation Corps
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FCR	Field contact representative
FLPMA	Federal Land Policy and Management Act of 1976
FOFEM	First Order Fire Effect Model
FY	Fiscal Year
HMA	Herd Management Areas
HMP	Habitat Management Plans
HA	Herd Areas
IC	Incident Commander
IMT	Incident Management Team
ITA	Indian Trust Assets
LUP	Land Use Plans
MFP	Management Framework Plan
NAAQS	National Ambient Air Quality Standards
NCA	National Conservation Area
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NOx	Nitrogen oxides
NPS	National Park Service
NRHP	National Register of Historic Places
O_3	Ozone
OHV	Off Highway Vehicles
PM_{10}	Ten microns or less
RMP	Resource Management Plans
RNCA	Riparian National Conservation Area
SAF	Society of American Foresters
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	Sulfur dioxide
TCP	Traditional cultural property
TE&P	Threatened, endangered, proposed, and candidate
TNC	The Nature Conservancy
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile organic compounds
VRM	Visual Resource Management
WHB	Wild Free-Roaming Horses and Burros
WUI	Wildland-Urban Interface

Section 1 ñ Introduction

1.1 Need for the Plan Amendment

The Bureau of Land Management (BLM) Arizona State Office is amending its six Resource Management Plans (RMP; the Phoenix, Kingman, Arizona Strip, Safford, Yuma, and Lower Gila South RMPs) and one Management Framework Plan (MFP; the Lower Gila North MFP). These document, collectively known as Land Use Plans (LUPs), need to be amended to address todayís wildland fire management concerns and issues, including:

- Improved Public and Firefighter Safety from wildland fires on public lands;
- The use of fire as a management tool for achieving resource management objectives (such as restoring desirable vegetation, improving the health of desirable habitats, reducing competition from invasive species, and restoring/rehabilitating habitats consumed by wildfires), including the return of fire as a process to fire dependent ecosystems;
- The management of hazardous fuel loads inside and outside the Wildland-Urban Interface (WUI) by the appropriate use of fire, mechanical, biological, and/or chemical treatments to reduce firefighter risk, decrease wildfire severity and intensity, and to restore more natural conditions to forest, rangeland, and woodland vegetative communities;
- Adaptive Fire Suppression Response Strategy. Appropriate Management response, including managing natural fire starts for resource benefit, that will prioritize multiple fires and allow for change in suppression response requirements during these events; and
- Air Quality, and how it will be affected by the reintroduction of fire to the ecosystem as a natural process.

1.1.1 National Fire Management Plan

In September 2000 the Secretaries of the Departments of Interior and Agriculture (DOI and DOA) prepared a report, *Managing the Impact of Wildfires on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000*. As a result of the 2000 wildfire season and the report to the President, Congress provided substantial new appropriations and guidance in the Fiscal Year (FY) 2001 Interior and Related Agencies Appropriations Act. The activities resulting from the Secretariesí report and the Congressional action are generally known as the National Fire Plan.[1] The 2001 Federal Wildland Fire Management Policy (2001 Federal Fire Policy)[2] provides a broad philosophical and policy foundation for federal agency fire management programs and activities, including those conducted under the National Fire Plan. The 2001 Federal Fire Policy contained in this report is focused on internal federal agency strategic direction for a broad range of fire management related activities while the National Fire Plan is a more narrowly focused and tactical undertaking involving both federal and non-federal entities. A consistent approach to the incorporation of the National Fire Plan into LUPs is also a requirement for BLM-administered lands. The LUP amendment will be based upon the National Fire Plan and the 2001 Federal Fire Policy.

1.1.2 Comprehensive LUP Evaluation Results

In FY 2001, the BLM Arizona State Office evaluated the existing LUPs for its seven Field Offices and found that they have not kept pace with current fire management issues and policy, nor do they provide for interrelationships between fire management and other resources. The Federal Wildland Fire Management Policy has required all agencies to update and include aspects of fire management into their LUPs. The purpose of BLMís LUP amendment is to accomplish the required updates by incorporating adaptive fire management into all planning processes, and to provide a consistent approach to incorporating the National Fire Policy into LUPs. The current LUPs also do not meet BLMís goal of having a consistent approach to incorporating the National Fire Policy in land use plans.

1.1.3 Planning Area

The BLM in Arizona is responsible for fire management on approximately 12 million acres of public lands consisting of 2 million acres of

[1] See National Fire Plan website at: www.fireplan.gov

[2] The Federal Wildland Fire Policy can be found on the NIFC website at: www.nifc.gov

Figure 1.1

Ponderosa Pine, Pinion/Juniper woodlands, 10 million acres of South West desert vegetation, and 43,000 acres of riparian vegetation. The BLM has 7 planning areas in Arizona, covering some 12 million acres of BLM-administered lands. The LUP amendment would amend those seven LUPs (six Resource Management Plans (RMPs) and one Management Framework Plan (MFP).

The Yuma RMP includes the Yuma Field Office (formerly the Yuma District) and a portion of the Havasu Field Office, and encompasses Yuma and La Paz Counties. The Kingman RMP includes the Kingman Field Office and a portion of the Havasu FO, and encompasses some 2.4 million acres of public lands in Mohave and Yavapai Counties. The Arizona Strip RMP encompasses one field office: the Arizona Strip FO located in St. George, Utah. The Arizona Strip FO is comprised of 2.8 million acres of land north of the Grand Canyon and south of the Utah State line, and manages lands within Mohave and Coconino Counties in Arizona. The Safford RMP includes a portion of the Tucson and Safford Field Offices. The Tucson FO manages some 800,000 acres of public lands within Pinal and Santa Cruz Counties. The Safford FO contains 1.6 million acres within Graham, Greenlee, Cochise, Navajo, Apache, and Pinal counties. The Phoenix RMP covers the former Phoenix Resource Area within the Phoenix District (now the Phoenix Field Office) and includes a portion of the Phoenix, Tucson, and Safford Field Offices. The northern region encompasses Apache and Navajo Counties. The southern region includes most of Maricopa County, and all or parts of Gila, Pima, Pinal, Santa Cruz, Yavapai. The major metropolitan areas of Phoenix and Tucson are included within the Phoenix RMP. The Lower Gila South RMP covers a portion of the Yuma and Phoenix Field Offices within La Paz, Maricopa, Pima, Pinal, and Yuma Counties. The Lower Gila North Management Framework Plan spans public lands within Yuma, Yavapai, and Maricopa Counties in the former Lower Gila Resource Area (now the Phoenix Field Office), and a portion of the Havasu Field Office.

In addition to BLM-administered land, the planning area contains private, State and other land. Indian Trust Assets (ITAs) are lands, natural resources, money, or other tangible assets held by the Federal Government in trust or restricted against alienation for Indian tribes and individual Indians. The Proposed Action is not likely to affect ITAs in the State of Arizona. As with many western states, a significant portion of the lands in Arizona are public lands administered by the Federal government, including the Bureau of Land Management (BLM), Forest Service, and National Park Service. Table 1.1 provides the general ownership of lands in Arizona.

Table 1.1 ñ General Land Ownership in Arizona

	Acres	Percent of Total
Bureau of Land Management	12,296,000	16.5%
Other Federal Agencies	18,704,000	25.6%
State of Arizona	9,335,000	12.8%
Indian Trust	19,910,000	27.3%
Private	12,982,000	17.8%

1.2 Determining the Scope/Issues

A Notice of Intent (NOI) to initiate the planning effort was published in the Federal Register on January 27, 2003. To ensure that the most appropriate measures of managing fire in Arizona are selected from numerous options and alternatives, public input into the LUP Amendment process was essential from the beginning planning stages and throughout the planning process.

A Public Involvement Plan was also prepared to manage and ensure effective, consistent, open communication process between BLM, other federal agencies, state and local government agencies, Native American tribes, universities and research entities, the public, and other stakeholding parties.

In March 2003, BLM conducted eight Open House meetings in Phoenix, Safford, Tucson, Flagstaff, Yuma, Lake Havasu City, Kingman, and St. George, Utah (the location of the BLM field office for the Arizona Strip). These meetings were announced in the first Planning Bulletin, mailed in February 2003 to more than 3,500 individuals and organizations throughout the state. News releases were issued to state and local media, and advertisements were placed in most major newspapers. More than 100 people attended at least one of the meetings.

Issues or concerns on the following topics were expressed by meeting attendees: Coordination with other agencies and/or National Monuments; support for using fire to manage ecosystems, including prescribed fire or allowing naturally-occurring fire cycles with minimal suppression efforts; WUI fires and the cost of fire prevention; hazardous fuel loadings; environmental impacts to air and water quality, and mature trees from logging; invasive species such as tamarisk; fire as a threat to cultural, archeological, and historical resources; impact of fires on livestock forage availability and grazing, as to do so would take a grave toll on the health of public lands and wildlife.

Potential issues not raised by the public include impacts to soil resources, wild horses and burros, or socio-economic impacts of wildland fire. Also, no questions were raised in regards to BLMís LUP amendment process, compliance with the National Environmental Policy Act (NEPA) and the Environmental Assessment (EA) process being followed, or the schedule for the LUP amendment and Environmental Assessment, and no alternatives were raised to the preferred alternative. Additional details on the public involvement meetings is provided in **Appendix A**, *Determining the Scope Process Summary*

1.3 Laws, Regulations, Policies, and Planning Criteria

The BLM planning process is governed by the Federal Land Policy and Management Act of 1976 (FLPMA, 43 U.S.C. 1711) and the Code of Federal Regulations (CFR) contained in 43 CFR Part 1600. Land Use Plans ensure that the public lands are managed in accordance with the intent of Congress as stated in FLPMA, under the principles of multiple use and sustained yield. As required by FLPMA, the public lands must be managed in a manner that protects the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition, that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use by encouraging collaboration and public participation throughout the planning process. In addition, the public lands must be managed in a manner that recognizes the Nationís need for domestic sources of minerals, food, timber, and fiber from the public lands.

Land use plans are the primary mechanism for guiding BLM activities to achieve the mission and goals outlined in the BLM Strategic Plan. BLMís Land Use Planning Handbook (H-1601-1) contains implementation guidance. BLMís Land Use Planning Handbook, Appendix C (Program-Specific and Resource-Specific Decision Guidance), Part 1 (Natural, Biological and Cultural Resources), Paragraph J (Fire Management), also contains specific guidance on fire management in LUPs.

The Presidentís Council on Environmental Quality's (CEQs) regulations for implementing NEPA (Title 40 CFR Parts 1500-1508) detail the process of preparing Environmental Assessments (EAs). This CEQ guidance and BLMís own internal guidance for conducting an EA-level analysis were followed in the preparation of this document. BLMís National Environmental Policy Act (NEPA) Handbook (H-1790-1) contains BLM guidance for preparation of an EA-level analysis.

On November 13, 2001, BLMís National Director issued Instruction Memorandum No. 2002-034, providing guidance regarding the Federal Wildland Fire Management Policy and the treatment of wildland fire management in LUPs. The Instruction

Memorandum directs BLMís LUPs to be amended to meet current fire management policy.

In addition, there are other cross-cutting environmental laws and Executive Orders that may be affected by an agencyís action, and they have been considered. These authorities include (but are not limited to) the Clean Air and Clean Water Acts, the Wild and Scenic Rivers Act, the Endangered Species Act, the National Historic Preservation Act, the Archaeological Resource Protection Act, and such Executive Orders as EO 11593, "Protection and Enhancement of the Cultural Environment," and EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." Additional information is provided in **Appendix B**, *Applicable Laws, Regulations, Policies and Planning Criteria.*

1.4 Collaboration/Partnership Relationship

As part of the processes to determine the projectís scope, agency coordination and notification, BLM took actions to inform and obtain input from all other Federal, State, Tribal and local agencies about this LUP amendment project, the schedule, and the steps being taken to complete the project. Agencies were given the opportunity to participate and comment.

In January and February 2003, letters were sent by the BLM, Deputy State Director, to Arizona Federal, State, and County agencies, and to Tribal contacts. These letters provided background information on BLMís statewide fire, fuels and air quality LUP amendment process, and invited them to attend one or more of the public meetings or to contact BLM if they would like a separate meeting. Additionally, tribal representatives were contacted to obtain information on potential issues and concerns they might have. All information obtained was fully considered in the LUP amendment and NEPA processes.

Under a separate but related project, the BLM has arranged for The Nature Conservancy (TNC), a non-profit conservation organization, to review and provide an independent, scientific evaluation of the ecological validity of BLMís existing fire management polygons. TNCís efforts will directly support BLMís update of its Fire Management Plans.

1.5 Existing LUP Decisions That Would Be Amended

BLMís seven existing LUPs contain some Desired Future Conditions, Land Use Allocations, and Management Actins pertaining to fire and fuels management, vegetation, and other resources. Some of these decisions are inconsistent with new fire management issues and policies. Table 2.3, ìExisting LUP Decisions,î lists existing decisions that would be modified by the Proposed Action.

Section 2.0 Description of Alternatives

2.1 Alternative Resource Management Plans

The primary goal is to incorporate new management direction that integrates fire and fuels management with other management activities to benefit both natural resources and multiple-uses on BLM-administered public lands throughout Arizona. Table 2.1 compares the average annual level of fire management activity under the Proposed Action and the No Action Alternative.

2.2 Proposed Action

The proposed action is to amend BLMís seven existing Land Use Plans (LUPs) to update the plans to comply with current fire policy and guidance and to fully integrate fire and fuels management and direction found in the latest DOI and BLM resource program guidance for lands administered by BLM. The LUP Amendment would establish **Desired Future Conditions, Land Use Allocations,** and **Management Actions,** and would amend existing LUP decisions concerning fire, fuels and air quality management. The LUP Amendment would include use of fire and other vegetative treatments as tools to achieve resource management objectives. Fire management in the amended LUPs would also include adaptive management for wildfire; allow fire to resume a more natural ecological role within each ecosystem; the use of prescribed fire; and mechanical, chemical or biological treatments to meet resource objectives and reduce hazardous fuels on public lands inside and outside Wildland-Urban Interface (WUI) areas.

The objective of the proposed action is to manage fire and fuels according to the current policies and requirements (as discussed in Sections 1.1.1. and 1.3) and to meet desired future conditions for those and other resources. Fire management objectives would be developed and coordinated from resource management objectives. The utilization of prescribed fire, mechanical, biological, and chemical fuels treatments combined with fire suppression and rehabilitation would be the tools fire management would use to achieve the resource objectives.

2.2.1 Desired Future Conditions

The Proposed Action would establish the following Desired Future Conditions:

- Fire is recognized as a natural process in fire-adapted ecosystems and is used to achieve objectives for other resources;
- Fuels in WUI areas are maintained at non-hazardous levels to provide for public and fire fighter safety;
- Prescribed fire activities comply with Federal and State air quality regulations;
- Each vegetation community is maintained within its natural range of variation in plant composition, structure, and function, and fuel loads are maintained below levels that are considered to be hazardous (**Table 2.1**; see **Appendix C** for additional information for each vegetation community).

2.2.2 Land Use Allocations

Under the Proposed Action, BLM-administered public lands would be assigned to one of the following two land use allocations for fire management (Table 2.1):

Allocation 1 ñ Wildland Fire Use:
Areas suitable for wildland fire use for resource management benefit.
Areas where wildland fire is desired, and there are few or no constraints for its use. Where conditions are suitable, unplanned and planned wildfire may be used to achieve desired objectives, such as to improve vegetation, wildlife habitat or watershed conditions, maintain non-hazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires and meet resource objectives. Where fuel loading is high but conditions are not initially suitable for wildland fire, fuel loads are reduced by mechanical, chemical or biological means to reduce hazardous fuels levels and meet resource objectives (includes WUI areas).

Allocation 2 ñ Non Wildland Fire Use:
Areas not suitable for wildland fire use for resource benefit.
This allocation includes areas where mitigation and suppression are required to prevent direct threats to life or property. It includes areas where fire never played a large role, historically, in the development and maintenance of the ecosystem, and some areas where fire return intervals were very long It also includes areas (including some WUI areas) where an unplanned ignition could have negative effects to the ecosystem unless some form of mitigation takes place. Mitigation may include mechanical, biological, chemical, or prescribed fire means to maintain non-hazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires and meet resource objectives.

The allocation of lands is based on the desired future condition of vegetation communities, ecological conditions and ecological risks. The allocation of lands is determined by contrasting current and historical conditions and ecological risks associated with any changes (**Figure 2.1**). The condition class concept helps describe alterations in key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. BLM Fire Management Plans[1], will include the two allocations and identify areas for including fire use, mechanical, biological or chemical means to maintain non-hazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires and meet resource objectives. They will also identify areas for exclusion from fire (through fire suppression), chemical, mechanical, and/or biological treatments.

2.2.3 Management Actions

In areas not suitable for fire, BLM will implement programs to reduce unwanted ignitions, and emphasize prevention, detection, and rapid suppression response techniques.
In areas not suitable for fire where fuel loading is high, BLM will utilize biological, mechanical or chemical treatments, and some prescribed fire to maintain non-hazardous levels of fuels and meet resource objectives.

In areas suitable for fire where fuel loading is high and current conditions constrain fire use, BLM will emphasize prevention and mitigation programs to reduce unwanted fire ignitions, and use mechanical, biological or chemical treatments to mitigate the fuel loadings and meet resource objectives.

In areas suitable for fire where conditions allow, BLM will allow naturally ignited wildland fire, use prescribed fire and a combination of biological, mechanical and chemical treatments to maintain non-hazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires and meet resource objectives.

In areas suitable for fire, BLM will monitor existing air quality levels and weather conditions to determine which prescribed fires can be ignited and which, if any, must be delayed to ensure that air quality meets federal and state standards. If air quality approaches unhealthy levels BLM will delay igniting prescribed fires.

In addition to both allocations, to reduce human caused fires, BLM will undertake education, enforcement and administrative fire prevention mitigation measures. Education measures will include various media information including a signing program, information as to the natural role of fire within local ecosystems, participation in fairs, parades and public contacts. Enforcement will be accomplished by providing training opportunities for employees interested in fire cause determination. Administration includes expanded prevention and education programs with other cooperator agencies.

For all fire management activities (wildfire suppression, appropriately managed wildfire use, prescribed fire, and mechanical, chemical, and biological vegetation treatments), Conservation Measures will be implemented as part of the Proposed Action to provide statewide consistency in reducing the effects of fire management actions on Federally threatened, endangered, proposed, and candidate (ìFederally protectedî) species (**Appendix D**).

[1] BLMís fire management program in Arizona is divided into four fire zones each with its own fire staff and fire management plan. The four zones are: Arizona Strip (ASFZ), Phoenix/Kingman (PKFZ), Safford/Tucson (STFZ), and Yuma/Lake Havasu (YHFZ). The ASFZ and the YHFZ are interagency in organizational makeup. The ASFZ is combined with the Dixie National Forest, Pine Valley Ranger District. The STFZ and PKFZ are BLM zones only.

Table 2.1 ñ Desired Future Conditions and Land Use Allocation for Vegetation Communities

Vegetation Community Type	Approximate Acreage	Desired Future Conditions	Land Use Allocation
Upland Sonoran Desert Scrub	3,280,602 acres	The Desired Future Conditions are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to non-hazardous levels.	2
Lower Sonoran Desert Scrub	2,727,540 acres	The Desired Future Conditions are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to non-hazardous levels.	2
Great Basin Pinyon-Juniper Woodland	1,533,012 acres	The Desired Future Conditions are that annual weeds such as cheatgrass are controlled, ladder fuels and downed woody debris are limited or not present, and juniper and piÒon pine tree densities and cover occur at their historic range of variation.	1
Mohave Desert Scrub	1,165,687 acres	The Desired Future Conditions are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to non-hazardous levels.	2
Great Basin Desert Scrub	1,058,401 acres	The Desired Future Conditions are for fire to naturally reduce annual weed densities and cover, limit or reduce the invasion of juniper, and for the densities of shrubs, such as big sagebrush, to be maintained within their historic range of variability.	1
Plains and Great Basin Grasslands	747,509 acres	The Desired Future Conditions are for a predominance of perennial grass cover, reduced cover of annual grasses, and for fire to naturally inhibit the invasion of woody shrubs such as rabbitbrush, snakeweed, and big sagebrush.	1
Semidesert Grassland	757,668 acres	The Desired Future Conditions are for perennial grasses to cover its historic range of variability, annual grass cover is reduced, and fire naturally inhibits the invasion of woody plants such as juniper, tarbush, whitethorn, and creosotebush.	1
Interior Chaparral	425,287 acres	The Desired Future Conditions are that fire naturally maintains shrub cover while reducing annual grass cover, the invasion of woody plants such as juniper and piÒon pine are controlled, and the average age of chaparral stands is reduced through controlled fire or mechanical treatment.	1
Chihuahuan Desert Scrub	447,398 acres	The Desired Future Conditions are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to non-hazardous levels.	2

Vegetation Community Type	Approximate Acreage	Desired Future Conditions	Land Use Allocation
Riparian	176,927 acres	The Desired Future Conditions are that annual weed cover and density is controlled and ladder fuels and downed woody debris are limited or not present. Disturbances such as livestock grazing, mining, and off road vehicle travel, that can potentially reduce natural vegetation cover and vigor, are managed to maintain adequate cover and mix of natural plant species.	2
Madrean Evergreen Woodland	67,731 acres	The Desired Future Conditions are that annual weeds such as red brome and buffle grass are controlled, ladder fuels and downed woody debris are limited or not present, a high percent of large trees are maintained, and tree stand vigor is maintained through controlled fire and mechanical treatments.	1
Montane Conifer Forest	19,067 acres	The Desired Future Conditions are that ìdog -hair thicketsî are controlled, ladder fuels and downed woody debris are limited or not present, a high percent of large trees are maintained, and tree stand vigor is maintained through controlled fire and mechanical treatments.	1

Land Use Allocation 1: Wildland Fire Use; Areas suitable for wildland fire use for resource management benefit
Land Use Allocation 2: Non Wildland Fire Use; Areas that are not suitable for wildland fire use for resource benefit.

Conservation Measures noted as ìRecommendedî are discretionary for implementation, but are recommended to help minimize effects to Federally protected species. Procedures within the Interagency Standards for Fire and Fire Aviation Operations 2003, including future updates, relevant to fire operations that may affect Federally protected species or their habitat are incorporated here by reference.[2]

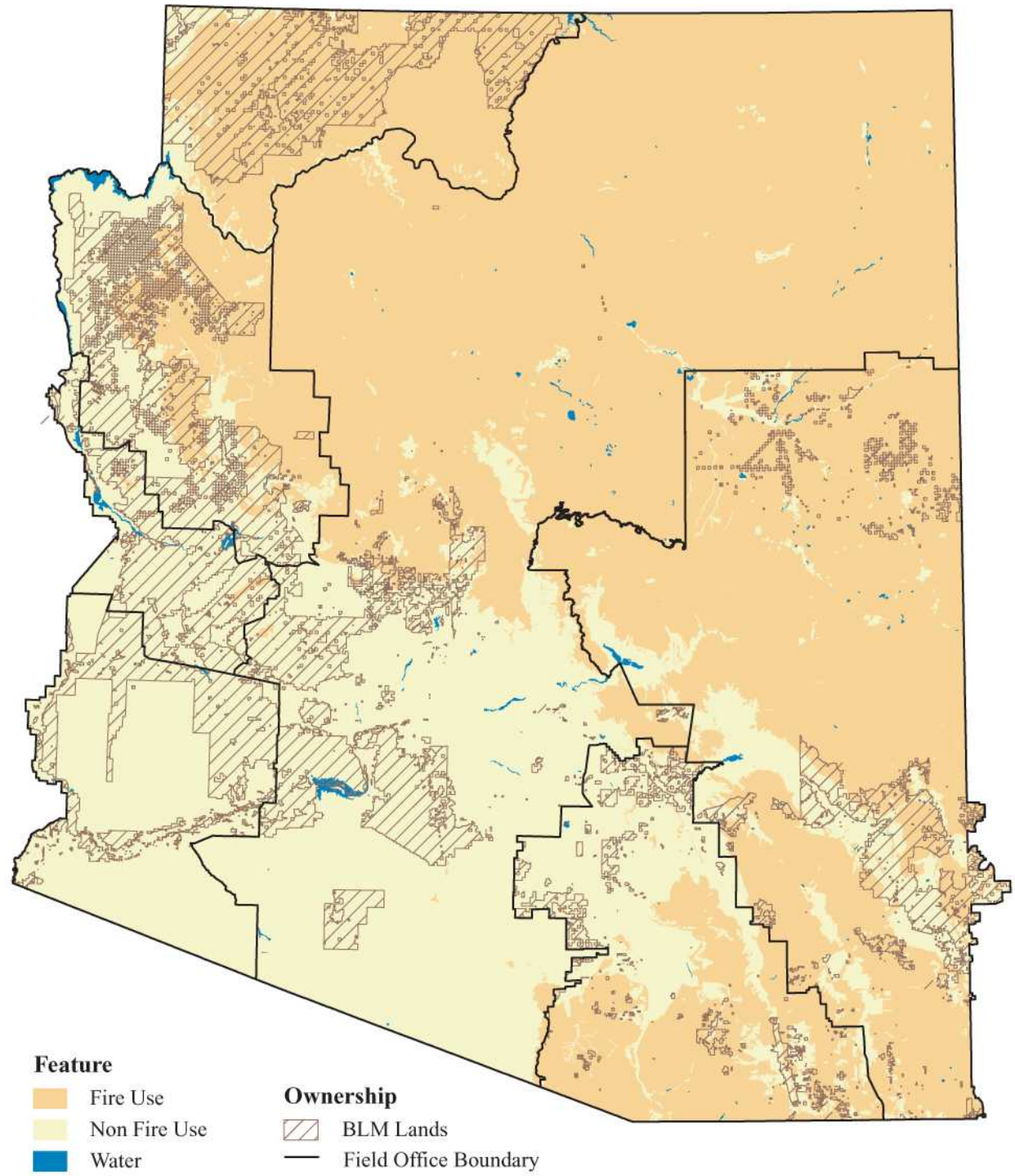
Firefighter and public safety is the first priority in every fire management activity. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources must be based on the values to be protected, human health and safety, and costs of protection (2001 Federal Wildland Fire Management Policy). However, implementing the following Conservation Measures during fire suppression to the extent possible, and during the proposed fire management activities as required, would minimize or eliminate the effects to Federally protected species and habitats.

During fire suppression actions, Resource Advisors may be designated to coordinate concerns regarding Federally protected species, and to serve as a liaison between the Field Office Manager and the Incident Commander/Incident Management Team. They will also serve as a field contact representative (FCR) responsible for coordination with the USFWS. The Resource Advisors will have the necessary information on Federally protected species and habitats in the area and the available Conservation Measures for the species. They will be briefed on the intended suppression actions for the fire, and will provide input on which Conservation Measures are appropriate, within the standard constraints of safety and operational procedures. The Incident Commander has the final decision-making authority on implementation of Conservation Measures during fire suppression operations.

Because of the number of species located within the action area for proposed Statewide LUP Amendment, combined with a variety of fire suppression and proposed fire management activities, conflicts may occur in attempting to implement all Conservation Measures for every species potentially affected by a particular activity. Implementing these Conservation Measures effectively would depend on the number of Federally protected species and their individual life history or habitat requirements within a particular location that is being affected by either fire suppression or a proposed fire management activity.

[2] BLM, NPS, USFWS, USFS. 2003. *Interagency Standards for Fire and Fire Aviation Operations 2003*. These standards can be found at: www.fire.blm.gov/Standards/redbook.htm (*Note:* This document is updated annually. For BLM, this document is Handbook 9213-1).

Figure 2.1 Land Use Allocation



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

0 25 50 75 100 Miles

1:3,500,000

Projection UTM, Zone12, North American Datum 1927

This would be particularly true for timing restrictions on fuels treatment activities, if the ranges of several species with differing restrictions overlap, making effective implementation of the activity unachievable. Resource Advisors (in coordination with the USFWS), Fire Management Officers or Incident Commanders, and other resource specialists would need to coordinate to determine which Conservation Measures would be implemented during a particular activity. If Conservation Measures for a species cannot be implemented, BLM would be required to initiate Section 7 consultation with the USFWS for that particular activity.

BLM will update their local Fire Management Plans to include site-specific actions for managing wildfire and fuels in accordance with the new Federal fire policies, based on guidance provided in the Decision Records for this Statewide LUP Amendment. These plans will be coordinated with the USFWS and the Arizona Game and Fish Department (AGFD) to address site-specific concerns for Federally protected species. These plans will incorporate the Conservation Measures included in this Statewide LUP Amendment for Federally protected species occurring within each Fire Management Zone. Consultation with the USFWS will occur with these project-level plans, as necessary.

Special Designation Areas

For all fire management activities in National Monuments and National Conservation Areas, measures will be taken to assure that no adverse effects occur to those resources, values, and objects identified in the respective proclamations or legislation as reasons for establishing the area.

In Wilderness Areas, Wilderness Study Areas, and areas being managed for wilderness characteristics according to LUPs, when suppression actions are required, minimum impact suppression tactics (MIST, Interagency Standards for Fire Operations, 2003) would be applied and coordinated with Wilderness Area management objectives and guidelines

Fire management activities along National Historic Trails will be conducted to assure no adverse effects occur to those resources and values identified in the legislation designating the trail.

Fire management efforts along river segments recommended as eligible for designation under the Wild and Scenic Rivers Act should utilize those measures that avoid adversely affecting the identified outstandingly remarkable values that qualify the rivers for designation.

Areas of Critical Environmental Concern (ACECs) and Backcountry Byways are established in land use plans. The desired conditions and management prescriptions for these special areas will be considered in implementing fire management activities.

2.3 No Action Alternative

Under the No Action Alternative, BLM-administered public lands would be assigned to one of the following four fire management categories:

Category A: ***Areas where fire is not desired at all.*** This category includes areas where mitigation and suppression are required to prevent direct threats to life or property. It also includes areas where fire never played a large role historically in the development and maintenance of the ecosystem, and some areas where fire return intervals were very long.

Category B: ***Areas where unplanned wildfire is not desired because of current conditions.*** These are ecosystems (including some WUI areas) where an unplanned ignition could have negative effects unless/until some form of mitigation takes place.

Category C: ***Areas where wildland fire is desired, but there are significant constraints that must be considered for its use.*** Areas where significant ecological, social or political constraints (such as air quality, threatened and endangered species, or wildlife habitat considerations) limit wildland fire.

Category D: ***Areas where wildland fire is desired, and there are few or no constraints for its use.*** Areas where unplanned and planned wildfire may be used to achieve desired objectives such as to improve vegetation, wildlife habitat or watershed conditions.

Under the No Action Alternative, the LUPs would not be amended and existing fire management direction would be continued as described in Table 2.3. Existing fire management direction is for BLM to aggressively suppress fires to protect other resources in areas without approved Fire Management Plans or in areas with Fire Management Plans that are not consistent with the 2001 Federal Fire Policy. Table 2.2 lists current Fire Management categories for each Field Office. Figure 2.2 depicts the categories state-wide. No FO has any lands designated as Category D, ìAreas where wildland fire is desired, and there are few or no constraints for its use.î Under the No Action Alternative, fire would

not be consistently managed by BLM across Arizona. Areas where unplanned and planned wildfire may be used to achieve desired objectives such as to improve vegetation, wildlife habitat or watershed conditions.

2.4 Management Common to all Alternatives

There are several treatment methods and Standard Operating Procedures that would be used in a vegetation treatment program. BLM policies and guidance for public land treatments would be followed in implementing all treatment methods. Many guidelines are provided in manual Section 1740, BLM Arizona's Standards for Rangeland Health, Programmatic documents such as BLMís *Final Environmental Impact Statement, Vegetation Treatment on BLM Lands in Thirteen Western States (May 1991),* and other general and specific program policy, procedures, and standards pertinent to implementation of renewable resource improvements.

In Arizona, BLM manages designated Wilderness Areas, Wilderness Study Areas, and areas managed for wilderness characteristics that are identified in an approved land use plan. Guidelines and operating procedures for fire management activities in Wilderness Areas are provided in BLM Manual 8560, *Management of Designated Wilderness Areas*, and in Wilderness Management Plans, where completed for specific Wilderness Areas (Table 3.9).

Fire management guidance for Wilderness Study Areas is provided in BLM Manual 8550, *Interim Management Policy and Guidelines for Lands Under Wilderness Review*. Approved land use plans specify fire management procedures for areas identified in the land use plan to be managed for wilderness characteristics.

The following manual, chemical, mechanical, biological and fire treatment methods would be used for all alternatives.

Manual

Hand-operated power tools and hand tools are used in manual vegetation treatment to cut, clear, or prune herbaceous and woody species. In manual treatments, workers would cut plants above ground level; pull, grub, or dig out plant root systems to prevent subsequent sprouting and regrowth; scalp at ground level or remove competing plants around desired vegetation; or place mulch around desired vegetation to limit the growth of competing vegetation. Hand tools such as the handsaw, axe, shovel, rake, machete, grubbing hoe, mattock (combination of axe and grubbing hoe), brush hook, and hand clippers are used in manual treatments. Axes, shovels, grubbing hoes, and mattocks can dig up and cut below the surface to remove the main root of plants such as prickly pear and mesquite that have roots that can quickly resprout in response to surface cutting or clearing. Workers also may use power tools such as chain saws and power brush saws.

Mechanical

Mechanical methods of vegetation treatment employ several different types of equipment to suppress, inhibit, or control herbaceous and woody vegetation (Vallentine 1980). The goal of mechanical treatments is to kill or reduce the cover of undesirable vegetation and thus encourage the growth of desirable plants. BLM uses wheel tractors, crawler-type tractors, mowers, or specially designed vehicles with attached implements for mechanical vegetation treatments. The use of mechanical equipment to reduce fuel hazards will be conducted in accordance with BLM established procedures. Re-seeding after a mechanical treatment has been applied is important to help insure that desirable plants will become established on the site and not weedy species. The mechanical treatment and reseeding should occur at a time to best control the undesirable vegetation and encourage the establishment of desirable vegetation. The best mechanical method for treating undesired plants in a particular location depends on the following factors:

(1) Characteristics of the undesired species present such as plant density stem size, woodiness, brittleness, and re-sprouting ability;

(2) Need for seedbed preparation, re-vegetation, and improve water infiltration rates;

(3) Topography and terrain;

(4) Soil characteristics such as type, depth, amount and size of rocks, erosion potential, and susceptibility to compaction;

(5) Climatic and seasonal conditions;

(6) Potential cost of improvement as compared to expected results.

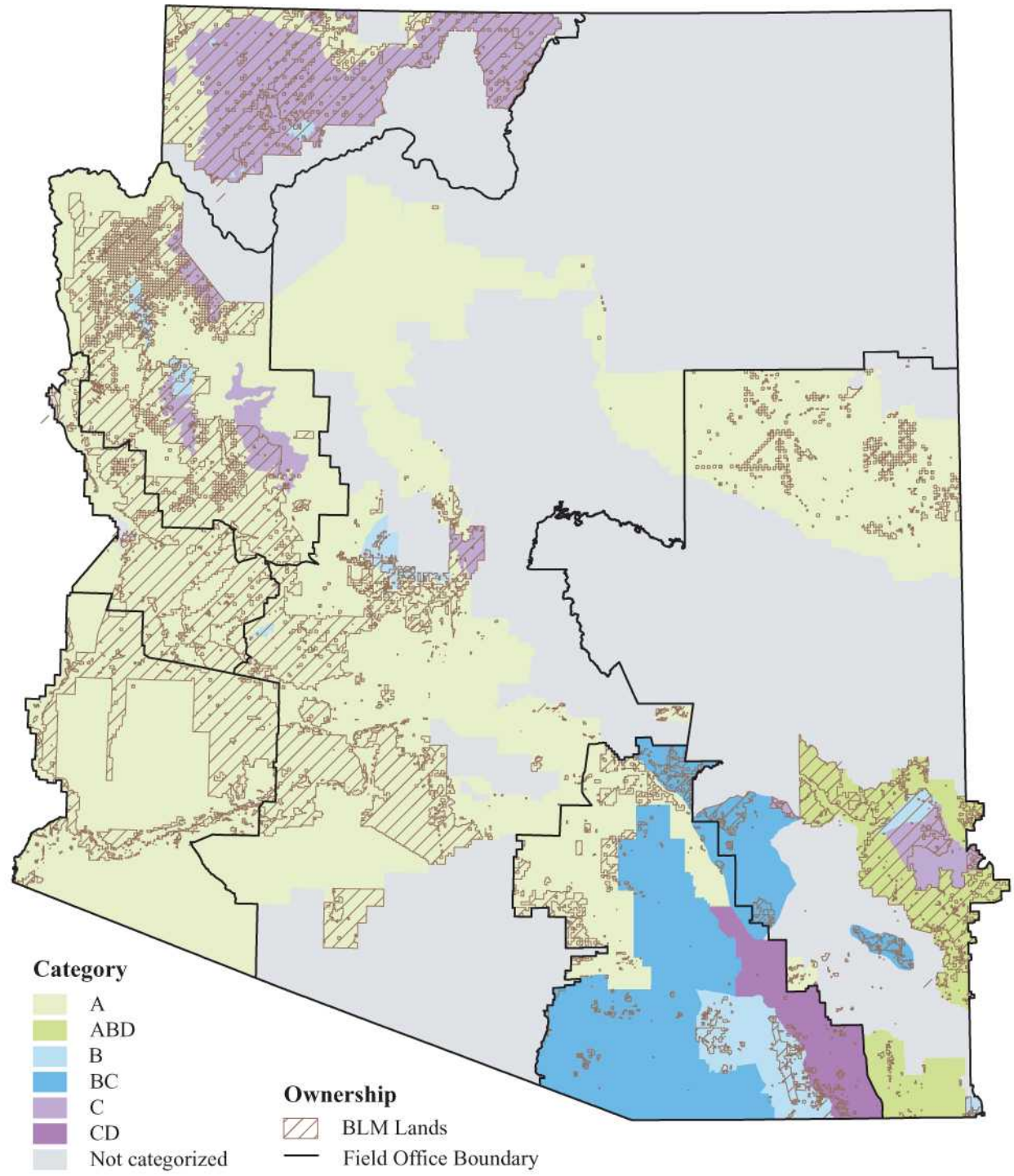
Bulldozing consists of a wheeled or crawler tractor with a heavy hydraulic controlled blade. Vegetation is pushed over and uprooted and then left in windrows or piles. Bulldozing is best adapted to removing scattered stands of large brush or trees. There are several different kinds of blades available depending of the type of vegetation and goals of the

Table 2.2 ñ Current Fire Management Zone Categories

Field Office	Category	Number of Fire Management Polygons	Approximate Acres	Percent
Arizona Strip	A	4	626,850	23%
	B	2	34,880	1%
	C	6	2,099,550	76%
	D	0	0	0%
Kingman	A	1	2,056,660	84%
	B	1	98,540	4%
	C	2	301,840	12%
	D	0	0	0%
Lake Havasu	A	5	1,325,150	99%
	B	0	0	0%
	C	0	0	0%
	D	0	0	0%
	Unclassified	1	13,060	1%
Phoenix	A	2	2,306,840	94%
	B	1	56,950	2%
	C	1	84,200	3%
	D	0	0	0%
	Unclassified	1	160	<.01%
Safford	A	2	223,470	14%
	B	2	97,310	6%
	C	2	163,120	10%
	B, C[1]	2	152,500	10%
	A, B, D[1]	1	916,330	59%
	D	0	0	0%
	Unclassified	1	6,670	0.4%
Tucson	A	1	320,550	52%
	B	1	130,790	21%
	B, C[1]	2	131,990	22%
	C, D[1]	1	27,510	5%
	C	0	0	0%
	D	0	0	0%
Yuma	A	7	1,342,770	100%
	B	0	0	0%
	C	0	0	0%
	D	0	0	0%
Total	Not Applicable	49	12,517,690	Not Applicable

[1] Multiple categories denote a fire management polygon that contains land with a different category within it.

Figure 2.2 Current Fire Management Zone Categories



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

N

0 25 50 75 100 Miles

1:3,500,000

Projection UTM, Zone12, North American Datum 1927

Table 2.3 ñExisting LUP Decisions

KINGMAN RMP		
Resource Area	**Decision Number**	**Decision**
Fire Management	FM01/C2	Implement and propose revision of the Phoenix District Fire Management Activity Plan to meet specific Kingman Resource Area needs
	FM02/C2	Use prescribed fire to achieve management objectives where suitable
	FM03/C3	Adhere to conditions that restrict or constrain fire suppression activities on public lands.
	FM04/C3	Prepare site specific emergency fire rehabilitation plans, as needed, using an interdisciplinary team.
Vegetative Products Management	VP01/B2	Develop Fuelwood Management Plan
Watershed Management	WS06/C2	Identify areas for potential vegetation treatment
YUMA RMP		
Fire Management	F-1	Fires on or threatening public lands will be suppressed in accordance with BLM fire policy, initial attack agreements with other government agencies, and approved modified fire suppression plans.
	F-2	Prescribed burning will continue to be used in support of resource management objectives where warranted.
Vegetation Management	V-2	Whenever practical, impacts to vegetation from construction, recreation, and other activities will be mitigated through avoidance, use of the minimum reasonable and practical tools and equipment, minimizing disturbance to the extent practical, and by soil stabilization and vegetative rehabilitation or revegetation where feasible. Where plants and parts of plants will be destroyed as an unavoidable impact, reasonable efforts will be made to salvage useable plants and parts of plants for commercial or public use.
Resource Area	**Decision Number**	**Decision**
SAFFORD RMP		
Vegetation Management	VM02	Upland vegetation on public lands within the Safford District will be managed for watershed protection, livestock use, reduction of non-point source pollution, Threatened and Endangered species protection, priority wildlife habitat, firewood and other incidental human uses. Best management practices and vegetation manipulation will be used to achieve desired plant community management objectives. Treatments may include various mechanical, chemical and prescribed fire methods.
	VM07	Land treatments (vegetation manipulation) will be used to decrease invading woody plants and increase grasses and forbs for wildlife, watershed condition, and livestock. Treatment areas will be identified in activity plans. Treatments may include various artificial (mechanical, chemical, or prescribed fire) methods.
	VM08	The following actions will be implemented to accomplish the land treatment objective. a) Implement those best management practices and methods that will increase vegetation cover and decrease soil erosion and non-point source pollution to streams from sedimentation. b) Study the methods and effects of reducing rodent and rabbit populations on selected upland areas to improve vegetation cover.
	VM10	Evaluate other areas suitable for firewood harvest. Permit the harvest of up to 500 cords of firewood per year from public lands District-wide. Do not allow cutting in major desert washes, wilderness areas, or some special management areas.
	VM114	Land treatments such as imprinting and seeding, chaining or fire could be implemented on approximately 75,000 acres to enhance rangeland values, watershed conditions, and wildlife habitat.
Wildlife/Fisheries	WF17	Develop prescribed burning plans in fire-dependent vegetation communities to improve habitat conditions for priority wildlife species.
	WF18	Suppress wildfire in sensitive vegetation communities (like paloverde/saguaro) to reduce the detrimental effects on priority wildlife dependent on those communities.
Watershed	WS36	Conduct prescribed fire with prior approval of the Arizona Department of Environmental Quality, Office of Air Quality.

PHOENIX RMP		
Fire Management	A	Maintain full fire suppression in all areas.
	B	Special Management Area plans will identify areas where prescribed burning would benefit wildlife, watershed and rangeland resources.
Eastern Arizona Grazing EIS		Land treatments such as imprinting and seeding, chaining or fire could be implemented to enhance rangeland values, watershed conditions, and wildlife habitat.
ARIZONA STRIP RMP		
Fire Management		Full suppression activities will be initiated in the four desert ACECs. BLM will suppress wildfires with minimum surface disturbance, in accordance with the guidelines in Duck et al (1994) and appropriate biological opinions.
		BLM will pre-position suppression forces in critical areas during periods of high fire danger.
		BLM will require a resource advisor on all wildfires in tortoise ACECs. Firefighters and support personnel will be provided with a briefing on tortoises and their habitat as soon as practical, which will focus on minimizing take of listed species, particularly take due to vehicle use. On-road travel will be restricted to the minimum necessary to suppress wildfires. Whenever practicable, individuals trained to recognize tortoises and their shelter sites will precede any vehicle traveling off-road. Use of tracked vehicles will be restricted to extreme cases. Camps, staging areas, and helispots will be surveyed for tortoises prior to use whenever feasible; camps will be established within previously disturbed areas whenever practicable; personnel will avoid active tortoise shelter sites.
Resource Area	**Decision Number**	**Decision**
		BLM will obliterate tracks where they leave roads to reduce future use.
		Use of foam or retardant is authorized.
		BLM will take appropriate action to suppress all wildfires based on pre-planned analysis consistent with land management objectives, including threats to life and property. Backfiring operations will be permitted where necessary. Burning-out of unburned fingers and islands will not be permitted.
Forest and Woodland	FW08	Protect forests from catastrophic fires while managing prescribed burns or naturally occurring fires within established prescriptions to reduce fuel buildup, maintain healthy species composition and benefit wildlife habitat, watershed cover and livestock forage.
Grazing Management	GZ06	Continue implementing the grazing management program as described in the Grazing Environmental Impact Statements that specify grazing systems, management facilities and land treatments, provided they are consistent with other RMP decisions. Practices used to accomplish this include mechanical treatment, herbicide applications, biological treatments, prescribed fire, reseeding and construction of water control structures. Use of pesticides are prescribed, as appropriate to control insects, such as grasshoppers, crickets, etc.
LOWER GILA SOUTH RMP		
None		
LOWER GILA NORTH MFP		
	D-11	By 1987, develop fire management plans that coincide with established resource objectives to include protection from wildfire, introduction of prescribed fire and modification of normal suppression actions.
	D-16	Develop a fire management program in coordination with the rangeland management program that would include identification of modified suppression areas, intensive control areas, and areas where controlled burning would be beneficial.
	D-17	Develop a fire management program to protect riparian habitat from fire within all of the significant botanical areas.

project. The disadvantage of bulldozing is soil disturbance and damage to non-target plant species.

Disk plowing in it various forms can be used for removing shallow-rooted herbaceous and woody plants. Disk plows should only be used where all of the vegetation is intended to be killed. There are several different kinds of root plows that are specific for certain types of vegetation. In addition to killing vegetation, disk plowing is effective in loosening the soil surface to prepare it for seeding and to improve the rate of water infiltration. The disadvantage of disk plowing is that it may be expensive and usually kills all species. Also, plowing is usually not practicable on steep slopes (greater than a 35% to 45% slope) or rocky soil. Plant species that sprout from roots may survive.

Chaining and cabling is accomplished by dragging heavy anchor chains or steel cables hooked behind to tractors in a U-shape, half circle of J-shaped manner. Chaining and cabling is affective on rocky soils and steep slopes. Chaining and cabling are best used to control non-sprouting woody vegetation such as small trees and shrubs. However, desirable shrubs may be damaged in the process. Herbaceous vegetation is normally not injured by this control method. This control method is cost effective as large areas can be readily treated. The chains or cables also scarify the soil surface in anticipation of seeding desirable species. The disadvantage is that weedy herbaceous vegetation can survive this treatment.

There are various tractor attachments that are used for mowing, beating, crushing, chopping, or shredding vegetation depending on the nature of the plant stand and goals of the project. The advantage in using this type of equipment is that selective plants may be targeted to achieve specific goals. For example, mowing is effective in reducing plant height to a desirable condition and it usually does not kill vegetation. Mowing is more effective on herbaceous than woody vegetation. On the other hand, a rolling cutter can kill woody non-sprouting vegetation by breaking stems at ground level but leave herbaceous vegetation. Mowing, beating, crushing, chopping, or shredding usually does not disturb soil. Rocky soil and steep slopes may limit this use of this equipment.
Debris management after a mechanical control treatment application is critical in fuels reduction projects. Vegetation material that is left on-site will dry and may become more hazardous than before the treatment. Herbaceous material is usually not a problem because it will decompose relatively fast depending on soil moisture, and ambient humidity and temperature. Woody vegetation should be piled and burned under acceptable fire management practices.

Biological

Biological methods of vegetation treatment could employ grazing by cattle, sheep or goats, but would not include the use of invertebrates or microorganisms. BLM would only use cattle, sheep or goats when grazing would have no effect on listed, proposed, or candidate species. The use of grazing as a biological control agent will be conducted in accordance with BLM procedures in the Use of Biological Control Agents of Pests on Public Lands (BLM 1990). Grazing by cattle, sheep, or goats would be used as biological control methods under all alternatives, although at the present these methods can control few plant species.

Gradually, biological methods using cattle, sheep, or goats would avoid erosion hazard areas, areas of compactable soils, riparian areas susceptible to bank damage, and steep erodible slopes.

Biological control using cattle, sheep or goats would be applied to treatment areas for short periods. When considering the use of grazing animals as an effective biological control measure, several factors will be taken into consideration including:

(1) Target plant species present,

(2) Size of the infestation of target plant species,

(3) Other plant species present,

(4) Stage of growth of both target and other plant species

(5) Palatability of all plant species present,

(6) Selectivity of all plant species present by the grazing animal species that is being considered for use as a biological control agent.

(7) The availability of that grazing animal within the treatment site area, and

(8) Type of management program that is logical and realistic for the specific treatment site.

These factors will be some of the options taken when developing the individual treatment for a specific site.

Although discussed as biological agents, cattle, sheep and goats are not truly biological agents but are domestic animals used to control only the top growth of certain noxious weeds. The following are some advantages of using domestic animals, mainly sheep

or goats, for noxious weed control: (1) they use weeds as a food source, (2) following a brief adjustment period, they sometimes consume as much as 50 percent of their daily diet of this species, (3) average daily gains of offspring grazing certain weed-infested pastures can sometimes be significantly higher than average daily gains of offspring grazing grass pastures, and (4) sheep or goats can be used in combination with herbicides.

Some of the disadvantages of using domestic animals are (1) they also use nontarget plants as food sources, (2) the use of domestic animals, like sheep or goats, requires a herder or temporary fencing, (3) the animals may be killed by predators such as coyotes, (4) heavy grazing of some weed species, such as leafy spurge, tends to loosen the stool of the grazing animals, (5) most weed species are less palatable than desirable vegetation and would cause overgrazing, (6) they may accelerate movement of nonnative plants through seed ingestion and excretion, and (7) domestic livestock may transmit parasites and/or pathogens to resident native wildlife species.

Prescribed Burning

Prescribed burning is the planned application of fire to wildland fuels in their natural or modified state, under specific conditions of fuels, weather, and other variables, to allow the fire to remain in a predetermined area and to achieve site-specific fire and resource management objectives.

Management objectives of prescribed burning include the control of certain species; enhancement of growth, reproduction, or vigor of certain species, management of fuel loads, and maintenance of vegetation community types that best meet multiple-use management objectives. Treatments would be implemented in accordance with BLM procedures in Fire Planning (BLM 1987c), Prescribed Fire Management (BLM 1988b), and Fire Training and Qualifications (BLM 1987d).

Prior to conducting a prescribed burn, a written plan must be prepared that takes into consideration existing conditions (amount of fuel, fuel moisture, temperatures, terrain, weather forecasts, etc.) And identifies people responsible for overseeing the fire. Natural fire that is allowed to burn also needs to be carefully monitored to ensure that it will not threaten communities, other values to be protected, and ecosystems. This may require special expertise such as the fire use management teams that have been developed to support the overall fire management program. Planning and implementation for a specific prescribed fire project entails the following four phases:

- Phase 1: Information/Assessment Phase includes identifying the area to be treated, inventory and assessment of site specific conditions (live and dead vegetation densities, dead down woody fuels loadings, soil types, etc.), analysis of historic and present fire management, identification of resource objectives from Land Use Plans and NEPA analysis and compliance.
- Phase 2; The Prescribed Fire Plan Development Phase includes developing the site specific prescribed fire plan to BLM Standards, it also includes reviews of the plan and obtaining plan approval from local BLM field office administrators.
- Phase 3; Implementation includes ignition of the fire according to the planís prescribed parameters. Implementation includes prescribed fire boundary area preparation to ensure the fire remains in prescribed boundaries. Site preparation may be in the form of fire line construction and improving roads, wildlife and stock trails by limbing trees and clearing debris.
- Phase 4; Monitoring and Evaluation includes assessment and long term monitoring of the fire treatment to ensure the prescribed fire has met the objectives of the approved prescribed fire plan. BLM fire monitoring policy is described in the BLM prescribed Fire Management Handbook, October 2003, Chapter 2 and Appendix 7. This policy applies to prescribed fire and wildland fire use.

Appropriate Management Response

The appropriate management response concept represents a range of available management responses to wildland fires. Responses range from full fire suppression to managing fires for resource benefits (fire use). Management responses applied to a fire will be identified in the FMPís and will be based on objectives derived from the land use allocations; relative risk to resources, the public and fire fighters; potential complexity; and the ability to defend management boundaries. Any wildland fire can be aggressively suppressed and any fire that occurs in an area designated for fire use can be managed for resource benefits if it meets the prescribed criteria from an approved fire management plan.

Chemical

BLM will use EPA-approved herbicides in accordance with EPA's Endangered Species Pesticide Program covered in the BLMís *Vegetation Treatment on BLM Lands in Thirteen Western States FEIS* (May 1991) and further limited to those approved for use by the Arizona Record of Decision (Page 3, ROD, July 1991). These herbicides are: Atrazine; Bromacil; Bromacil + Diuron; Chlorsulfuron; Clopyralid; 2,4-D, Dicamba; Dicamba + 2,4-D; Diuron; Glyphosate; Glyphosate + 2,4-D; Hexazinone; Imazapyr; Mefluidide; Metsulfuron Methyl; Picloram; Picloram + 2,4-D; Simazine; Sulfometuron Methyl; Tebuthiuron; and Triclopyr. Treatments will follow Standard Operating Procedures) on pages 1-19 through 1-32 and project design features on pages 1-33 through 1-37 of the FEIS. Additionally, project design features, including buffer strips described on page 10 of the ROD, as follows: Buffer strips would be used adjacent to dwellings, domestic water sources, agriculture land, streams, lakes, and ponds. A minimum buffer strip 100 feet wide will be provided for aerial application, 25 feet for vehicle application and 10 feet for hand application. Any deviations must be in accordance with the label for the herbicide. Herbicides will be wiped on individual plants within 10 feet of water where application is critical. Additionally, in order to protect listed, proposed, and candidate species, these buffer strips would be used. BLM will work closely with the FWS to ensure that herbicide applications will not affect listed or proposed threatened or endangered species on a project-level basis. If adverse effects are anticipated during informal consultation, then BLM will formally consult on these projects. If FWS develops herbicide guidance for particular species that improves protection beyond the current BLM design features, BLM will consider and incorporate that guidance as it consults with the FWS on a project-level basis. The chemicals can be applied by many different methods, and the selected technique depends on a number of variables. Some of these are (1) the treatment objective (removal or reduction); (2) the accessibility, topography, and size of the treatment area; (3) the characteristics of the target species and the desired vegetation; (4) the location of sensitive areas in the immediate vicinity (potential environmental impacts); (5) the anticipated costs and equipment limitations; and (6) the meteorological and vegetative conditions of the treatment area at the time of treatment.

Herbicide applications are scheduled and designed to minimize potential impacts on non-target plants and animals, while remaining consistent with the objective of the vegetation treatment program. The rates of application depend on the target species, presence and condition of non-target vegetation, soil type, depth to the water table, presence of other water sources, and the requirements of the label.

In many circumstances the herbicide chosen, time of treatment, and rate of application of the herbicide is different than the most ideal herbicide application for maximum control of the target plant species in order to minimize damage to the non-target plant species, and to ensure minimum risk to human health and safety.

The chemicals would be applied aerially with helicopters or fixed-wing aircraft or on the ground using vehicles or manual application devices. Helicopters are most expensive to use than fixed-wing aircraft, but they are more maneuverable and effective in areas with irregular terrain and in treating specific target vegetation in areas with many vegetation types. Manual applications are used only for treating small areas or those inaccessible by vehicle.

The typical and maximum application rates of each chemical would vary, depending on the program area being treated.

Fire Suppression Actions

The following constraints to fire suppression actions are common to all alternatives:

- Suppression tactics will be utilized that limit damage or disturbance to the habitat and landscape. No heavy equipment will be used (such as dozers) unless approved the Field Office Manager.
- Use of fire retardants or chemicals adjacent to waterways will be accomplished in accordance to the ìEnvironmental Guidelines For Delivery of Retardant or Foam Near Waterways (Interagency Standards for Fire and Aviation Operations pages 8-13)
- All known cultural resources will be protected from disturbance.
- In Wilderness Areas, Wilderness Study Areas, and areas being managed for wilderness characteristics according to LUPs, when suppression actions are required, minimum impact suppression tactics (Interagency Standards for Fire and Aviation Operations, 2003) would be utilized and coordinated with Wilderness Area management objectives and guidelines.

- The general and species-specific Conservation Measures listed in Appendix D will be implemented to the extent possible to minimize adverse effects to Federally listed, proposed, or candidate species occurring within the action area.
- For fire suppression activities, a protocol for consultation has been developed as a part of the Biological Opinion. This programmatic consultation contains conservation measures and prescriptions for use in fire suppression activities. Emergency consultation should only be needed in the future if suppression actions fall outside of these prescriptions/measures. The BO will outline coordination needs for emergency response actions that may affect a listed/proposed species and/or critical habitat. The following protocol will apply:
    - BLM will contact the appropriate USFWS biologist as soon as practical once a wildfire starts and a determination is made that a Federally protected species and/or its habitat could be affected by the fire and/or fire suppression activities. USFWS will work with BLM during the emergency response to apply the appropriate Conservation Measures. If Conservation Measures cannot be applied during the suppression activities, BLM will need to consult after the fact on any suppression actions that may have affected the Federally protected species or its habitat. If Conservation Measures are adhered to, then BLM will report on the actions taken and effects to the species and its habitat following the fire, but no further consultation on that incident will be required.

2.5 Implementation and Monitoring

2.5.1 Implementation

LUP decisions generally are implemented or become effective upon approval of the plan or amendment. These include the effective date of land health standards and desired future condition decisions, land use allocation decisions, and all special designations such as an ACEC. Management actions that require additional site-specific project planning as funding becomes available will require further environmental analysis. Decisions to implement site-specific projects are subject to administrative review at the time such decisions are made. BLM will continue to involve and collaborate with the public during implementation of the LUP amendment.

2.5.2 Adaptive Management

Adaptive management is a formal, systematic, and rigorous approach to learning from the outcomes of management actions, accommodating change and improving management. It involves synthesizing existing knowledge, exploring alternative actions and making explicit forecasts about their outcomes. Management actions and monitoring programs are carefully designed to generate reliable feedback and clarify the reasons underlying outcomes. Actions and objectives are then adjusted based on this feedback and improved understanding. In addition, decisions, actions and outcomes are carefully documented and communicated to others, so that knowledge gained through experience is passed on, rather than being lost when individuals move or leave the organization.

This LUP amendment implements an adaptive management strategy. This adaptive management process is a flexible process that generally involves four phases: planning, implementation, monitoring, and evaluation. As BLM obtains new information, it would evaluate monitoring data and other resource information to periodically refine and update desired conditions and management strategies. This allows for the continual refinement and improvement of management prescriptions and practices.

2.5.3 Administrative Actions

Although BLMís intent and commitment to accomplish administrative actions is generally addressed in RMP/EIS or LUP amendment/EA level documents, such activities are neither land use plan level decisions nor implementation level management actions decisions. Administrative actions are day-to-day activities conducted by BLM, often required by FLPMA but do not require a NEPA analysis or decision by a responsible official to be accomplished. Examples of administrative actions include: mapping, surveying, inventorying, monitoring, collecting information needed such as research and studies, and completing project specific or implementation level plans. Administrative actions are denoted throughout the decision document with a number beginning with an ìAA.î

2.5.4 Requirements for Further Environmental Analysis

The LUP amendment/EA is a programmatic environmental document describing the impacts of implementing the LUP decision and associated management actions described in the planning areas on a statewide basis. LUP decisions that are implemented upon approval of the amendment do not require any further environmental analysis or documentation.

Fire Management Plans (FMPs) are strategic documents that compile LUP decisions related to fire management. They describe the entire fire management program for a fire planning area (FPA). Fire Management Plans must provide for firefighter and public safety; include fire management strategies, tactics, and alternatives (appropriate management response to wildfire and identifying areas for fire use), address values to be protected and public health issues; and be consistent with resource management objectives, activities of the area, and environmental laws and regulations. FMPs incorporate mitigation, wildfire burn area rehabilitation, and fuels reduction and restoration activities that contribute to ecosystem sustainability identifying in general areas, sizes and describing in general terms the fuels management treatments that may be implemented to meet LUP resource management objectives and constraints. FMPs describe fire management forces, equipment, and support and administrative personnel and associated budgets needed to manage the fire program. FMPs do not make new decisions or Land Use Allocations and do not qualify as documents constituting discretionary Federal actions. Whenever implementation level plans (Fuels Management Plans, Fire Use Plans, etc.) are prepared additional environmental analysis and documentation would be required. Environmental analysis of site-specific projects at the watershed or FPA wide programmatic level may analyze multiple fire management projects. Section 7 consultation for multiple projects planned over a three to five year period would be batched together or done on a case by case basis.

Site-specific environmental analyses and documentation (including the use of categorical exclusions and determinations of NEPA adequacy where appropriate) may be prepared for one or more individual projects, in accordance with management objectives and decisions established in the approved land use plan. In addition, BLM will ensure that the environmental review process includes evaluation of all critical elements. Cultural resources and threatened and endangered species will be identified and considered in accordance with Section 106 of the National Historic Preservation Act and Section 7 of the Endangered Species Act, respectively.

Interdisciplinary impact analysis will be based on this and other applicable environmental documents. If the analysis prepared for site-specific projects finds potential for significant impacts not already described in an existing EA or EIS, another EA, EIS, or a supplement to an existing EIS may be warranted.

Upon providing public notice of a decision, supporting environmental documentation will be sent to all affected interests and made available to other publics on request. Decisions to implement site-specific projects are subject to administrative review at the time such decisions are made.

2.6 Interrelationships

The BLM coordinates its fire management activities with the actions of related Federal and State agencies responsible for fire management. The Federal Wildland Fire Policy is a collaborative effort that includes the BLM, U.S. Forest Service, National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), Bureau of Indian Affairs, the National Biological Service, and State wildfire management organizations. The collaborative effort has formulated and standardized the guiding principals and priorities of wildland fire management. Collaboration of the Federal Wildland Fire Policy on a nation wide scale has provided common priorities and objective for Federal land management agencies including protection of human life, property, and natural/cultural resources as secondary priorities. This policy also provides recognition of wildland fire as a critical natural process that should be safely reintroduced into ecosystems that are wildfire dependent across agency boundaries. The National Fire Plan is a collaborative interagency effort to apply the Federal Wildland Policy to all Federal Land Management Agencies and partners in State forestry or lands departments. Operational collaboration between the BLM, U.S. Forest Service, NPS, and USFWS is included in the Interagency Standards for Fire and Fire Aviation Operations 2003. This Federally approved document addresses fire management, wildfire suppression, fuels management and prescribed fire safety, interagency coordination and cooperation, qualifications and training, objectives, performance standards, and fire management program administration.

As part of the LUP amendment process, BLM conducted Endangered Species Act (ESA) Section 7 informal and formal consultation with the U.S. Fish

and Wildlife Service (USFWS) on potential impacts to federally listed, proposed, and candidate species, and designated or proposed critical habitat. In April 2003, BLM and USFWS finalized a Consultation Agreement to establish an effective and cooperative ESA Section 7 consultation process. The Agreement defines the process, products, actions, schedule, and expectations of the BLM and USFWS regarding project consultation. The Agreement also considers effects to, and management for, candidate species. One Biological Evaluation (BE) was prepared to determine the effect of the preferred alternative on all relevant listed, proposed, and candidate species, and associated critical habitat. All anticipated environmental effects, conservation actions, mitigation, and monitoring were disclosed in the BE, including analysis of all direct and indirect effects of the LUP amendment and any interrelated and interdependent actions. The BE was submitted to the USFWS on December 4, 2003 and a BO is expected from the USFWS in about May 2004.

This EA also included consultation with the Arizona State Historic Preservation Office (SHPO) on compliance with Section 106 of the National Historic Preservation Act (NHPA). BLM actions will also comply with other Federal environmental legislation, existing programmatic fire management, land use plans, and vegetation treatment documents, such as the Clear Air Act, the Clean Water Act, and the Safe Drinking Water Act, and with applicable State and local government regulations, such as the Sikes Act (16 U.S.C. 670 et seq.), as amended (see Section 1.4 and Appendix B, ìApplicable Laws, Regulations, Policies and Planning Criteriaî).

The Sikes Act authorizes DOI, in cooperation with the State agencies responsible for the administration of fish and game laws, to plan, develop, maintain, and coordinate programs for the conservation and rehabilitation of wildlife, fish and game on public lands within its jurisdiction. The plans must be consistent with any overall land-use and management plans for the lands involved and could include specific habitat improvement projects and related activities and adequate protection for species of fish, wildlife, and plants considered endangered or threatened. BLM must also coordinate with appropriate State agencies in management of State-listed plant and animal species when a State has formally made such designations.

Section 3.0 Affected Environment

The CEQís regulations implementing NEPA direct agencies to reduce excessive paperwork by incorporating by reference (40 CFR 1500.4(j)). As such, the LUPs to be amended, along with supplements or documents tiered to those original LUPs, frequently present more detailed information on the affected environment of the BLM-administered public lands that the plans represent. In an effort to reduce excessive or unnecessary paperwork, the affected environment sections of those LUPs are incorporated by reference into this document. Those LUPs, supplemental or tiered documents are:

Bureau of Land Management. 1982. Final Environmental Impact Statement, Proposed Grazing Management Program for the Lower Gila North EIS Area. U.S. Dept. of the Interior, Bureau of Land Management Yuma, Mohave, Yavapai, and Maricopa Counties, Phoenix District, Arizona.

Bureau of Land Management. 1983. Lower Gila North Management Framework Plan. U.S. Dept. of the Interior, Bureau of Land Management, Lower Gila North Resource Area, Arizona.

Bureau of Land Management. 1985. Lower Gila South Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Phoenix District, Arizona.

Bureau of Land Management. 1985. Final Yuma District Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Yuma District, Arizona.

Bureau of Land Management. 1988. Proposed Phoenix Resource Management Plan, Draft and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Phoenix District, Arizona.

Bureau of Land Management. 1989. Final Lower Gila South Resource Management Plan (Goldwater Amendment). U.S. Dept. of the Interior, Bureau of Land Management, Lower Gila South Resource Area, Arizona.

Bureau of Land Management. 1990. Proposed Arizona Strip District Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Arizona Strip District, Arizona (as amended, 1998).

Bureau of Land Management. 1991. Safford District Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Safford District Office, Arizona.

Bureau of Land Management. 1993. Kingman Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Kingman Resource Area, Arizona.

Bureau of Land Management. 1994. Planning Update, Amendment and Environmental Assessment to the Lower Gila North and South Management Plans. U.S. Dept. of the Interior, Bureau of Land Management, Lower Gila Resource Area, Arizona.

Bureau of Land Management. 1994. Rangeland Reform '94, Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Department of Agriculture, Forest Service.

Bureau of Land Management. 1998. Resource Management Plan Amendment, Desert Tortoises and Virgin River Fishes. U.S. Dept. of the Interior, Bureau of Land Management.

3.1 Physical Environment

3.1.1 Air Resources

The Clean Air Act (CAA) was first enacted in 1970 (amended in 1990) to limit the emission of pollutants into the atmosphere to protect human health and the environment from the effect of airborne pollution. The CAA authorized the U.S. Environmental Protection Agency (EPA) to achieve this objective by setting air quality standards and regulate emissions of pollutants into the air. EPA has established emission standards for mobile (e.g., automobile) and stationary (e.g., factories) sources for pollutant emissions. These controls are implemented in Arizona through EPA and the Arizona Department of Environmental Quality (ADEQ).

EPA has established National Ambient Air Quality Standards (NAAQS) for six pollutants: particulate matter with diameter of ten microns or less (PM_{10}), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2) Ozone (O_3), and volatile organic

compounds (VOC). The State of Arizona has adopted the EPA standards for the six pollutants. Regulation has afforded the public some protection from toxic levels of these air pollutants. The primary responsibility rests with ADEQ, which must submit a State Implementation Plan (SIP) to achieve and maintain the NAAQS. Pursuant to the SIP, new or modified air emission sources must undergo pre-construction review to determine whether the source will interfere with attainment or maintenance of NAAQS. In addition, some areas that do not attain NAAQS must have a SIP that includes regulatory strategies to control emissions from existing sources.

As **Figure 3.1** and **Table 3.1** illustrate, Arizona currently has ten PM_{10}, six SO_2, two CO, and one O_3 nonattainment areas. The BLM planning areas of the Arizona Strip RMP, the northern region of the Phoenix RMP, the Kingman RMP, Lover Gila South RMP, and the Lower Gila North MFP meet (in-attainment) the NAAQS. The BLM planning areas that do not meet the air quality standards include the Yuma RMP, Safford RMP, and the southern region of the Phoenix RMP. These nonattainment planning areas are described below and presented in **Table 3.2**.

- Land managed by the Yuma Field Office is nonattainment for PM_{10} in the City of Yuma in Yuma County.

- Land managed by the Havasu Field Office is nonattainment for PM_{10} in the Bullhead City area in Mohave County.

- Land managed by the Safford Field Office is nonattainment for PM_{10} and SO_2 in the Douglas area in Cochise County and SO_2 in the Morenci area in Greenlee County.

- Land managed by the Phoenix Field Office is nonattainment for PM_{10} in the Hayden area in Pinal and Gila Counties, the Phoenix area in Maricopa County, the Nogales area in Santa Cruz County, and the Rillito area in Pima County. Nonattainment for SO_2 occurs in the Hayden area in Pinal and Gila Counties, the Miami area in Gila County, and the San Manuel area in Pinal County. CO nonattainments in the region occur at the Phoenix area in Maricopa County and the Tucson area in Pima County. The Phoenix area in Maricopa County is also nonattainment for ozone.

Additional information on air resources in each BLM Field Office is provided in BLMís existing LUPs, referenced at the beginning of Section 3.0, and incorporated here by reference.

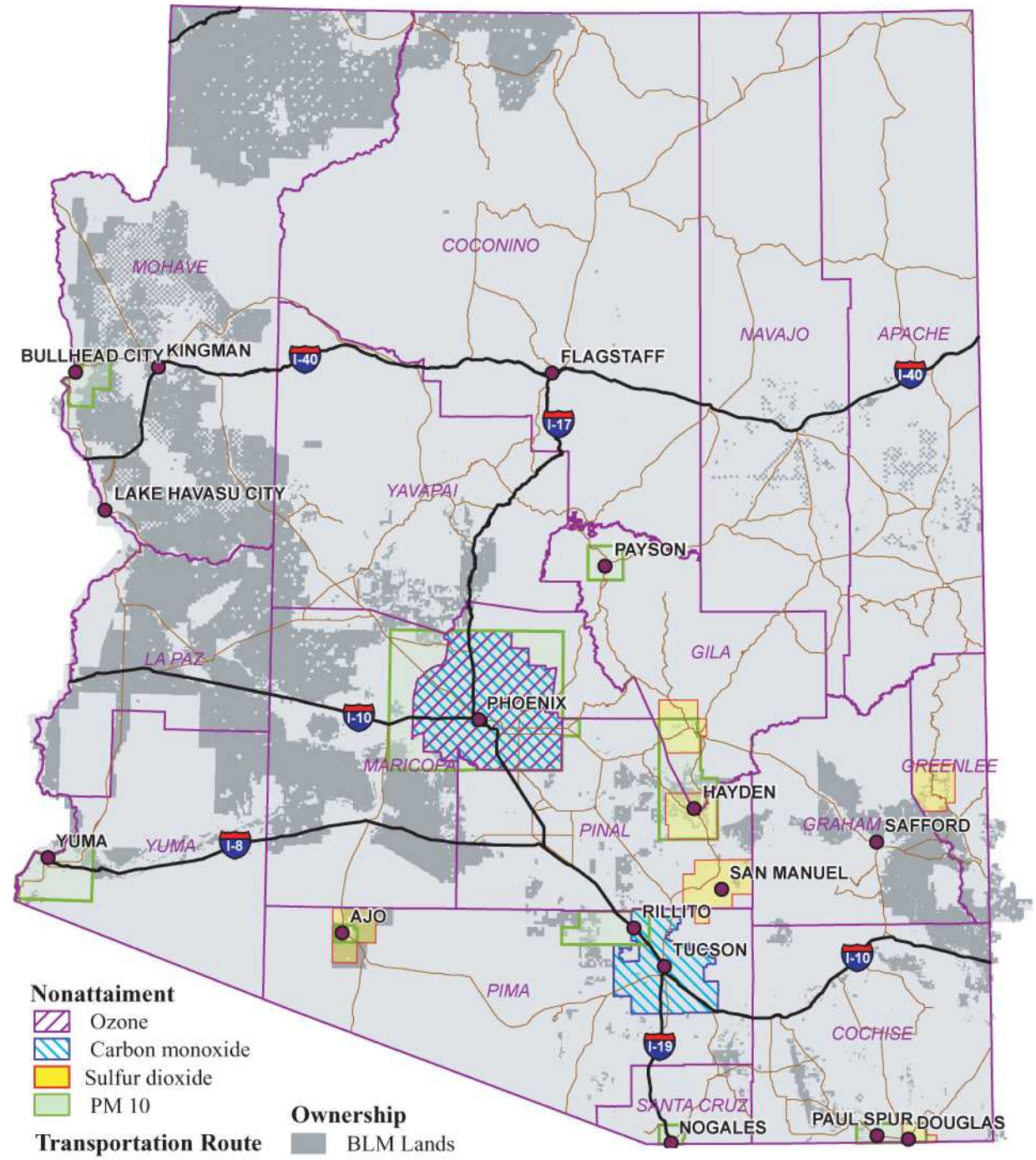
3.1.2 Soil Resources

The soils on BLM-administered land in Arizona are diverse and associated with a variety of climates, vegetative cover, topography, and geology. Fire-related impacts on soils are largely dependent on the duration and intensity of the fire and its effects on the vegetative cover, the properties of the soils, and the climate and topography (Clark, 2001). The impacts of wild or prescribed fire on soils may be minimal, or may accelerate improvement or degradation of the soil resources beyond what may have occurred without intervention, such as extinguishing a wildfire or conducting a prescribed burn.

There are 11 soil suborders found on BLM-administered land in Arizona (**Figure 3.2**), however approximately 83% of these soils are associated with only 3 suborders: Orthids, Argids and Orthents (**Table 3.3**). These soils developed primarily under hot, dry conditions and are characterized as having thermic or hyperthermic temperature regimes, and aridic or semi-aridic moisture regimes. Orthids and Argids are light-colored soils containing little organic matter and having at least one diagnostic subhorizon. Orthids can be calcerous throughout, but can also have accumulations of carbonates (calcic horizon), cemented carbonates (petrocalcic horizon) or cemented silica (duripan), with limited areas having accumulations of gypsum (gypsic horizon). Argids can have clay (argillic horizon) or sodium (natric horizon) accumulations in the subsurface. On BLM-administered lands, Sonoran and Mohave Desert Scrub in western and southern Arizona are the primary vegetation communities associated with Orthids and Argids soils (71.5% and 63.5%, respectively). Plains and Great Basin Grassland, Great Basin Desert Scrub and Great Basin Pinyon-Juniper Woodland compose most of the remaining vegetative cover for Orthids and Argids soils (26.5% and 15.4%, respectively), with additional areas of Chihuahuan Desert Scrub, Semidesert Grassland, and Interior Chaparral associated with the Argids soils (19.2%). Approximately 1% of the Orthids and Argids soils are in Riparian areas.

Orthents soils are characterized by a lack of horizon development due to a dry climate, and parent materials that are resistant to weathering. Orthents are commonly shallow soils over rock and found on steep slopes or very dry environments. Sonoran and Mohave Desert Scrub are the primary vegetation

Figure 3.1 Arizona Air Quality Nonattainment Areas



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

N

0 25 50 75 100 Miles

1:3,500,000

Projection UTM, Zone12, North American Datum 1927

Table 3.1 ñ Arizona NAAQS Nonattainment Areas

Nonattainment Pollutant	Affected Areas and Counties	Sources of Pollutant Emissions in Areas	Status
PM_{10}	Ajo Area of Pima County	Dry, unstable conditions of the trailing piles northeast of Ajo, paved and unpaved roads, and cleared areas.	ADEQ had developed a maintenance plan and submitted to EPA requesting redesignation to attainment
	Bullhead City Area of Mohave County	Cleared construction areas, unpaved roads, and parking lots.	EPA designated Bullhead City Area a moderate PM_{10} nonattainment in 1993. In 2002 EPA determined that the Bullhead City PM_{10} nonattainment did attain the 24-hour and annual PM_{10} NAAQS. ADEQ had submitted a request for redesignation to attainment.
	Douglas Area of Cochise County	Unpaved roads, parking lots, off road vehicles, and agricultural activities (most of the agricultural activities and associated emissions occur on the Mexico side of the international border.	
	Hayden Area of Gila and Pinal Counties	Crushing and conveying activities at the Ray Unit crushing plant and road dust.	
	Nogales Area of Santa Cruz County	Paved and unpaved road. It was estimated that 94 percent of the PM_{10} emissions in the international regions were generated in Nogales, Mexico.	
	Paul Spur Area of Cochise County	Emissions from lime plant, unpaved roads, and border dragging operations.	ADEQ had developed a maintenance plan and submitted to EPA requesting redesignation to attainment
	Payson Area of Gila County	Rock crushers, concrete batch plants, sawmill, wood smoke, and paved/unpaved roads.	ADEQ had developed a maintenance plan and submitted to EPA requesting redesignation to attainment
	Phoenix Area of Maricopa County	A Paved/unpaved road, construction sites disturbed areas on vacant lots, and windblown dusts from agricultural fields.	ADEQ had submitted to EPA a SIP revision of Agricultural PM_{10} General Permit.
	Rillito Area of Pima County	Unstabilized river banks and road shoulders unpaved local roads, and the Arizona Portland Cement Company.	
	Yuma Area of Yuma County	Paved/unpaved roads, agricultural tilling and burning, and disturbed areas.	ADEQ anticipates submitting to EPA the Yuma Moderate Area PM_{10} Maintenance Plan and request redesignation to attainment by late 2003
SO_2	Ajo Area of Pima County	The Ajo copper smelter operation. The operation was dismantled in 1995 (Phelps Dodge Ajo, Inc.)	ADEQ had developed a maintenance plan and submitted to EPA requesting redesignation to attainment
	Douglas Area of Cochise County	Douglas copper smelter operation. The operation was dismantled in 1987.	ADEQ had developed a maintenance plan and submitted to EPA requesting redesignation to attainment
	Hayden Area of Gila and Pinal Counties	Hayden and Ray copper smelter operations. Ray operation was closed in 1987.	ADEQ developed the Hayden Moderate Area SO_2 Maintenance Plan and submitted to EPA and requested redesignation to attainment.
	Miami Area of Gila County	Copper smelter operations.	ADEQ developed the Miami Moderate Area SO_2 Maintenance Plan and submitted to EPA and requested redesignation to attainment.
	Morenci Area of Greenlee County	Morenci copper smelter operations	ADEQ developed a Maintenance Plan and submitted to EPA and requested redesignation to attainment.
	San Manuel Area of Pinal County	Copper smelter operations.	ADEQ developed a Maintenance Plan and submitted to EPA and requested redesignation to attainment.
CO	Phoenix Area of Maricopa County	On-road and non-road mobile and area sources (fuel combustion, incineration, etc.)	Area is designated as serious CO nonattainment.
	Tuscan Area of Pima County	Vehicular emissions.	
Ozone*	Phoenix Area of Maricopa County	VOC and NOx emissions from point, non road, area, stationary, motor vehicles, and biogenic sources	Area is designated as serious ozone nonattainment.

* VOC and NOx are ozone precursors.

Table 3.2 ñ NAAQS Nonattainment Areas Within The Affected Environment

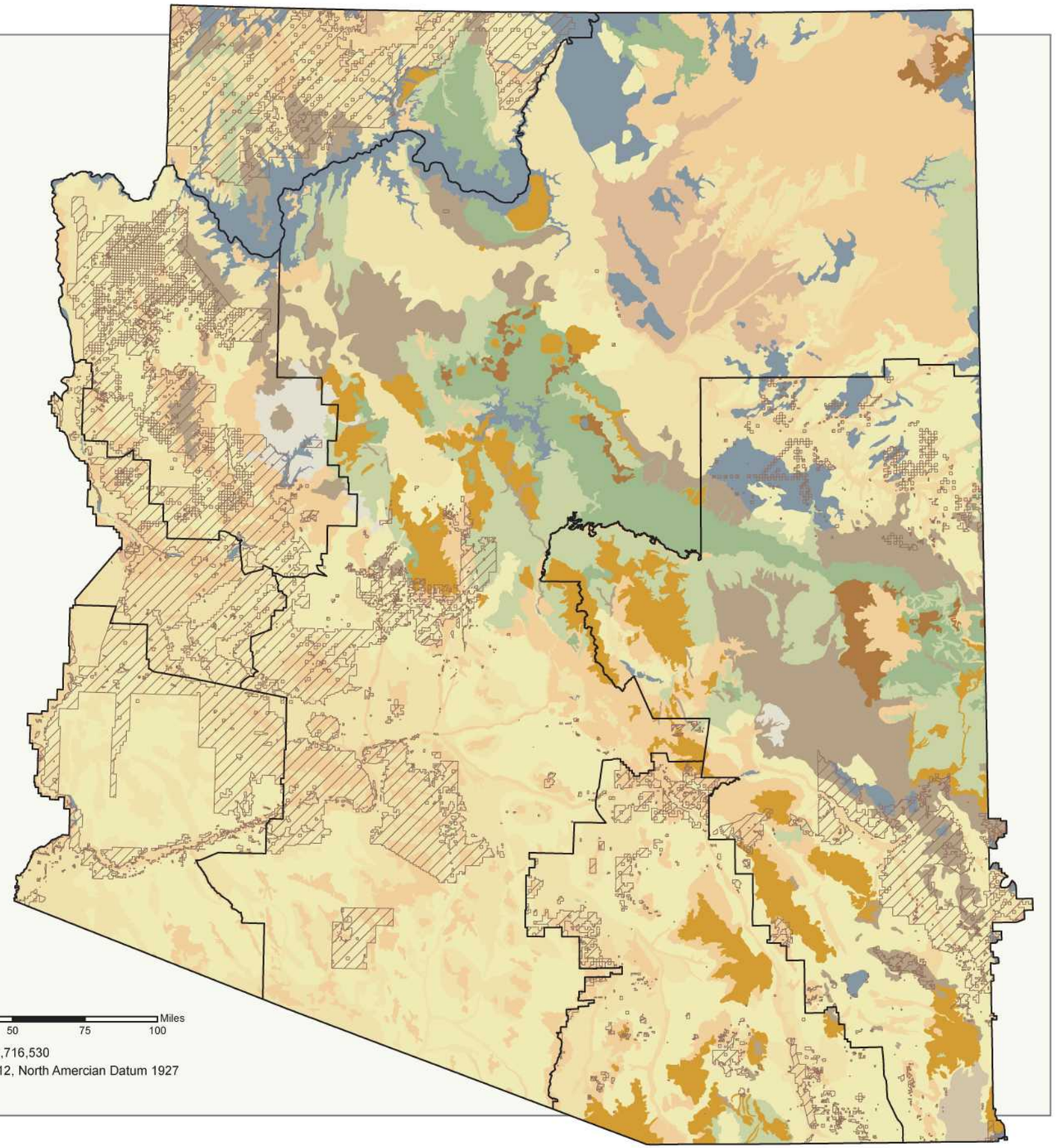
Planning Areas	Nonattainment Air Pollutants And Areas Affected			
	PM_{10}	SO_2	CO	Ozone
Yuma RMP	Bullhead City Area (Mohave County)	-	-	-
	Yuma Area (Yuma County)	-	-	-
	Ajo Area (Pima County)	Ajo Area (Pima County)		
Safford RMP	Douglas Area (Cochise County)	Douglas Area (Cochise County)	-	-
	-	Morenci Area (Greenlee County)	-	-
Phoenix RMP (Southern Region)	Hayden Area (Pinal and Gila Counties)	Hayden Area (Pinal and Gila Counties)	Phoenix Area (Maricopa County)	Phoenix Area (Maricopa County)
	Phoenix Area (Maricopa County)	Miami Area (Gila County)	Tucson Area (Pima County)	-
	Nogales Area (Santa Cruz County)	San Manuel Area (Pinal County)	-	-
	Rillito Area (Pima County)	-	-	-

Table 3.3 ñ Distribution of Soil Suborders on BLM-Administered Land in Arizona

Soil Type		Area of BLM land	Area of BLM land
Order	Suborder	(Acres)	(%)
Alfisols	Boralfs	950	0.01
	Ustalfs	314,223	2.55
Aridisols	Argids	3,758,250	30.49
	Orthids	4,437,152	36.00
Entisols	Fluvents	462,103	3.75
	Orthents	2,049,837	16.63
	Psamments	44,632	0.36
Inceptisols	Ochrepts	46,415	0.38
Mollisols	Ustolls	790,448	6.41
Vertisols	Torrents	3,036	0.02
	Usterts	50,108	0.41
Rock		369,551	3.00
TOTAL		12,326,704	100.00

Figure 3.2 Arizona Soils

Order	Suborder	BLM Total Acres
Alfisols	Boralfs	950
Alfisols	Ustalfs	314,223
Aridisols	Argids	3,790,986
Aridisols	Orthids	4,484,254
Entisols	Fluvents	500,105
Entisols	Orthents	2,067,806
Entisols	Psaments	56,708
Inceptisols	Ochrepts	46,869
Mollisols	Borolls	0
Mollisols	Ustolls	803,552
Vertisols	Torrets	3,036
Veritsols	Usterts	50,108
Rock, undeveloped soils		399,057
BLM Lands		12,517,653
Field Office Boundary		



Soils data source:
USDA Natural Resource Conservation Service soils maps for the State Soils Geographic (STATSGO) database

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

N

0 5 10 15 20 25 50 75 100 Miles

1:2,716,530

Projection UTM, Zone 12, North Amercian Datum 1927

communities associated with Orthents (67.1%), and are scattered throughout western, southern and south central Arizona. Semidesert Grassland, Plains and Great Basin Grassland, Great Basin Desert Scrub, Great Basin Pinyon-Juniper Woodland and Interior Chaparral compose most of the remaining vegetative cover (29.7%), primarily in northeastern Arizona. Approximately 2% of the Orthents soils are in Riparian areas. Approximately 13% of the remaining soils on BLM-administered lands are in the suborders Fluvents, Ustolls and Ustalfs. Fluvents formed in recent loamy or clayey alluvial deposits near stream channels or on piedmont slopes and are associated with Chihuahuan Desert Scrub, Plains and Great Basin Grassland, Great Basin Desert Scrub, and Great Basin Pinyon-Juniper Woodland (68.6%) found mainly in northwestern Arizona and in narrow bands along the river valleys. Over 7% of the Fluvents soils are in riparian areas and approximately 2% are agricultural lands. Ustolls are thick, dark-colored soils that occur at higher elevations in semiarid and subhumid climates with an ustic soil moisture regime and a mesic soil temperature regime. Ustolls can have clay, carbonate or cemented carbonate horizons, and are associated with Semidesert Grassland, Great Basin Pinyon-Juniper Woodland and Interior Chaparral (87.3%) found scattered throughout Arizona. Ustalfs are reddish-colored soils that usually have some accumulations of carbonates in or below the subsoil and can have a high sodium content. Ustalfs are associated almost entirely with Great Basin Pinyon-Juniper Woodland (70.6%), with some Upland Sonoran Desert Scrub, Plains and Great Basin Grassland and Great Basin Desert Scrub (22.7%) found scattered throughout Arizona. Riparian areas are not generally associated with Ustolls or Ustalfs soils.

3.1.3 Water Resources

3.1.3.1 Surface Waters

There is a diversity of surface water types in Arizona, reflecting the varied topography, climate, and human modification of the landscapes in the state. Surface waters occurring within BLM districts of the state have been described in existing planning documents cited in Section 3.1.1; readers are referred to those documents for detailed information about the occurrence and nature of surface water resources in individual districts. Figure 3.3 shows the locations of major rivers in the state, and also shows occurrence of lakes (including impoundments) and other streams.

Figure 3.3 also notes the occurrence of significant riparian areas in the state. The largest contiguous riparian areas occur in the Little Colorado River basin near Holbrook. Extensive riparian areas also exist along the Virgin River, Paria River, and Kanab Creek and the Gila River; extensive areas are also present in the Kingman district. Many of the latter appear on the map as linear features, reflecting their association with intermittent streams. The occurrence and condition of riparian areas and wetlands on BLM lands (including some lands proposed for acquisition), and management of those lands, has been described in existing management plans. In some plans, riparian areas have been discussed in the context of stream and water resources, in other reports focus on the habitat values of riparian areas and describe management activities to protect and improve the quality of riparian and wetland systems.

3.1.3.2 Groundwater

The occurrence and characteristics of groundwater resources have been described in varying levels of detail in the LUP documents cited at the beginning of Section 3, and incorporated here by reference. There have likely not been significant changes in the occurrence, availability, or chemistry of groundwater from conditions described in those documents. Moreover, potential changes in fire prevention and fire suppression activities on BLM lands in the state are not likely to result in material changes to groundwater resources.

3.1.3.3 Water Quality

A 1988 report by the Arizona Department of Environmental Quality (ADEQ, 1988), cited in the RMP for the Arizona Strip District (1990) indicated that fewer than 10% of waters in the state met standards for beneficial uses, due mostly to impacts from non-point sources, and further indicated that the most significant non-point sources included grazing, hydrologic/habitat modification, recreation, and resource extraction. More recent ADEQ data (Marsh, 2002) indicate significantly better water quality in the state; the stateís 2002 water quality assessment found that only 14% of streams and 15 % of the area of lakes included in their analysis were classified as ìimpairedî or ìnot attainingî water quality standards. Thirty six percent of streams and 62% of lakes, however, were classified as having insufficient data to assess compliance. These water bodies with insufficient data have been placed on a planning list until they can be further evaluated.

To protect outstanding state water resources, the State of Arizona has established a program of ìUnique Waters.î These surface waters are identified as having ìexceptional recreational or

ecological significance,î or have been identified as being ìessential to the maintenance and propagation of a threatened or endangered species,î or as providing critical habitat for a threatened or endangered species (Marsh, 2002). Water quality protections for Unique Waters are more stringent than for other surface waters, and include anti-degradation procedures that prohibit new or expanded discharge of pollutants to these waters. The restrictions include discharges associated with land use activities such as mining, grazing, and agriculture. As of 2002, the state had identified 20 Unique Waters.

3.2 Biological Environment

3.2.1 Vegetation Resources

BLM-administered lands in Arizona support 12 main biotic communities (after Brown, 1994): Chihuahuan Desert Scrub, Mohave Desert Scrub, Great Basin Desert Scrub, Lower Sonoran Desert Scrub, Upper Sonoran Desert Scrub, Great Basin Pinyon-Juniper Woodland, Madrean Evergreen Woodland, Plains and Great Basin Grassland, Semidesert Grassland, Montane Conifer Forest, Riparian, and Interior Chaparral **(see Figure 3.4 and Table 3.4**; Brown 1982a). These 12 vegetation communities give rise to diversity in plant and wildlife species. The nature of plant communities is often clearly demarcated by climatic, geological, elevation and aspect gradients which in turn influences soil type and soil water holding capacity. At the lower elevations, Arizona is the confluence of the four major North American Deserts: Sonoran Desert, Mojave Desert, Chihuahuan Desert, and Great Basin Desert. These deserts support a mixture of different vegetation communities because of variances in annual precipitation and temperature patterns. As elevation increases, woodland, chaparral, montane conifer forest, subalpine conifer forest, and alpine tundra, respectively, become foremost. The vegetation communities at mid-level and high elevation are influenced by Great Basin Conifer and California Evergreen Woodlands, and Sierra and Rocky Mountain Conifer Forests, respectively. The vegetation communities in each BLM Field Office are described by ecological site[1] in the approved LUPs referenced at the beginning of Section 3.0. Each vegetation community is more fully described by Brown (1982a) and summarized in **Appendix C**.

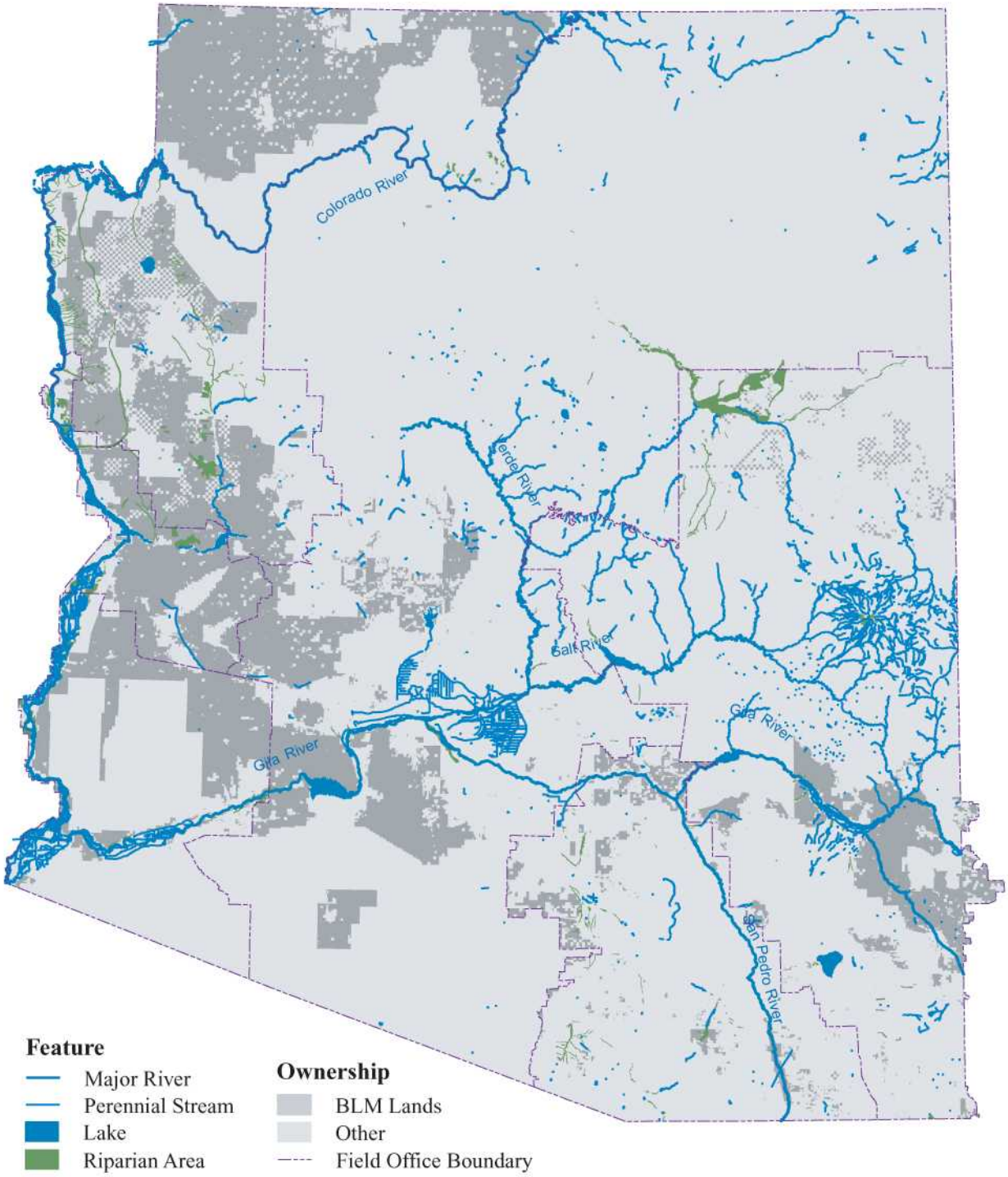
[1] An ecological site is a kind of land defined by physical characteristics such as soil that differs from other kinds of lands in its ability to produce a distinctive mix of vegetation and in its response to management (Pellant et al. 2000).

Each vegetation community varies in annual precipitation and temperature regimes, elevation, and historic fire regimes (Swetnam and Baisan 1996, Paysen et al. 2000). Wildfire in some of these vegetation communities was a normal occurrence with short return intervals that helped to define species composition, structure, and productivity (Brown 2000, Paysen et al. 2000). As such, many plants that make up these communities are adapted to withstand wildfire through a variety of anatomical or physiological mechanisms. Examples of fireñ adapted vegetation communities are Interior Chaparral and Montane Forest. On the other hand, some vegetation communities, wildfire may not be part of their normal ecology and many of the plant species are not fire adapted (Roger and Stelle 1980). Lower Sonoran Desert Scrub and Mohave Desert Scrub are examples of vegetation communities with long fire return intervals. Fire in these communities would probably be detrimental because plant succession would require decades to hundreds of years for the vegetation recover and some species may never recuperate.

3.2.2 Fire Ecology

Prior to European settlement, fire was a common and widespread influence on many landscapes in the Southwest (Paysen et al. 2000). Many of these fires were caused naturally from lightening but some were also started purposefully by Native Americans for a variety of reasons (Swetnam and Baisan 1996, Brown 2000). The historic fire regime of Arizona lands varied in frequency and severity depending on many factors such as vegetation type, climate, and topography (**Figure 3.5**). Wildfire in the different vegetation communities found on BLM land was a normal occurrence and helped define their species composition, structure and standing biomass (Brown 2000). As such, many plants were adapted to withstand wildfire through a variety of anatomical or physiological mechanisms and persisted with frequent fire. Examples of fire-adapted vegetation communities with frequent fire return intervals are Interior Chaparral, Plains and Great Basin Grassland, and Montane Conifer Forest. However, for other vegetation communities, wildfire was not a normal part of their ecology because the return frequencies were hundreds of years (Rogers and Steele 1980, McAuliffe 1995). In these communities, the distance between shrubs is too great for fire to carry unless annual plant growth in the inter-shrub spaces is sufficient to carry fire. Upland Sonoran Desert Scrub and Mohave Desert Scrub are examples of plant communities with long fire return intervals.

Figure 3.3 Arizona Major Surface Water Features



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

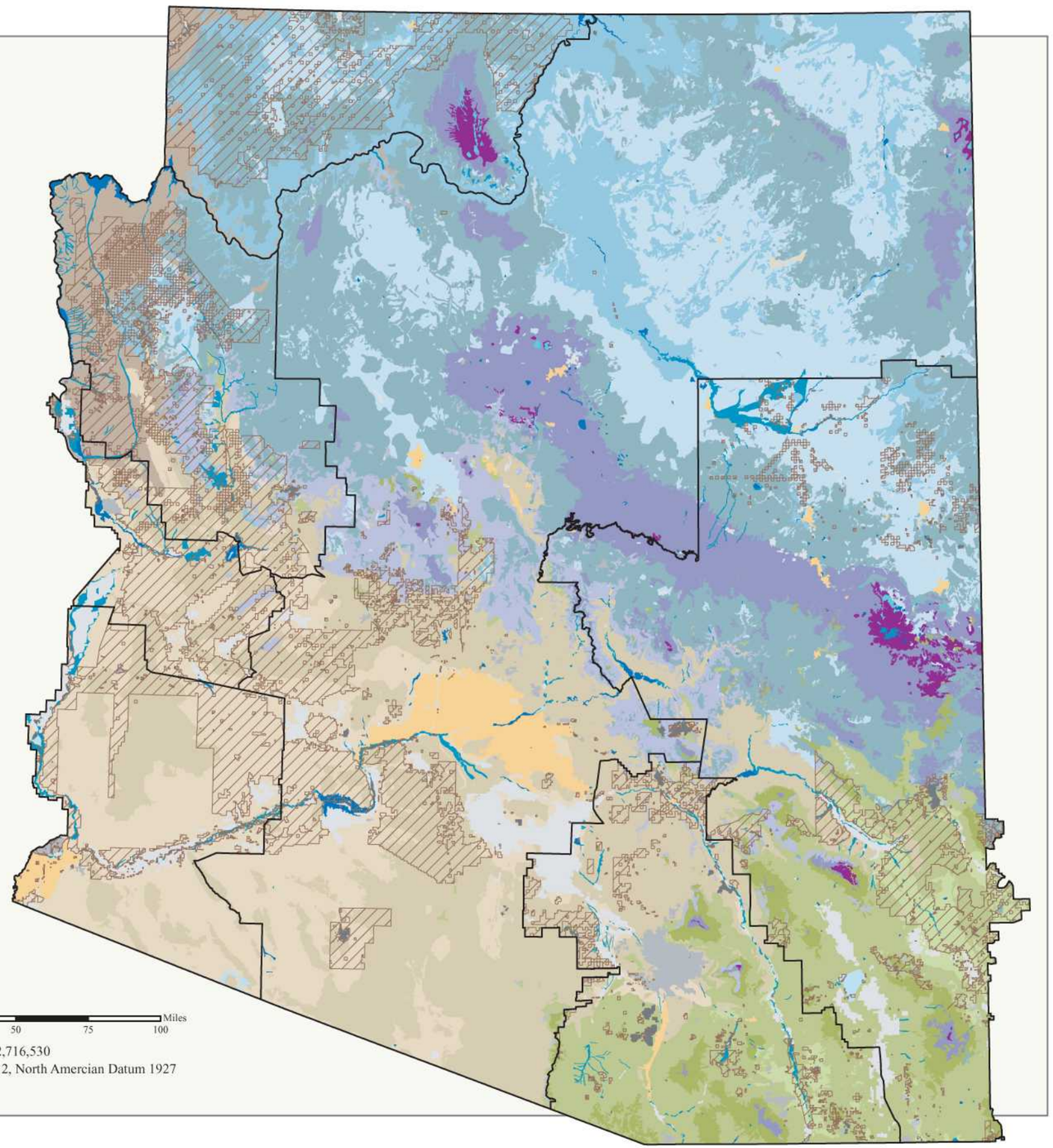
0 25 50 75 100 Miles

1:3,500,000

Projection UTM, Zone12, North American Datum 1927

Figure 3.4 Arizona Vegetation Communities

	BLM Total Acres
Lower Sonoran Desert Scrub	2,743,602
Upland Sonoran Desert Scrub	3,280,602
Mohave Desert Scrub	1,163,882
Chihuahuan Desert Scrub	447,381
Semidesert Grassland	757,634
Madrean Evergreen Woodland	67,706
Plains and Great Basin Grassland	747,502
Great Basin Desert Scrub	1,060,725
Great Basin Pinyon-Juniper Woodland	1,532,999
Interior Chaparral	425,287
Montane Conifer Forest	19,067
Sub-Apline Conifer Forest	0
Sub-Alpine Grassland	0
Mixed	4,715
Water	26,318
Riparian	176,103
Playa	11,676
Agriculture	34,513
Urban	13,817
Industrial	4,125
BLM Lands	12,517,653
Field Office Boundary	



Vegetation data source:
Natural vegetation as mapped for the Arizona, California, and New Mexico Gap Analysis Programs (GAP).

N

0 5 10 15 20 25 50 75 100 Miles

1:2,716,530
Projection UTM, Zone 12, North Amercian Datum 1927

Table 3.4 ñ
General Characteristics of the Various Vegetation Communities on BLM-Administered Land Throughout Arizona (after Brown 1982)

Vegetation Community	BLM Land (%)	Plant Growth Form	Dominant Species	Elevation (Feet)	Climate	Precipitation (inches)
Lower Sonoran Desert Scrub	21.8	Shrubñ microphyllous	Creosotebush (*Larrea tridentata)*, Whitebursage (*Ambrosia dumosa*), Ocotillo (*Fouquieria splendens*), Brittlebrush (*Encelia farinose*), Fourwing saltbush (*Atriplex canescens*), Palo verde (*Parkinsonia florida*), Saguaro (*Carnegiea gigantean*), Mesquite (*Prosopis velutina*), Ironwood (*Olneya tesota*), Catclaw acacia (*Acacia greggii*), Smoketree, Big galleta grass (*Pleuraphis rigida*)	< 3,445	Subtropical	2ñ9
Upper Sonoran Desert Scrub	26.2	Shrubñ microphyllous	Blue palo verde (*Parkinsonia florida*), Foothill palo verde (*Parkinsonia* sp.), Ironwood (*Olneya tesota*), Creosotebush (*Larrea tridentata*), White bursage (*Ambrosia dumosa*), Limber bush (*Jatropha dioica*), Ocotillo (*Fouquieria splendens*), Johoba (*Simmondsia chinensis*), Buckhorn cholla (*Opuntia acanthocarpa*), Klein cholla (*Opuntia kleiniae*), Chain fruit cholla (*Opuntia fulgida*), Devilís club cholla (*Opuntia kunzei*), Fish-hook pincushion (*Mammillaria thornberi*), Thornber pincushion (*mammillaria viridiflora*), Fishñhook barrel cactus (*Mammillaria diocia*), Compass cactus (*Ferocactus acanthodes*), Saguaro (*Carnegiea gigantean*)	984ñ3,280	Subtropical	12ñ16
Great Basin Pinyon-Juniper Woodland	12.2	Treeñconifer	Rocky Mountain juniper, (*Juniperus scopulorm*) Great Basin juniper (*Juniperus occidentalis*), Rocky Mountain pinyon pine (*Pinus edulis*), Big sagebrush (*Artemisia tridentata*), Snakeweed (*Gutierrezia sarothrae*), Rabbitbrush (*Ericameria* spp.), Winterfat (*Ceratoides lanata*), Blackbrush (*Isomeris arborea*), Cliffrose (*Purshia mexicana*), Apache plume (*Fallugia paradoxa*), Blue gramma (*Bouteloua gracilis*), Galleta grass (*Hilaria jamesii*), Indian rice grass (*Oryzopsis hymenoidesi)*, Western wheatgrass (*Agropyron smithii*), several Muhleys (*Muhlenbergia* sp.) and Dropseeds (*Sporobolus* sp.).	6,560ñ9,840	Cold-Temperate	10ñ22
Mohave Desert Scrub	9.3	Shrubñ microphyllous	Creosotebush (*Larrea tridentata*), Joshua tree (*Yucca brevifolia*), All-scale atriplex (*Atriplex polycarpa*), Brittlebush (*Encelia farinose*), Desert holly (*Atriplex hymenelytra*), White burrobrush (*Hymenolea salsola*), Shadscale (*Aptriplex confertifolia*), Blackbrush (*Isomeris arborea*), Engleman hedgehog (*Echinocereus engelmannii*), Silver cholla (*Opuntia echinocarpa*), Mojave pricklypear (*Opuntia phaeacantha*), Beavertail cactus (*Opuntia basilaris*), Many-headed barrel cactus (*Echinocactus polycephalus*), numerous ephemeral forbs	980ñ4,000	Warm-Temperate	2ñ8

Vegetation Community	BLM Land (%)	Plant Growth Form	Dominant Species	Elevation (Feet)	Climate	Precipitation (inches)
Great Basin Desert Scrub	8.5	Shrub	Big sagebrush (*Artemisia tridentata*), Black sagebrush (*Artemisia nova*), Bigelow sagebrush (*Artemisia bigelovii*), Shadscale (*Atriplex confertifolia*), Fourwing saltbush (*Atriplex canescens*), Rabbitbrush (*Ericameria* spp.), Winterfate (*Ceratoides lanata*), Hopsage (*Grayia spinosa*), Horsebrush (*Tetradymia* sp.), Blackbrush (*Isomeris arborea*), Greasewood (*Sacrobatus vermiculatus*), Blue gramma (*Bouteloua gracilis*), Galleta grass (*Hilaria jamesii*), Indian rice grass (*Oryzopsis hymenoides*), Western wheatgrass (*Agropyron smithii*), Junegrass (Ikoeleria macrantha), several Muhleys (*Muhlenbergia* sp.) and Dropseeds (*Sporobolus* sp.)	3930ñ7220	Cold-Temperate	< 10
Plains and Great Basin Grassland	6.0	Grass	Big bluestem (*Andropogon gerardii*), Little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), Switchgrass (*Panicum virgatum*), Western wheatgrass (*Agropyron smithii*), Needle and thread grass (*Stipa comatai)*, Galleta (*Hilaria* sp.), Sand dropseed (*Sporobolus crytandrus*), Blue gramma (*Bouteloua gracilis*), Buffalo-grass (*Buchloe dactyloides*), Indian rice grass (*Oryzopsis hymenoides*), Prairie grass (*Bromus wildenowii*), Junegrass (*Koeleria macrantha*), Plains lovegrass (*Eragrostis intermedia*), Alkali sacaton (*Sporobolus airoides*), Fourwing saltbush (*Atriplex* canescens), Big sagebrush (*Artemisia tridentata*), winterfat (*Ceratoides lanata*), Soapweed, Rabbitbrush (*Ericameria* spp.)	4,920ñ7,545	Cold-Temperate	12ñ18
Semidesert Grassland	6.0	Grass	Tobosa (*Pleuraphis mutica*), Black gramma (*Bouteloua hirsute*), Side-oats gramma (*Bouteloua curtipendula*), Slender gramma (*Bouteloua repens*), Bush muhly (*Muhlenbergia porteri*), Three awn (*Aristida purpurea*), Arizona cottontop (*Digitaria californica*), Vine mesquite (*Prosopis* sp.), Buffalo-grass (*Buchloe dactyloides*), Plains lovegrass (*Eragrostis intermedia*), Wolftail (*Lycurus setosus*), Little bluestem (*Schizachyrium scoparium*), Mesquite (*Prosopis* sp.), Lotebush (*Ziziphus obtusifolia*), Allthorn (*Koeberlinia spinosa*), False mesquite (*Prosopis* sp.), Catclaw Acacia (*Acacia greggii*), Desert hackberry (*Celtis spinosa*), Ocotillo (*Fouquieria splendens*), Creosotebush (*Larrea tridentata*)	2,300ñ4,920	Warm-Temperate	8ñ12
Interior Chaparral	3.4	Shrubñsclerophyll	Shrub live oak (*Quercus turbinella*), Birchleaf mountain	3,445ñ6,070	Warm-	15ñ25

Vegetation Community	BLM Land (%)	Plant Growth Form	Dominant Species	Elevation (Feet)	Climate	Precipitation (inches)
			mahogany (*Rosaceae Cerocarpus betuloides*), Skunkbush sumac (*Rhus trilobata*), Silktassel (*Garrya elliptica*), Desert ceanothus (*Ceanothus greggii*), cliffrose (*Purshia mexicana*), Desert olive (*Forestiera pubescensi)*, Sophoras , Arizona rosewood (*Vauquelina californica*), Sideoats gramma (*Bouteloua curtipendula*), Hairy gramma (*Bouteloua hirsute*), Cane bluestem (*Bothriochloa barbinodes*), Plains lovegrass (*Eragrostis intermedia*), Wolftail (*Lycurus setosus*), Single threeawn (*Aristida schiedeana*)		Temperate	
Chihuahuan Desert Scrub	3.6	Shrubñ microphyllous	Creosote (*Larrea tridentata*), Tarbush (*Flourensia cernua*), Whitethorn acacia (*Acacia constrictai)*, several saltbushes (*Atriplex* sp.), Guayule (*Parthenium argentatum*), Ocotillo (*Fouquieria splendens*), Ratany (*Krameria* sp.), several Agrave and Yucca, Catclaw (*Acacia greggii*), Condalia, several Chollas (*Opuntia* sp.), Prickly pear (*Opuntia* sp.), and Hedgehog (*Echinocereus* sp), Turkís head (*Echinocactus horizonthalonius*), Pin cushion (*Mamillaria vivipara*), and Fish-hook cacti (*Sclerocactus polyancistrus*).	2,300ñ4,900	Warm-Temperate	8ñ12
Riparian	1.4	Treeñdeciduous	Pacific willow (*Salix lasiandra*), Bigtooth maple (*Acer grandidentatum*), Narrowleaf cottonwood (*Populus angustifolia*), Box elder (*Acer negundo*), Black cherry (*Prunus serotina*), Arizona walnut (*Juglans major*), Velvet ash (*Fraxinus velutina*), Western soapberry (*Sapindus saponaria*), Red willow (*Salix laevigata*), Mesquite (*Prosopis* sp.), Gooddings willow (*Salix gooddingii*), Netleaf hackberry (*Celtis reticulata*), Wrightís sycamore (*Ficus* sp.)	Various	Various	Various
Madrean Evergreen Woodland	0.5	Treeñmixed	Emory oak (*Quercus emoryi*), Arizona white oak (*Quercus arizonica*), Alligator juniper (*Juniperus deppeana*), One-seeded Juniper (*Juniperus monosperma*), Mexican pinyon (*Pinus cembroides*), Apache pine (*Pinus engelmannii*), Arizona pine (*Pinus ponderosa var. arizonica*), Pino triste (*Pinus lumholtzii*), Durango pine (*Pinus* sp.)	3,940ñ7,220	Warm-Temperate	> 15
Montane Conifer Forest	0.2	Treeñconifer	Ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), White pine (*Pinus strobus)*, Limber pine (*Pinus flexilis*), Aspen (*Populus* sp.)	6,560ñ9,840	Cold-Temperate	18ñ30

The historic nature of wildfire in Arizona changed with the onset of European settlement. As such currentñday fire regimes for many vegetation communities have changed (**Figure 3.6**) in comparison with historic patterns (**Figure 3.5**). Livestock grazing and land cultivation caused fuel loads (i.e., the amount of standing live and dead vegetation) to be reduced and fragmented into smaller landscape units. Furthermore, the introduction of organized fire suppression caused a drastic decrease in fire occurrence and size (Brown 2000). The exclusion of fire as a dominant ecological factor on many sites has caused significant changes in the character of vegetation communities such as species composition, structure, and standing biomass. Ironically, these changes have, in some instances, caused the vegetation community to be more fire prone. Plant successional pathways that have occurred on some sites would probably not have occurred prior to European settlement, where frequent fires suppressed woody vegetation establishment (Brown 2000). The increases in the density of woody species that have occurred on some sites, as well as the invasion of woody species onto sites where frequent fire used to preclude their establishment is probably a consequence of the alteration of historic fire regimes. Perhaps a change in the historic fire regime is, in part, responsible for the invasion of tarbush, whitethorn acacia, and creosotebush into Semidesert Grassland (Brown 1982b).

Wildfires can have significant environmental impacts on soils, fish, wildlife, timber resources, recreation, air and water quality, visual resources, archeological sites, homes and structures, utility corridors and facilities, and human welfare. The Wildland-Urban Interface (WUI) occurs where wildland vegetation and human structures interface or intermix with each other (Arno and Wakimoto 1987). The buildup of flammable vegetation including woody perennial (trees, shrubs), vegetation, forbs and annual weeds to hazardous levels is a concern in many areas of the state. Therefore, fire management and fuels reduction in the WUI is a priority. The creation of fuels breaks, infrastructure improvements, identifying communities at risk, fire suppression, and community outreach to encourage creation of defensible space around structures are some ways BLM attempts to reduce the risk of WUI fire.

Considerable resources are required to mitigate the effects of wildfire on ecological resources and human welfare. The invasion of woody plants into new areas, and total exclusion of fire have increased fuel loadings, and the buildup of dead plant material. Increased fuel loadings, will influence and have an effect on wildfire severity and intensity. Wildfire intensity is related to flame length and the amount of heat released per second during a wildfire. Severity refers to post fire assessments of upward (intensity) and downward (heat per unit area) heat pulses. Various fuel treatments, including prescribed fire, mechanical, chemical, and biological treatments can be used to improve vegetation management for control of woody plant invasion and the buildup of fuels. The effectiveness of fuels control on BLM land is being weighed along with environmental concerns and consequences in a programmatic Environmental Impact Statement analysis, *Environmental Impact Statement for Vegetation Treatments, Watersheds and Wildlife Habitats on Public Lands Administered by the BLM in the Western United States, Including Alaska (Vegetation EIS)*. After fuels reduction treatments such as a prescribed fire or mechanical treatment, proper rehabilitation is often essential to deter the establishment of weeds and reduce soil erosion. Encouraging the growth and productivity of desirable vegetation will most likely inhibit the re-establishment of invasive weeds and minimize soil erosion.

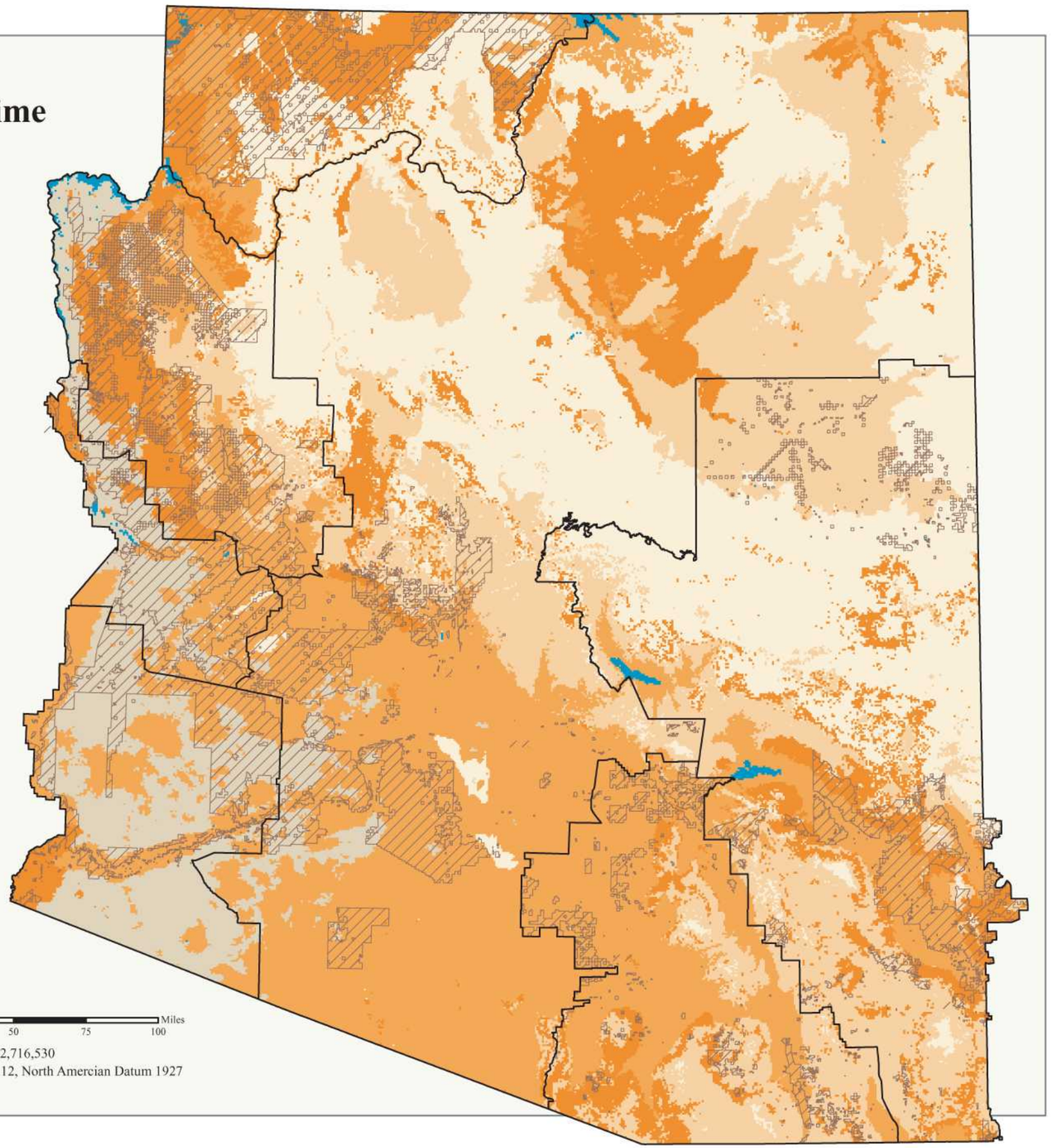
3.2.3 Invasive and Noxious Weeds

Invasive and noxious weeds are an increasing problem on BLM lands. Invasive and noxious weeds rapidly displace desirable plants that provide habitat for wildlife and food for people and livestock. Some weeds are poisonous to wildlife, livestock, and people. Invasive and noxious weeds are plants that are not native to Arizona vegetation and were introduced accidentally or intentionally. Noxious weeds are listed by state and federal law and are generally considered those that are exotics and negatively impact agriculture, navigation, fish, wildlife, or public health (Howery and Ruyle 2002). **Table 3.5** lists the Arizona regulated and restricted noxious weeds. However, there are other invasive weeds such as spotted knapweed, leafy spurge, cheatgrass, buffelgrass, red brome, and saltcedar that are not listed as noxious but still can be problematic on Arizona rangelands. These plants are considered invasive weeds because they displace and reduce the normal composition and productivity of native rangeland vegetation. In addition, they may raise the risk of wildland fire because of increased flammability and biomass accumulation in rangeland vegetation communities.

Many noxious weeds were originally brought by European settlers inadvertently to the United States in grain seed, livestock feed and ship ballasts (Harvey and Ruyle 2002). Weeds slowly spread across the

Figure 3.5 Arizona Historical/Natural Fire Regime

	BLM Total Acres
Fire Regime I 0-35 year frequency, low severity	1,214,648
Fire Regime II 0-35 year frequency, stand replacement severity	1,044,818
Fire Regime III 35-100+ year frequency, mixed severity	5,291,465
Fire Regime IV 35-100+ year frequency, stand replacement severity	2,959,291
Fire Regime V 200+ year frequency, stand replacement severity	0
Barren	1,998,832
Water	8,598
BLM Lands	12,517,653
Field Office Boundary	



Fire regime data source:
Course-scale Spatial Data for Wildland Fire and Fuel Management. November 1999. Produced by the Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station. Available at www.fs.fed.us/fire/fuelman

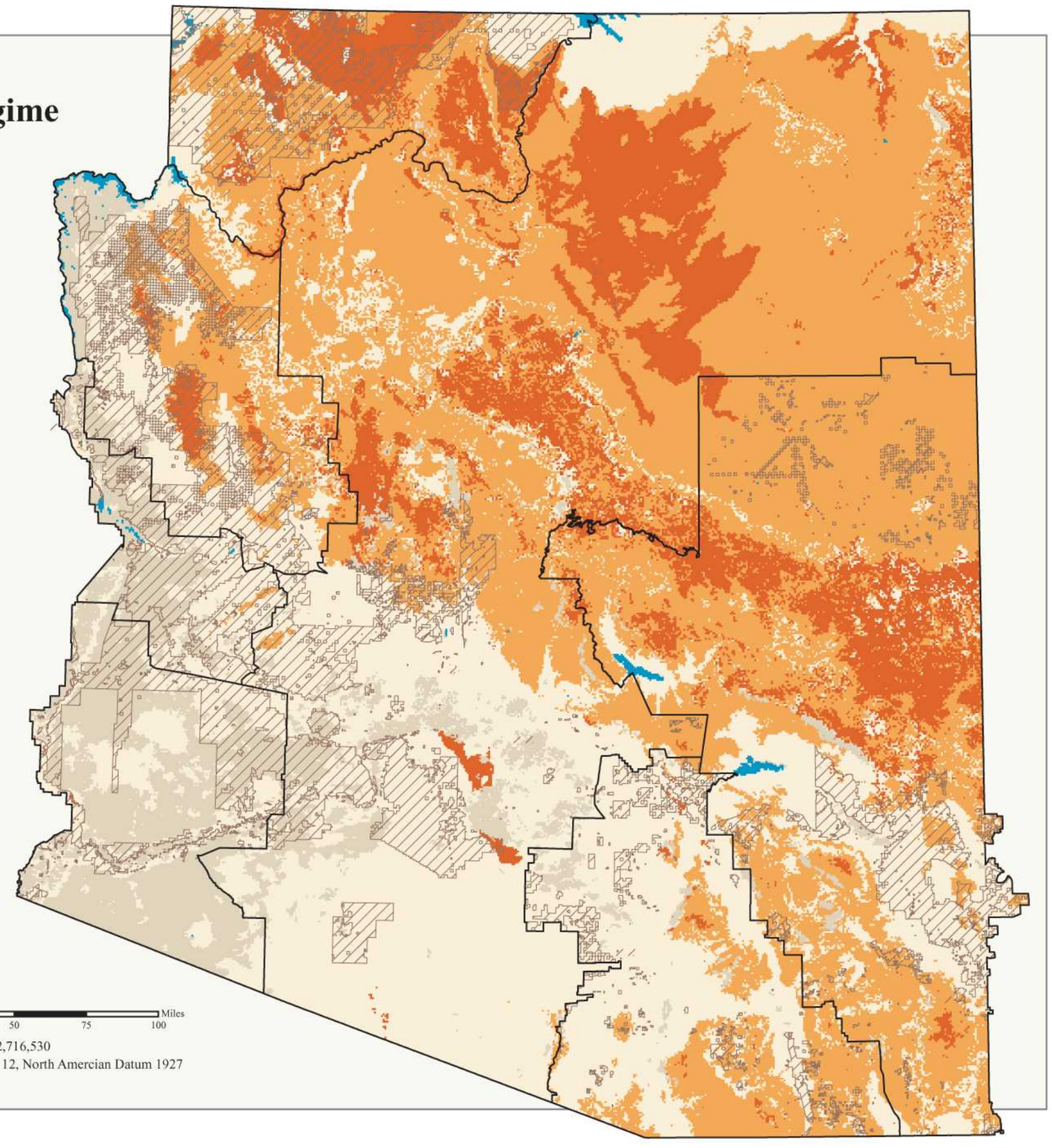
N

0 5 10 15 20 25 50 75 100 Miles

1:2,716,530

Projection UTM, Zone 12, North Amercian Datum 1927

Figure 3.6 Arizona Current Condition Fire Regime



	BLM Total Acres
Condition Class 1 Fire regime within or near historical range. Risk of key ecosystem component loss low. Departed from historical fire frequency by not more than one return interval. Vegetation attributed (species composition and structure) intact and functioning within historical range.	6,738,178
Condition Class 2 Fire regime moderately altered from historical range. Risk of key ecosystem component loss moderate. Departed from historical fire frequency by more than one interval. Moderate change to fire size, frequency, intensity, severity, and/or landscape pattern, and to vegetation.	2,468,623
Condition Class 3 Fire regime significantly altered from historical range. Risk of key ecosystem component loss high. Departed from historical fire frequency by multiple return intervals. Dramatic changes to fire size, freqency, intensity, severity, and/or landscape pattern, and to vegetation.	1,198,836
Non-vegetation, Agriculture, Urban Development	2,103,418
Water	8,598
BLM Lands	12,517,653
Field Office Boundary	

Fire regime data source:
Course-scale Spatial Data for Wildland Fire and Fuel Management. November 1999. Produced by the Prescribed Fire and Fire Effects Research Work Unit, Rocky Mountain Research Station. Available at www.fs.fed.us/fire/fuelman

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

N

0 5 10 15 20 25 50 75 100 Miles

1:2,716,530

Projection UTM, Zone 12, North Amercian Datum 1927

country as different parts were settled. Accidental introductions have occurred, for example, through contaminated crop seed or livestock forage and include species such as cheatgrass and halogeton. Some invasive weeds were introduced for specific purposes such as livestock forage, horticultural or soil stabilization and they escaped into natural vegetation communities. Examples include buffelgrass and saltcedar. Invasive and noxious weeds are likely spread through a variety of mechanisms including: cross-country travel (Off Highway Vehicles (OHV), hiking, and camping activities and through the movement of wildlife and/or livestock. Invasive and noxious weeds my readily establish in highly disturbed areas (for instance, where the cumulative impacts of fire, grazing, and recreation activities are compounded). The spread of invasive weeds poses a hazard to vegetation communities on BLM rangelands because weeds can displace native plants as they compete for space, sunlight, water, and nutrients. As such, weeds can cause drastic changes in the composition, structure and productivity of vegetation communities. Also, weeds can alter the mix of native vegetation and reduce ungulate forage quality and quantity and some may even be poisonous to livestock. Finally, weeds high growth rate and flammability tend to increase the risk of wildfire to the vegetation community and structures in the WUI (Arno and Wakimoto 1987). Invasive weeds such as cheatgrass, red brome, and buffelgrass can alter fire regimes and cause fire re-occurrence to increase when they outcompete more fire-resistant native vegetation and provide flammable fuel between the interspaces among shrubs that allows the fire to carry in an unnatural manner (McAuliffe 1995, Brown 2000).

The Great Basin Desert Scrub is divided into a sagebrush, shadscale, and blackbrush series which vary in fire ecology (McAuliffe 1995, Brown 2000). Wildfire in sagebrush communities has become important in recent years (Brown 2000). Historic fire in the shadscale and blackbrush communities was infrequent and years were required for the natural process to restore these communities after its occurrence. However, fire behavior in sagebrush communities is different. Sagebrush communities are usually heavily grazed by domestic and wild ungulates. The sagebrush plants themselves are often not grazed but associated palatable plants such as bunchgrasses and forbs are heavily grazed. Since the 1900s, weedy annuals such as cheatgrass, Russian thistle, filaree, and tumble mustard have become established in areas where grazing has greatly reduced the native vegetation. Historic fire has been considered to be a minor component of sagebrush communities before settlement. But in the last half of the 1900s, fire became a dominant force in sagebrush communities where cheatgrass provides significant fuel to carry fire. In addition, sagebrush is also flammable because of volatile leaf oils. The highly flammable cheatgrass increases in response to overgrazing and fire and provides sufficient competition to reduce perennial bunchgrass cover. This cycle is repeated with successive fire and with each cycle cheatgrass and other weeds usually become more abundant and colonize new sites. Sagebrush usually does not recover sufficiently after fire because it re-establishes from seed and rootñ sprouting species such as rabbitbrush, horsebrush, and snakeweed become established more quickly.

Invasive weed control to reduce fire hazard can occur by a variety of ways including chemical, prescribed fire, biological, and mechanical or a combination of techniques (Howery and Ruyle 2002). The control of noxious weeds on BLM lands is being evaluated in *Environmental Impact Statement for Vegetation Treatments, Watersheds and Wildlife Habitats on Public Lands Administered by the BLM in the Western United States, Including Alaska (Vegetation EIS)*. After any weed control treatment such as a prescribed fire or mechanical treatment, proper rehabilitation is essential to deter the re-establishment of weeds. Encouraging the growth and productivity of desirable vegetation will most likely inhibit the re-establishment of invasive weeds. The degree and type of rehabilitation management required will depend of the nature and severity of the weed control treatment. Changes in grazing practices may be all that is needed on rangelands where minimal weed control has been implemented. However, rangelands where wildfire or prescribed burns have occurred will need aggressive rehabilitation practices to reduce the chances of weed domination before desirable plants can become established. Implementation may include soil erosion control and the seeding of desirable native and non-native perennial grasses and perhaps shrubs and forbs. Appropriate seed mixtures of native and non-native plants seeded at appropriate times are effective in becoming quickly established and not allowing weed seedlings to take root.

Table 3.5 ñ Arizona Regulated and Restricted Noxious Weeds

Species	Common Name	State Designation
Cenchrus echinatus	Southern sandbur	Regulated
Cendhrus incertus	Field sandbur	Regulated
Convolvulus arvensis	Field bindweed	Regulated
Medicago polymorpha	Burclover	Regulated
Portulaca oleracea	Common purslane	Regulated
Tribulus terrestris	Puncturevine	Regulated
Acroptilon repens	Russian knapweed	Restricted
Aegilops cylindrica	Jointed goatgrass	Restricted
Alhagi maurorum	Camelthorn	Restricted
Cardaria draba	Globed-podded hoary cress (Whitetop)	Restricted
Centaurea diffusa	Diffuse knapweed	Restricted
Centaurea maculosa	Spotted knapweed	Restricted
Centaurea solstitialis	Yellow starthistle	Restricted
Cuscuta spp	Dodder	Restricted
Eichhornia crassipes	Floating waterhyacinth	Restricted
Elymus repens	Quackgrass	Restricted
Halogeton glomeratus	Halogeton	Restricted
Helianthus ciliaris	Texas blueweed	Restricted
Ipomoea triloba	Three-lobed morning glory	Restricted
Linaria dalmatica	Dalmation toadflax	Restricted
Onopordum acanthium	Scotch thistle	Restricted

3.2.4 Wild Free-Roaming Horses and Burros

Wild horses and burros are protected by the Wild and Free-Roaming Horse and Burro Act of 1971 (P.L. 92-195), as amended by the FLPMA and the Public Rangelands Improvement Act of 1978 (P.L. 95-514). After the passage of the 1971 Wild Free-Roaming Horse and Burro Act, BLM became the managing agency responsible for protecting the wild burros and their habitat. The first wild burros were gathered in Arizona in 1977 around Alamo Lake in west central Arizona. Since 1977, more than 12,000 wild burros have been captured and removed from the public rangelands in western Arizona. In order to maintain their population around 2,000 animals (a level that their desert habitat can support), BLM continues its population control program by rounding up excess burros and offering them to the public through the Adopt-A-Burro Program.

The BLM manages two small wild horse herds in Arizona, one in the Cerbat Mountains, located northwest of Kingman (within the Kingman Field Office), and one between the Cibola National Wildlife Refuge and the U.S. Armyís Yuma Proving Ground (within the Yuma Field Office). There are 4 Herd Areas (HS) and 7 Herd Management Areas (HMA) managed by BLM in Arizona, containing 210 wild horses and 2,500 wild burros. These areas are the Tassi-Gold Butte HMA (Arizona Strip FO); Big Sandy HMA, Black Mountain HMA and Cerbat HA (Kingman FO); Harquahala HA, Lake Pleasant HMA, and Painted Rock HA (Phoenix FO); Alamo HMA and Havasu HMA (Lake Havasu FO); and Cibola-Trigo HMA and Little Harquahala HA (Yuma FO). Five of the areas are described in the Affected Environment section of current Land Use Plans. Descriptions of these five areas are incorporated here by reference and descriptions for the remaining HMAs are included in **Appendix E**.

3.2.5 Fish And Wildlife Resources

General Wildlife Habitat

Arizona sits at the junction of several physiographic provinces, including the four American deserts (Chihuahan, Great Basin, Mohave, and Sonoran), Colorado plateau, Rocky Mountains, and Sierra Madre. This diversity in habitat types creates tremendous wildlife diversity on public lands within the state. BLM manages 12 million acres of both big

and small game habitat, 30,000 acres of waterfowl and wetland habitat, 813 miles of streams, and 21,890 acres of riparian vegetation within Arizona. These habitats provide a wide range of variability in vegetation species composition, structural components, and food quality and availability, thereby hosting abundant wildlife. More than 800 species of fish, amphibians, birds, reptiles and mammals occur in Arizona as year-round residents, seasonal residents, or migrants. This diversity has strong ecological value and attraction for the public.

Within these broad habitats are relatively small amounts of wetland/riparian habitat. Although riparian areas make up less than two percent of the public lands in Arizona, they are one of the most productive and important habitats, providing for an even greater diversity of wildlife species. Much of the native riparian habitats on public lands within Arizona have been severely fragmented, degraded or otherwise substantially altered from a variety of causes, thereby affecting the wildlife populations and species that inhabit them. In some cases, upland portions of watersheds have also been degraded, exacerbating impacts at lower elevations, especially on streams, rivers and riparian habitats. Many riparian-obligate wildlife species, as well as many native fish species, are either Federally listed or are considered special status species by the Federal government (USFWS and BLM) or state wildlife agencies in Arizona and California (for public lands in California managed by the Yuma and Lake Havasu Field Offices).

The structure, composition, and condition of the various habitat types directly influence the fish and wildlife species assemblages that inhabit them. Fire-adapted vegetation communities comprise approximately 40 percent of wildlife habitats on BLM-administered lands in Arizona. These habitats and their availability on public lands are: Great Basin Pinyon-Juniper Woodland (12.2%), Great Basin Desert Scrub (8.5%), Plains and Great Basin Grassland (6.0%), Semi-desert grassland (6.0%), Interior Chapparal (3.4%), Madrean Evergreen Woodland (0.5%), and Montane Conifer Forests (0.2%). Many of these fire-adapted vegetation communities are overgrown with dense shrubs and young trees because they have been subjected to a regime of aggressive fire suppression and fire exclusion. Non-fire adapted communities comprise approximately 60 percent of habitats on BLM-administered lands, including Lower Colorado River (21.8%) and Upland Sonoran Desert Scrub (26.2%), Mohave Desert Scrub (9.3%), Chihuahuan Desert Scrub (3.6%), and riparian habitats (1.4%). However, because of the proliferation of non-native plants, many of the non-fire adapted communities, such as Sonoran Desert Scrub, Mohave Desert Scrub, and riparian habitats, are threatened by wildfires. The altered conditions of both the fire-adapted and non-fire adapted vegetation communities have left these communities, and their fish and wildlife inhabitants, at high risk of unnatural, high-intensity wildfire events.

The Arizona Game and Fish Department (AGFD) is responsible for managing wildlife populations throughout Arizona. The BLM coordinates closely with the AGFD to manage the diverse habitats that sustain these wildlife populations[2]. Many of the Arizona BLM Field Offices have developed Habitat Management Plans (HMPs), or other interdisciplinary activity plans, in cooperation with the AGFD, that outline the goals and actions for managing wildlife habitats and populations on public lands in the state. Wildlife habitats and priority wildlife species within the management areas of the BLM Field Offices in Arizona are discussed in these HMPs and the LUPs listed at the beginning of Section 3, and are incorporated here by reference.

Game Species, Predators, and Furbearers

Big game species are an important aesthetic and economic resource in Arizona (Silberman 2003). On BLM administered lands, 12 big game species (or subspecies) occupy a variety of habitat types. Habitat management is achieved cooperatively between the BLM and the AGFD. One or more small game species occur in virtually all vegetation types throughout Arizona. Small game species commonly found in many Arizona habitats include upland game birds (*e.g.,* pigeons, doves, quail, etc.), cottontail rabbits, and squirrels, as well as a wide variety of waterfowl species. Waterfowl species, including ducks, geese, coots, and gallinules, nest in Arizona, are found primarily in the natural and modified marshes found above the Mogollon Rim and in the White Mountains. Many waterfowl species also migrate through or winter in wetland habitats on public lands in Arizona. There are an additional 16 mammals which are classified as predators and/or furbearers. These game species, predators, and furbearers inhabit the variety of both fire-adapted and

[2] Master Memorandum of Understanding (MOU) Between the State of Arizona, Arizona Game and Fish Commission and the Department of the Interior, Bureau of Land Management. Effective date March 18, 1987. 10 pp.

fire-threatened habitats on public lands in Arizona. Habitat information for these species is summarized in **Appendix C**.

Nongame Wildlife

Arizona has a diverse, abundant mammalian fauna, including 134 species of mammals native to the state, and 11 more species that have successfully been introduced. While the distribution, ecology, and habitat needs of many of the nongame mammals, are poorly understood, these species occupy a variety of habitats on public lands in Arizona (AGFD 2001). Many of these species have small, local populations that face a variety of threats, and some are tied to the severely altered riparian or native grassland communities (AGFD 2001).

Over 500 native bird species occupy the diverse habitats of Arizona, of which approximately 470 are nongame species. An additional 7 non-native species have also become established here. At least 296 native and 11 non-native bird species have been documented breeding at least once within the state (AGFD Nongame Branch, pers. comm.). Arizona provides habitats for roughly 240 species of neotropical migratory birds, which breed in the United States and/or Canada and winter from Mexico to South America, of which 165 nest in the state regularly or irregularly (AGFD 2001). Forty-one raptor and owl species have been documented in Arizona, 33 of which occur year-round or breed in the state. An additional two vulture species and the re-introduced California condor also occur in the state. The greatest variety of species, and often numbers, of birds in Arizona occurs in the riparian and wetland habitats, which often provide oases within the upland habitats.

Many Arizona amphibians and reptiles are abundant and seasonally conspicuous, especially the desert-dwelling species. Among them are such commonly encountered species as spadefoot toads; whiptail lizards; side-blotched, tree, and desert spiny lizards; gopher and king snakes; and western diamondback and mojave rattlesnakes. Two non-native species, the bullfrog and softshell turtle, have also become widespread and locally abundant. The distribution and status of many of the rest of Arizonaís 26 species of native amphibians and 103 species of native reptiles is not well known (AGFD 2001). Many of the desert-dwelling species occupy the desert scrub habitats that are not fire-adapted, but now support wildfires that burn hotter and farther than their historical fire regime.

Fish

The number and variety of streams, rivers, lakes and reservoirs occurring on public lands support a quality sportfishing experience in Arizona, including providing habitat for approximately 27 species of sportfish (see **Appendix C**). Of the species commonly sought by Arizona anglers, eight are cool or coldwater fish, and 19 are warmwater species. Arizona has more than 160 stream management reaches that have a combined length of nearly 1,500 miles, as well as 3,000 acres in 64 lakes that are managed, primarily, for trout. Ten other lakes and an additional 34 miles in stream length (within four rivers) are managed primarily for warmwater species and secondarily for trout (AGFD 2001). Activities occurring on upland terrestrial habitats can affect the water quality and other attributes of these diverse aquatic habitats.

The 32 native fishes of Arizona include 30 freshwater and two saltwater species (AGFD 2001). Of these fish species, one is extinct and almost 75 percent are Federally protected by the Endangered Species Act, as amended, or are listed as Wildlife of Special Concern by the AGFD. Occurrences of the two saltwater species, machete (*Elops affinis regan)* and striped mullet (*Mugil cephalus linnaeus*), vary with flows of the lower Colorado River as dams, water management, and floods permit.

3.2.6 Special Status Plant and Wildlife Species

Special status species include Federally listed (endangered or threatened), proposed, and candidate species, and designated or proposed critical habitat; species of concern managed under Conservation Agreements or Management Plans; state-listed species; and BLM-sensitive species. Several special status species occurring within the management areas of the BLM Field Offices in Arizona are discussed in the LUPs referenced at the beginning of Section 3.0, and are incorporated here by reference. However, additional species and critical habitats have been added to or have changed Federal status under the Endangered Species Act since the time these plans were written. These additional species are now considered special status species to BLM.

For species with Federal status under the ESA (ìFederally protected speciesî), 30 endangered species, 12 threatened species, one species proposed for listing, and five species that are candidates for listing inhabit either BLM-administered lands in Arizona or adjacent Federal, state, reservation, or

private lands that could be affected by fire management activities (see **Table 3.6**). Of these 48 species, 9 are known to occur only on lands adjacent to BLM-administered lands, and three species (northern aplomado falcon, ocelot, and black-tailed prairie dog) are currently extirpated from Arizona, but may re-establish within the state either naturally or through reintroductions within the next 10-15 years. These Federally protected species can be grouped as follows: two amphibians, 10 birds, 14 fish, 12 flowering plants, eight mammals, and two reptiles.

Three species (Flat-tailed horned lizard, Paradine plains cactus, and Virgin spinedace) occurring on public lands in Arizona do not have Federal status under the ESA, but are Federal species of concern managed under Conservation Agreements that BLM participates in. The Sonoran population of the desert tortoise has no Federal status, but is a species of concern managed by BLM under the *Management Plan for the Sonoran Desert Population of the Desert Tortoise in Arizona* (Arizona Interagency Desert Tortoise Team 1996). In addition, 202 plant and wildlife species that are either state species of concern in Arizona, state-listed in California (for lands in the Lake Havasu and Yuma Field Offices), or BLM-sensitive species also occur on or near BLM-administered lands within the action area of the proposed Statewide Land Use Plan Amendment (see **Table 3.7**). BLM considers these additional plant and animal species as priority species in management of public lands.

Brief descriptions of each of the Federally listed, proposed, and candidate species, as well as the Conservation Agreement and Management Plan species, are provided in **Appendix F**.

3.3 Social and Economic Environment

3.3.1 Cultural and Paleontological Resources

Cultural resources are locations of human activity, occupation or use. They include archeological, historic, and architectural sites with important public and scientific uses. They also include places of traditional cultural or religious importance to Native Americans and other cultural groups. Numerous authorities provide a basis for making decisions on actions that could affect cultural resources, including (but not limited to) the National Historic Preservation Act (NHPA), as amended, the American Indian Religious Freedom Act, the Archaeological Resources Protection Act, and Executive Order 13007, ìIndian Sacred Sitesî.

Section 106 of the NHPA and its implementing regulations (36 CFR 800) require Federal agencies to take into account the effects of their undertakings on historic properties. As defined in 36 CFR 800.14, a historic property is ìany prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places...î The term also encompasses artifacts, records, and remains related to such properties. Compliance with Section 106 of the NHPA will be completed on a project-specific basis before decisions are made to carry out fire management activities that could affect cultural resources.

Identification and context for cultural resources are included in the Land Use Plans referenced at the beginning of Section 3.0, and are incorporated herein by reference. The following updates those discussions and provides a general overview of the wide range of prehistoric, historic, and traditional cultural/religious sites that occur on BLM-managed lands throughout Arizona. **Appendix G** describes the site types known to occur within the state and on BLM-managed land, snd also provides a chronology of human occupation in the state.

The BLM manages approximately 11.6 million acres of land in Arizona. Over 700,000 acres have been inventoried for cultural resources, with over 10,500 sites recorded. Nineteen Areas of Critical Environmental Concern (ACECs) encompassing 297,483 acres have been designated entirely or partly to provide management and protection of cultural resources. Three National Conservation Areas (NCAs) contain numerous cultural resources, including the Lehner Mammoth Kill Site, a National Historic Landmark. Lands administered by the BLMís Arizona State Office currently include nineteen National Register of Historic Places (NRHP) listings containing 362 historic properties. These properties are listed in **Table 3.8**.

BLMís existing LUPs describe site types and general distribution throughout the individual planning areas. It is important to note that these represent *known* sites only, given that relatively small portions of the planning areas have been subjected to cultural resource surveys. A general listing of selected cultural resource localities on BLM-managed lands not discussed in this section is provided in **Appendix G**. Individual fire management activities carried out

Table 3.6 ñ
Federally Listed, Proposed, and Threatened Species in Arizona Considered in the Affected Environment for the Proposed Statewide Land Use Plan Amendment

Common Name	Scientific Name	Status[a]	Vegetation Community	County[b]	BLM Field Office(s)[c]
Amphibians (2 species)					
Chiricahua leopard frog	*Rana chiricahuensis*	Threatened	Riparian/Aquatic within Montane Conifer Forest, Madrean Evergreen Woodland, Great Basin Pinyon-Juniper Woodland	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Navajo, Pima, Santa Cruz, Yavapai	Arizona Strip, Phoenix, Safford, Tucson
Relict leopard frog	*Rana onca*	Candidate	Riparian/Aquatic within Mohave Desert scrub	Mohave	Arizona Strip
Birds (10 species)					
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	Endangered, Proposed Critical habitat	Upper Sonoroan Desert Scrub, Riparian	Maricopa, Pima, Pinal, Santa Cruz, Yuma	Phoenix, Tucson, Yuma
California brown pelican	*Pelecanus occidentalis californicus*	Endangered	Riparian/Aquatic	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Arizona Strip, Lake Havasu, Kingman, Phoenix, Safford, Tucson, Yuma
California condor	*Gymnogyps californianus*	Endangered, 10(j) species	Great Basin Desert Scrub, Great Basin Pinyon-Juniper Woodland	Apache, Coconino, La Paz, Mohave, Navajo	Arizona Strip, Phoenix
Masked bobwhite	*Colinus virginianus ridgewayi*	Endangered	Semidesert Grassland	Pima	Phoenix

Common Name	Scientific Name	Status[a]	Vegetation Community	County[b]	BLM Field Office(s)[c]
Northern aplomado falcon	*Falco femoralis septentrionalis*	Endangered	Semidesert Grassland	Cochise, Santa Cruz, Yuma	Safford, Tucson,Yuma
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Riparian	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Arizona Strip, Lake Havasu, Kingman, Phoenix, Safford, Tucson,Yuma
Yuma clapper rail	*Rallus longirostris yumanensis*	Endangered	Riparian	La Paz, Maricopa, Mohave, Pinal, Yuma	Lake Havasu, Phoenix, Yuma
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Upper Sonoran Desert Scrub, Riparian	Apache, Cochise, Coconino, Gila, Graham, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Arizona Strip, Lake Havasu, Kingman, Phoenix, Safford, Tucson, Yuma
Mexican spotted owl	*Strix occidentalis lucida*	Threatened, Critical habitat	Great Basin Desert Scrub, Great Baisn Pinyon-Juniper Woodland, Madrean Evergreen Woodland, Montane Conifer Forest	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai	Arizona Strip, Kingman, Phoenix, Safford, Tucson
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate	Riparian	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Arizona Strip, Lake Havasu, Kingman, Phoenix, Safford, Tucson, Yuma

Common Name	Scientific Name	Status[a]	Vegetation Community	County[b]	BLM Field Office(s)[c]
Fish (14 species)					
Bonytail chub	*Gila elegans*	Endangered, Critical habitat	Riparian/Aquatic within Sonoran Desert Scrub	La Paz, Mohave	Lake Havasu, Kingman
Desert pupfish	*Cyprinodon macularius*	Endangered, Critical habitat	Riparian/Aquatic within Upper Sonoran Desert scrub	Graham, La Paz, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	Lake Havasu, Phoenix, Safford, Tucson
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	Endangered	Riparian/Aquatic within Upper Sonoran Desert Scrub	Gila, Graham, La Paz, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	Lake Havasu, Phoenix, Safford, Tucson
Razorback sucker	*Xyrauchen texanus*	Endangered, Critical habitat	Riparian/Aquatic within Mohave Desert Scrub, Lower Sonoran Desert Scrub, Great Basin Desert Scrub, Semi-desert Grassland	La Paz, Maricopa, Mohave	Lake Havasu, Kingman, Phoenix
Virgin River chub	*Gila seminuda*	Endangered, Critical habitat	Riparian/Aquatic within Mohave Desert Scrub, Great Basin Desert Scrub, Great Basin Pinyon-Juniper Woodland	Mohave	Arizona Strip
Woundfin	*Plagopterus argentissimus*	Endangered, Critical habitat. Future 10(j) populations.	Riparian/Aquatic within Mohave Desert Scrub, Great Basin Desert Scrub, Great Basin Pinyon Juniper Woodland	Mohave	Arizona Strip
Yaqui chub	*Gila purpurea*	Endangered, Critical habitat	Riparian/Aquatic within Semidesert Grassland, Chihuahuan Desert Scrub	Cochise	Safford
Yaqui topminnow	*Poeciliopsis occidentalis sonoriensis*	Endangered	Riparian/Aquatic within Semidesert Grassland, Chihuahuan Desert Scrub	Cochise	Safford
Beautiful shiner	*Cyprinella formosa*	Threatened, Critical habitat	Riparian/Aquatic within Semidesert Grassland, Chihuahuan Desert Scrub	Cochise	Safford
Little Colorado spinedace	*Lepidomeda vittata*	Threatened, Critical habitat	Riparian/Aquatic within Plains and Great Basin Grassland, Great Basin Pinyon Juniper Woodland	Apache, Coconino, Navajo	Phoenix

Common Name	Scientific Name	Status[a]	Vegetation Community	County[b]	BLM Field Office(s)[c]
Loach minnow	*Tiaroga cobitis*	Threatened, Critical habitat	Riparian/Aquatic within Sonoran Desert Scrub, Chihuhuan Desert Scrub, Semidesert Grassland	Apache, *Cochise, Graham, Greenlee, Gila, *Pima, Pinal, Navajo, *Yavapai	Phoenix, Safford, Tucson
Spikedace	*Meda fulgida*	Threatened, Critical habitat	Riparian/Aquatic within Sonoran Desert Scrub, Chihuahuan Desert Scrub, Semidesert Grassland	*Apache, *Cochise, Graham, Greenlee, *Gila, *Pima, Pinal, Yavapai	Phoenix, Safford, Tucson
Yaqui catfish	*Ictalurus pricei*	Threatened, Critical habitat	Riparian/Aquatic within Semidesert Grassland, Chihuahuan Desert Scrub	Cochise	Safford
Gila chub	*Gila intermedia*	Proposed Endangered, Proposed Critical habitat	Riparian/Aquatic within Semidesert Grassland, Interior Chaparral	Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	Phoenix, Safford, Tucson
Flowering Plants (12 species)					
Arizona cliffrose	*Purshia subintegra*	Endangered	Upper Sonoran Desert Scrub	Graham, Maricopa, Mohave, Yavapai	Kingman, Phoenix, Safford
Brady pincushion cactus	*Pediocactus bradyi*	Endangered	Great Baisn Desert Scrub	Coconino	Arizona Strip
Holmgren (Paradox) milk vetch	*Astragalus holmgreniorum*	Endangered	Great Basin Desert Scrub	Mohave	Arizona Strip
Huachuca water umbel	*Lilaeopsis schaffneriana ssp. recurva*	Endangered, Critical habitat	Riparian/Aquatic	Cochise, Pima, Santa Cruz	Safford, Tucson
Kearneyís blue-star	*Amsonia kearneyana*	Endangered	Madrean Evergreen Woodland, Interior Chaparral, Riparian/Aquatic	Pima	Phoenix
Nichol Turkís head cactus	*Echinocactus horizonthalonius var. nicholii*	Endangered	Upper Sonoran Desert Scrub	Pima, Pinal	Tucson
Peebles Navajo cactus	*Pediocactus peeblesianus var. peeblesianus*	Endangered	Plains and Great Basin Grassland, Great Basin Desert Scrub	Navajo	Safford

Common Name	Scientific Name	Status[a]	Vegetation Community	County[b]	BLM Field Office(s)[c]
Pima pineapple cactus	*Coryphantha scheeri var. robustispina*	Endangered	Upper Snoran Desert Scrub, Semidesert Grassland	Pima, Santa Cruz	Tucson
Jones cycladenia	*Cycladenia humilis var. jonesii*	Threatened	Great Basin pinyon-Juniper Woodland, Great Basin Desert Scrub	Mohave	Arizona Strip
Siler pincushion cactus	*Pediocactus sileri*	Threatened	Plains and Great Basin Grassland, Great Basin Pinyon Juniper Woodland	Coconino, Mohave	Arizona Strip
Acuna cactus	*Echinomastus erectocentrus var. acunensis*	Candidate	Lower Sonoran Desert Scrub, Upper Sonoran Desert Scrub	Pima, Pinal	Tucson
Fickeisen plains cactus	*Pediocactus peeblesianus var. fickeiseniae*	Candidate	Plains and Great Basin Grassland, Great Basin Desert Scrub	Coconino, Mohave	Arizona Strip

Mammals (8 species)					
Black-footed ferret	*Mustela nigripes*	Endangered, 10(j) species	Plains and Great Plains Grassland	Apache, Coconino, Navajo	Phoenix
Hualapai Mexican vole	*Microtus mexicanus hualpaiensis*	Endangered	Great Basin pinyon-Juniper Woodland, Interior Chaparral	Mohave, Coconino, Yavapai	Kingman, Phoenix
Jaguar	*Panthera onca*	Endangered	Madrean Evergreen Woodland, Semi-desert Grassland, Montane Conifer Forest, Sonoran Desert Scrub	Cochise, Santa Cruz, Pima	Tucson, Safford
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	Endangered	Semidesert Grassland, Sonoran Desert Scrub, Chihuahuan Desert Scrub	Cochise, Gila, Graham, Pima, Pinal, Maricopa, Santa Cruz	Phoenix, Safford, Tucson
Mexican gray wolf	*Canis lupus baileyi*	Endangered, 10(j) species	Madrean Evergreen Woodland, Montane Conifer Forest	Apache, Cochise, Coconino, Greenlee, Pima, Santa Cruz	Phoenix, Safford, Tucson
Ocelot	*Leopardus (=Felis) pardalis*	Endangered	Chaparral, Desert Scrub, Riparian	Cochise, Pima, Santa Cruz	Safford, Tucson
Sonoran pronghorn	*Antilocapra americana sonoriensis*	Endangered	Sonoran Desert Scrub	Pima, Maricopa, Yuma	Phoenix, Yuma
Black-tailed prairie dog	*Cynomys ludovicianus*	Candidate	Plains and Great Basin Grassland	Cochise, Graham, Pima	Safford, Tucson
Reptiles (2 species)					
Desert tortoise, Mojave population	*Gopherus agassizii (xerobates)*	Threatened	Mohave Desert Scrub, Lower Sonoran Desert Scrub	Mohave (AZ), San Bernardino, Riverside, Imperial (CA)	Arizona Strip, Lake Havasu, Yuma
New Mexico ridgenose rattlesnake	*Crotalus willardi obscurus*	Threatened	Madrean Evergreen Woodland, Montane Conifer Forest	Cochise	Safford
Conservation Agreement and Management Agreement Species					
Flat-tailed horned lizard	*Phrynosoma mcallii*	Conservation Agreement	Lower Sonoran Desert Scrub	Yuma	Yuma
Paradine (Kaibab) plains cactus	*Pediocactus paradinei*	Conservation Agreement	Great Basin Desert Scrub, Great Basin Pinyon-Juniper Woodland, Plains and Great Basin Grassland, Montane Conifer Forest	Coconino	Arizona Strip

Virgin spinedace	*Lepidomeda mollispinis mollispinis*	Conservation Agreement	Riparian/Aquatic, Mohave Desert Scrub	Mohave	Arizona Strip
Desert tortoise, Sonoran population	*Gopherus agassizii (xerobates)*	Management Agreement	Sonoran Desert Scrub	Cochise, Gila, Graham, La Paz, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Lake Havasu, Kingman, Phoenix, Safford, Tucson, Yuma

[a] Species listed as ì10(j) speciesî are designated experimental/non -essential populations under Section 10(j) of the Endangered Species Act, as amended. This designation provides greater management flexibility. For BLM, 10(j) populations of Federally listed species are equivalent to a ìproposedî status.

[b] Counties with an asterik (*) have designated critical habitat, but presently contain no known existing populations of the fish species.

[c] Species within the BLM Field Office management boundaries may be on BLM-administered lands or on adjacent lands within the Affected Environment.

Table 3.7 ñ
BLM and State species of concern in Arizona and California considered in the planning area for the Proposed Statewide Land Use Plan Amendment[1]

Common Name	*Scientific Name*	Status
Mammals		
Allenís (Mexican) big-eared bat	*Idionycteris phyllotis*	BLM
Arizona myotis	*Myotis lucifugus occultus*	BLM
Arizona shrew	*Sorex arizonae*	AZSc
Big free-tailed bat	*Myctinomops macrotis*	BLM, CASc
California leaf-nosed bat	*Macrotus californicus*	BLM, AZSc, CASc
Camp Verde Arizona cotton rat	*Sigmodon arizonae arizonae*	AZSc
Cave myotis	*Myotis velifer*	BLM, CASc
Chihuahuan pronghorn	*Antilocapra americana mexicana*	AZSc
Fringed myotis	*Myotis thysanodes*	BLM
Houserock Valley chisel-toothed kangaroo rat	*Dipodomys microps leucotis*	BLM, AZSc
Long-eared myotis	*Myotis evotis*	BLM
Long-legged myotis	*Myotis volans*	BLM
Meadow jumping mouse	*Zapus hudsonius*	AZSc
Merriamís elk	*Cervus elaphus merriami*	AZSc
Mexican long-tongued bat	*Choeronycteris mexicana*	BLM, AZSc, CASc
Navajo Mexican vole	*Microtus mexicanus navaho*	AZSc
New Mexico banner-tailed kangaroo rat	*Dipodomys spectablis baileyi*	AZSc
Occult little brown bat	*Myotis lucifugus occultus*	BLM, CASc
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	BLM, CASc
Sanbornís long-nosed bat	*Leptonycteris sanborni*	AZSc
Southwestern river otter	*Lontra canadensis sonora*	AZSc
Western small-footed myotis	*Myotis ciliolabrum*	BLM
Southern yellow bat	*Lasiurus ega*	AZSc
Spotted bat	*Euderma maculatum*	BLM, AZSc, CASc
Underwoodís mastiff bat	*Eumops underwoodi*	BLM
Water shrew	*Sorex palustris*	AZSc
Western red bat	*Lasiurus blossevillii*	AZSc
Western yellow bat	*Lasiurus xanthinus*	AZSc
Yuma mountain lion	*Puma concolor browni*	AZSc, CASc
Birds		
American bittern	*Botaurus lentiginosus*	AZSc
American redstart	*Setophaga ruticilla*	AZSc
American peregrine falcon	*Falcoperegrinus anatum*	CAE
Arizonaís bell vireo	*Vireo belli arizonae*	CAE
Bairdís sparrow	*Ammodramus bairdii*	AZSc
Belted kingfisher	*Ceryle alcyon*	AZSc
Black-bellied whistling-duck	*Dendrocygna autumnalis*	AZSc
Black-billed magpie	*Pica hudsonia*	AZSc
Black-capped gnatcatcher	*Polioptila nigriceps*	AZSc
Burrowing owl	*Athene cunicularia* (burrow sites)	CASc
California black rail	*Laterallus jamaicensis coturniculus*	AZSc, CAT
Bobolink	*Dolichonyx oryzivorus*	AZSc
Buff-breasted flycatcher	*Empidonax fulvifrons*	AZSc
Clarkís grebe	*Aechmophorus clarki*	AZSc
Common black-hawk	*Buteogallus anthracinus*	AZSc
Crested caracara	*Buteogallus anthracinus*	AZSc
Elegant trogon	*Trogon elegans*	AZSc
Elf owl	*Micrathene whitneyi*	CAE

Common Name	*Scientific Name*	Status
Ferruginous hawk	*Buteo regalis*	AZSc
Fulvus whistling duck	*Dendrocygna bicolor*	BLM
Gila woodpecker	*Melanerpes uropygialis*	CAE
Gilded flicker	*Colaptes chrysoides*	CAE
Great egret	*Casmerodius albus*	AZSc
Great sandhill crane	*Grus Canadensis tabida*	CAT
Grey catbird	*Dumetella carolinensis*	AZSc
Grey hawk	*Buteo nitidus*	AZSc
Large-billed savannah sparrow	*Passerculus sandwichensis rostratus*	BLM, CASc
Least bittern	*Ixobrychus exilis*	AZSc
Le Conteís thrasher	*Toxostoma lecontei*	CASc
Loggerhead shrike	*Lanius ludovicianus*	BLM
Mississippi kite	*Ictinia mississippiensis*	AZSc
Northern goshawk	*Accipiter gentiles*	AZSc
Northern greyhawk	*Buteo nitidus maximus*	BLM
Osprey	*Pandion haliaetus*	AZSc
Peregrine falcon	*Falco peregrinus*	AZSc
Pine grosbeak	*Pinicola enucleator*	AZSc
Rose-throated becard	*Pachyramphus agliae*	AZSc
Snowy egret	*Egretta thula*	AZSc
Snowy plover	*Charadrius alexandrinus*	AZSc
Spragueís pipit	*Polioptila nigriceps*	AZSc
Swainsonís hawk	*Buteo swainsoni*	CAT
Thick-billed kingbird	*Tyrannus crassirostris*	AZSc
Thick-billed parrot	*Rhynchopsitta pachyrhyncha*	AZSc
Tropical kingbird	*Tyrannus melancholicus*	AZSc
Veery	*Catharus fuscescens*	AZSc
Violet-crowned hummingbird	*Amazilia violiceps*	AZSc
Western burrowing owl	*Athene cunicularia hypugea*	BLM
White-faced ibis	*Plegadis chihi*	BLM, CASc
Amphibians and Reptiles		
Arizona ridge-nosed rattlesnake	*Crotalus willardi willardi*	AZSc
Arizona skink	*Eumeces gilberti arizonensis*	BLM, AZSc
Arizona toad	*Bufo microscaphus*	CAProt
Banded Gila monster	*Heloderma suspectum cinctum*	BLM
Barking frog	*Eleutherodactylus augusti*	AZSc
Brown vine snake	*Ocybelis aeneus*	AZSc
Canyon spotted whiptail	*Cnemidophorus burti*	BLM
Chuckwalla	*Sauromalus ater*	BLM
Giant spotted whiptail	*Cnemidophorus burti stictogrammus*	BLM
Great Plains narrow-mouthed toad	*Gastrophryne olivacea*	AZSc
Lowland burrowing treefrog	*Pternohyla fodiens*	AZSc
Lowland leopard frog	*Rana yavapaiensis*	AZSC, CASc, CAProt
Massasuaga	*Sistrurus catenatus*	AZSc
Mexican garter snake	*Thamnophis eques*	AZSc
Mojave fringe-toed lizard	*Uma scoparia*	AZSc
Narrow-headed garter snake	*Thamnophis rufipunctatus*	AZSc
Northern casque-headed frog	*Pternohyla fodiens*	AZSc
Northern sagebrush lizard	*Sceloporus graciosus graciosus*	BLM
Northern leopard frog	*Rana pipiens*	AZSc
Plains leopard frog	*Rana blairi*	AZSc
Redback whiptail	*Cnemidophorus burti xanthonotus*	BLM

Common Name	*Scientific Name*	Status
Rosy boa	*Charina trivirgata*	BLM
Sonoran desert fringe-toed lizard	*Uma notata*	AZSc
Tarahumara frog	*Rana tarahumarae*	AZSc
Texas horned lizard	*Phrynosoma corutum*	BLM
Yuma desert fringe-toed lizard	*Uma notata rufopunctata*	BLM, AZSc
Fish		
Arizona stoneroller	*Campostoma ornatum pricei*	AZSc
Desert sucker	*Cotostomus clarki*	BLM
Little Colorado sucker	*Catostomus* sp.	BLM, AXSc
Longfin dace	*Agosia chrysogaster*	BLM
Mexican stoneroller	*Campostoma ornatum*	AZSc
Quitobaquito desert pupfish	*Cyprinodon eremus*	AZSc
Santa Cruz pupfish	*Cyprinodon arcuatus*	AZSc
Sonora sucker	*Cotostomus insignis*	BLM
Speckled dace	*Rhinichthys osculus*	BLM
Invertebrates		
Arizona giant sand treader cricket	*Daihinibaenetes arizonensis*	BLM
Cheese-weed moth lacewing	*Oliarces clara*	BLM
Chiriahua water scavenger beetle	*Cymbiodyta arizonica*	BLM
Cockerellís striate disc (snail)	*Discus shemeki cockerelli*	BLM
Ydrobiid springsnails	All species in genus *Pyrgulopsis*	BLM
MacNeill sooty wing skipper	*Hesperopsis gracielae*	BLM
Maricopa Jerusalem cricket	*Stenopelmatus navajo*	BLM
Niobrara ambersnail	*Oxyloma haydeni haydena*	BLM
Santa Rita Mountains chlorachoroan bug	*Chlorochroa rita*	BLM
Succineid snails	All species in the family Succineidae	BLM
Plants		
Agave sp.	*Agave delamateri*	AZNPL
Agave sp.	*Agave schottii* var. *treleasei*	AZNPL
Algodones Dunes sunflower	*Agave schottii* var. *treleasei*	CAE
Aquarius milkvetch	*Astragalus newberryi* var. *aquarii*	BLM
Aravaipa sage	*Savia amissa*	BLM
Aravaipa woodfern	*Thelypteris puberula* var. *sonorensis*	BLM
Arizona leatherflower	*Clematis hirsutissima* var. *arizonica*	AZNPL
Arizona Sonoran rosewood	*Vauquelinia californica* ssp. *sonorensis*	BLM
Balloonvine	*Cardiospermum corundum*	BLM
Balsamroot sp.	*Balsamorhiza hookeri* var. *hispidula*	BLM
Bartram stonecrop	*Graptopetalum bartramii*	BLM
Beath milk-vetch	*Astragalus beathii*	BLM
Beaver dam surf pea	*Pediomelum castoreum*	BLM
Black rock daisy	*Townsendia smithii*	BLM
Blue sand lily	*Triteleiopsis palmeri*	BLM
California copperleaf	*Acalypha californica*	BLM
California flannelbush	*Fremontodendron californica*	BLM
Cerbat beardtongue	*Penstemon bicolor* ssp. *roseus*	BLM
Chiricahua Mountain tansy-aster	*Machaeranthera riparia*	BLM
Chisos Mountains coralroot	*Hexalectris revoluta*	BLM
Cliff milkvetch	*Astragalus cremnophylax* var. *myriorraphus*	BLM

Common Name	*Scientific Name*	Status
Clifton rock daisy	*Perityle ambrosiifolia*	BLM
ëCrestedí or ëFan-toppedí Saguaro	*Carnegiea gigantean*	AZNPL
Dallhouse spleenwort	*Asplenium (Ceterach) dalhousiae*	BLM
Desert cassia	*Senna armata*	BLM
Desert moonpod	*Selinocarpus diffuses*	BLM
Death Valley Mormon tea	*Ephedra funerea*	BLM
Diamond Butte milkvetch	*Astragalus toanus* var. *scidulus*	BLM
Encinillas	*Croton fruticulosus*	BLM
False grama	*Cathestecum erectum*	BLM
Fish Creek fleabane	*Erigeron piscaticus*	BLM
Fragrant bursera	*Bursera fagaroides*	AZNPL
Gentry indigo bush	*Dalea tentaculoides*	BLM, AZNPL
Giant sedge	*Carex spissa* var. *ulta*	BLM
Goosfoot moonpod	*Ammocodon chenopodioides*	BLM
Green puccoon	*Lithospermum viride*	BLM
Grand Canyon rose	*Rosa stellata* var. *abyssa*	BLM
Huachuca golden aster	*Heterotheca rutteri*	BLM
Huachuca groundsel	*Senecio huachucanus*	AZNPL
Kaibab pincushion cactus	*Pedicactus paradinei*	BLM
Kearney sumac	*Rhus kearneyi* spp. *kearneyi*	BLM
Kofa Mt. Barberry	*Berberis harrisoniana*	BLM
Longleaf sandpaper plant	*Petalonyx linearis*	BLM
Mohave thistle	*Cirsium mohavense*	BLM
Mt. Trumbell beardtongue	*Penstemon distans*	BLM
Murphey agave	*Agave murpheyi*	BLM, AZNPL
Nevin birdís-beak	*Cordylamthus nevinii*	BLM
Orange pipe cactus	*Stenocereus thurberi*	BLM
Owns Valley cotton thorn	*Tetradymia stenolepis*	BLM
Parish onion	*Allium parishii*	BLM
Parish alkali grass	*Puccinellia parishii*	AZNPL
Parish phacelia	*Phacelia parishii*	BLM
Peebles bluestar	*Amsonia peeblesii*	BLM
Purple-spike coralroot	*Hexalectris warnockii*	BLM, AZNPL
Pygmy sagebrush	*Artemisia pygmaea*	BLM
Redflower onion	*Allium rhizomatum*	BLM
Round-leaf broom	*Errazuriza rotundata*	BLM
Rumex sp.	*Rumex orthoneurus*	AZNPL
Sand food	*Pholisma sonorae*	BLM, AZNPL
Santa Cruz beehive cactus	*Coryphantha recurvata*	BLM, AZNPL
Santa Cruz striped agave	*Agave parviflora* ssp. *parviflora*	BLM, AZNPL
Santa Rita yellowshow	*Amoreuxia gonzalezii*	AZNPL
Scaly-stemmed sand plant	*Pholisma arenaria*	BLM, AZNPL
Scheerís strong-spined cory cactus	*Coryphantha scheeri*	AZNPL
Schott wire-lettuce	*Stephanomeria schottii*	BLM
Sheep Range beardtongue	*Penstemon petiolatus*	BLM
Shiny-leaved sandpaper plant	*Petalonyx nitidus*	BLM
Silver buffaloberry	*Shepherdia argentea*	BLM
Silver felt thorn	*Tetradymia argyraea*	BLM
Silverleaf sunray	*Enceliopsis argophylla*	BLM
Slender evening primrose	*Camissonia exilis*	BLM
Texas globeberry	*Ibervillea tenuisecta*	BLM
Three hearts	*Tricardia watsonii*	BLM
Three-nerved scurfpea	*Pediomelum trinervatum*	BLM
Tumamoc globeberry	*Tumamoca macdougalii*	BLM

Common Name	*Scientific Name*	Status
Variegated beardtongue	*Penstemon discolor*	AZNPL
Waxy bitterbush	*Purshia glandulosa*	BLM
Whick fern	*Psilotum nudum*	AZNPL
White-margined penstemon	*Penstemon albomarginatus*	BLM
Yellow ladyís slipper	*Cypripedium calcelolus*	AZNPL

[1] Species already represented as federally listed, proposed, candidate, or Conservation Agreement/Management Plan species are not repeated here.

Status Definitions:

US Bureau of Land Management (2000 Animals, 2000 Plants; http://www.az.blm.gov)
BLM BLM Sensitive species
State Wildlife Species of Concern
AZSc Wildlife of Special Concern in Arizona (AGFD, Draft 1996; http://www.azgfd.com)
CAE California State Endangered
CAT California State Threatened
CASc California Species of Special Concern
CAProt California Protected
Arizona Native Plant Law, Highly Safeguarded Species
AZNPL

The Arizona Department of Agriculture maintains a list of native plants that are protected under the State of Arizona Native Plant Law. The list includes five categories of protection as follows:

HS Highly Safeguarded ñ no collection allowed
SR Salvage Restricted ñ collection only with permit
ER Export Restricted ñ transport out of State prohibited
SA Salvage Restricted ñ permits required to remove live trees
HR Harvest Restricted ñ permits required to remove plant by-products

For the purposes of this Environmental Assessment, only species identified on the Highly Safeguarded list (HS) are included in the table above. These species of native plants and parts of plants, including the seeds and fruits, represent species believed to be in jeopardy of extinction within Arizona.

Table 3.8 ñ
National Register Of Historic Places Listings On BLM-Managed Land In Arizona

County	NRHP Property	County	NRHP Property
Cochise	Lehner Mammoth Kill Site	Pima	Santa Ana del Chiquiburitac Mission Site
Cochise	Santa Cruz de Terrenate	Pinal	McClellan Wash Archeological District
Graham	Kearny Campsite and Trail	Riverside County	Blythe Intaglios
La Paz	Eagletail Petroglyph Site	Yavapai	Perry Mesa Archeological District
La Paz	Harquahala Mountain Smithsonian Solar Observatory Historic District	Yuma/La Paz	Earth Figures of California-Arizona
Maricopa	Painted Rocks	Yuma	El Camino del Diablo
Mohave	Antelope Cave	Yuma	Martinez Lake Site
Mohave	Bighorn Cave	Yuma	Ripley Intaglios
Pima	Corcoraque Butte Archeological District	Yuma	Sears Point Archeological District
Pima	Empire Ranch		

under this plan will be preceded by a complete review of known resources and field survey, as appropriate, to identify cultural resources that might be affected by the proposed activities.

3.3.1.1 Prehistoric Resources

Thousands of archeological sites representing over 13,000 years of human occupation have been recorded on BLM-managed land in Arizona. Prehistoric sites tend to concentrate near seeps and springs in mountain ranges, and along perennial streams such as Burro and Big Sandy Creeks and the Gila and Colorado Rivers. They include properties as diverse as Paleoindian mammoth kill sites, Archaic hunting camps, giant ground figures (intaglios), pueblo ruins and rock art. A few of these sites have been developed for public access, such as the Murray Springs Clovis Site, a Paleoindian mammoth and bison kill site, as well as the Little Black Mountain Rock Art Site.

3.3.1.2 Historic Resources

Historic resources in Arizona pertain primarily to Spanish, Mexican, and Anglo-American activities since the mid-1500s. They include ghost towns, historic ranches, and numerous historic trails and wagon roads such as the Butterfield Overland Stage Route. Some historic trails, such as the 1776 Dominguez and Escalante Trail and the Juan Bautista de Anza National Historic Trail along the Gila River date to the period of Spanish/Mexican exploration. Resources pertaining to mining, timber cutting, and Anglo-American settlement date from the 1870ís, and numerous ìghost townsî (i .e., abandoned settlements) occur throughout the state. Many resources, such as the National Register-listed Empire Ranch (dating from 1876), the 1920s Harquahala Peak Smithsonian Observatory, the 1776 Spanish Presidio Santa Cruz de Terrenate, the Gold King Mansion (1929), and the turn-of-the-century historic mining town of Swansea, are considered historically significant and are accessible to the public. Roads and structures constructed by the Civilian Conservation Corps (CCC) are also present.

3.3.1.3 Places of Traditional Cultural Importance

Places of traditional cultural importance provide a sense of spiritual and social continuity to Native Americans and other cultural groups. Some places may have religious significance. Others may be used for the observance of traditional ceremonial activities, or for hunting or gathering plants for food or medicinal use.

Within the context of the NHPA, a traditional cultural property (TCP) is a property that may be eligible for inclusion on the National Register of Historic Places due to its association with the cultural practices or beliefs of a living community when those practices or beliefs have been passed down through the generations and are important in maintaining the cultural identity and integrity of that group. Because they are not usually recognizable to an outsider through archeological or historical investigations, the existence and locations of TCPs may often only be identified through consultation with members of the groups who ascribe value to those places.

The BLM is consulting specifically with Indian tribes to provide an opportunity for tribes to identify any places of traditional religious or cultural importance relevant to the proposed land use plan amendment. In addition, tribal consultation will also take place for individual fire management actions undertaken under the proposed LUP amendment, when applicable. Many Native American belief systems require that the identity and location of traditional religious and cultural properties not be divulged. BLM has a commitment to keep specific information regarding such resources confidential to the fullest extent allowed by law.

3.3.2 Paleontological Resources

Paleontology is the study of flora and fauna (vertebrate and invertebrate) from past geological eras. Paleontological resources are fossils, or recognizable remains of past life, which have been preserved through various processes. The most typical process involves deposition of the organism in sediment which has either preserved the form of the organic material through replacement of the organic material by sediment, or through preservation of the form of the organism by impression in sediment. In some dry climates, preservation of organic material may occur.

Paleontological resources are discussed in somewhat more detail in the LUPs referenced at the beginning of Section 3.0, and are incorporated herein by reference. Significant fossil sites on BLM-managed land in Arizona include Bear Springs Badlands and the 111 Ranch, both located in Graham County and designated as ACECs due to the significance of their paleontological resources. Fossils on these lands date from the late Pliocene, approximately 2.5 million years ago, and contain representative remains of numerous land mammals now extinct in North America. A 25-mile long Pliocene lake near Wikieup also contains fossils of birds, horses, camels, and

other species. Mammoth remains have recently been found near Golden Shores, along the Colorado River.

Some prehistoric archeological sites, such as the Lehner Mammoth Kill Site and the Murray Springs Clovis Site, also contain paleontological resources indicating the exploitation of mammoth and bison by early human inhabitants of the area.

BLM also manages land adjacent to the Petrified Forest National Park in Navaho County, which contains petrified wood and other fossils.

3.3.3 Visual Resources

Visual resources on BLM-administered lands are identified, evaluated, and classified following management guidelines in BLM Manual Section 8400, Information Bulletin No. 98-135, and Instruction Memorandum No. 98-164. Systematic inventory procedures are described in BLM Handbook H-8410-1, Visual Resource Inventory. Accordingly, Visual Resource Management (VRM) land classifications have been established in LUPs referenced in Section 3. The four VRM classes (I-IV) are based on determinations of scenic quality or visual appeal of the area, distance zones from which the landscape of interest is viewed, and public sensitivities to change in the existing landscape character. Overall VRM quality is managed on the basis of the objectives for Classes I through IV described below:

Class I ñ The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; it does not, however, preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

Class II ñ The objective of this class is to retain the character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III ñ The objective of this class is to partially retain the existing character of the landscape. The level of activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV ñ The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. Every attempt should be made, however, to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Class I VRM areas, the most scenic and most sensitive of the four VRM classes, are typically special designation management areas such as wilderness or Areas of Critical Environmental Concern (ACECs). Management in these areas is generally consistent with VRM objectives. Class II areas may include special designation areas not managed as Class I areas and, in addition, include canyon and mountain vistas of particular interest. Class III VRM management areas are established along some major highway corridors or may have been established adjacent to higher level VRM classes to buffer management impacts near more sensitive areas or broad vistas. Class IV areas are those lands not included in Classes I-III. Management activities in all of these areas are assessed on a project-by-project basis through a process described in BLM Handbook H-8431-1, Visual Resource Contrast Rating, to assure that impacts to visual quality are minimized or mitigated. Potential impacts, analyzed for the basic elements of form, line, texture, and color, can be managed through the application of various design techniques.

3.3.4 Special Designation Areas

Special designation or Special Management Areas are lands that contain natural features that have been recognized by law, Presidential Proclamation, or have been recognized in prior plans or reports as being unique, important and deserving of some form of special management. There are five types of such special designation areas on BLM-managed lands in Arizona: wilderness areas, Wild and Scenic Rivers, National Monuments, National Conservation Areas, and Areas of Critical Environmental Concern (ACECs). Special designation areas are discussed in more detail in the LUPs referenced at the beginning of Section 3.0, and are incorporated herein by reference. The following are brief descriptions of special designation areas.

Table 3.9 ñ Wilderness Areas and Acreage Amount per BLM Field Office

Phoenix Field Office		Kingman Field Office	
Big Horn Mountains Wilderness	21,000 ac	Arrastra Mountain Wilderness	129,800 ac
Harquahala Mountains Wilderness	22,880 ac	Aubrey Peak Wilderness*	15,400 ac
Hassayampa River Canyon Wilderness*	11,840 ac	Mount Nutt Wilderness*	27,600 ac
Hells Canyon Wilderness*	9,900 ac	Mount Tipton Wilderness*	30,760 ac
Hummingbird Springs Wilderness	31,200 ac	Mount Wilson Wilderness*	23,900 ac
North Maricopa Mountains Wilderness*	63,200 ac	Tres Alamos Wilderness*	8,300 ac
Sierra Estrella Wilderness*	14,400 ac	Upper Burro Creek Wilderness	27,440 ac
Signal Mountain Wilderness*	13,350 ac	Wabayuma Peak Wilderness*	40,000 ac
South Maricopa Mountains Wilderness*	60,100 ac	Warm Springs Wilderness*	112,400 ac
Table Top Wilderness*	34,400 ac	**Safford Field Office**	
Woolsey Peak Wilderness*	64,000 ac	Aravaipa Canyon Wilderness*	19,410 ac
Lake Havasu Field Office		Baker Canyon Wilderness Study Area	4,810 ac
Cactus Plain Wilderness Study Area	59,100 ac	Dos Cabezas Mountains Wilderness*	11,700 ac
East Cactus Plain Wilderness*	14,630 ac	Fishhooks Wilderness	1,500 ac
Gibraltar Mountain Wilderness*	18,790 ac	North Santa Teresa Wilderness	5,800 ac
Harcuvar Mountains Wilderness	25,050 ac	Peloncillo Mountains Wilderness*	19,400 ac
Rawhide Mountains Wilderness	38,470 ac	Redfield Canyon Wilderness*	6,600 ac
Swansea Wilderness	16,400 ac	**Yuma Field Office**	
Arizona Strip Field Office		Eagletail Mountains Wilderness*	100,600 ac
Beaver DamWilderness*	19,600 ac	Muggins Mountains Wilderness*	7,711 ac
Cottonwood Point Wilderness*	6,860 ac	New Water Mountains Wilderness*	24,600 ac
Grand Wash Cliffs Wilderness*	37,030 ac	Trigo Mountains Wilderness	30,300 ac
Kanab Creek Wilderness*	75,300 ac	**Tucson Field Office**	
Mount Logan Wilderness*	14,650 ac	Baboquivari Peak Wilderness	2,065 ac
Mount Trumbull Wilderness*	7,880 ac	Coyote Mountains Wilderness	5,080 ac
PaiuteWilderness*	87,900 ac	Needleís Eye Wilderness	8,760 ac
Paria Canyon-Vermilion Cliffs Wilderness*	112,500 ac	White Canyon Wilderness	5,800 ac

* A Wilderness Management Plan has been approved for this area.

3.3.4.1 Wilderness

The BLM in Arizona is responsible for 49 wilderness areas totaling over 1.5 million acres. Congress established these areas through the Arizona Wilderness Act of 1984 and the Arizona Desert Wilderness Act of 1990. **Table 3.9** list wilderness areas by the Field Office that manages each area.

3.3.4.2 Wild & Scenic Rivers

The Verde River in central Arizona is a designated Wild and Scenic River, which is characterized by a rich riparian area. Indeed, *Verde* is the Spanish term for the color ìgreen.î Many people visit the Verde for its outstanding recreational opportunities including boating, hunting, fishing, birding, hiking, picnicking and photography. The Verde River heads at Sullivan Lake in the Big Chino Valley (south of Paulden) in Yavapai County, and flows generally south for 170 miles through private, state, tribal and National Forest System lands to the confluence with the Salt River.

3.3.4.3 National Monuments

BLM manages five National Monuments within the State of Arizona. These five monuments are:

Agua Fria National Monument - Adjacent to rapidly expanding communities, the 71,000-acre monument is approximately 40 miles north of central Phoenix. The monument encompasses two mesas and the canyon of the Agua Fria River. Elevations range from 2,150 feet above sea level along the Agua Fria Canyon to about 4,600 feet in the northern hills. This expansive mosaic of semi-desert area, cut by ribbons of valuable riparian forest, offers one of the most significant systems of prehistoric sites in the American Southwest. In addition to the rich record of human history, the monument contains outstanding biological resources. This monument is managed by the BLM Phoenix Field Office.

Grand Canyon-Parashant National Monument ñ Situated on the Colorado Plateau in northwestern Arizona within the Colorado River drainage, the Grand Canyon-Parashant National Monument borders the Grand Canyon National Park to the south and the state of Nevada to the west, encompassing a portion of Lake Mead National Recreation Area. The Grand Canyon-Parashant National Monument is under joint management of the BLM Arizona Strip Field Office and the NPS. Covering 1,054,264 acres of remote and unspoiled public lands, this monument is a scientific treasure, containing many of the same values that have long been protected in the Grand Canyon National Park. Deep canyons, mountains and lonely buttes testify to the power of geological forces and provide colorful vistas. Here Paleozoic and Mesozoic sedimentary rock layers are relatively undeformed and unobscured by vegetation, offering a clear view to understanding the geologic history of the Colorado Plateau. The monument encompasses the lower portion of the Shivwits Plateau, an important watershed for the Colorado River and the Grand Canyon. Beyond the phenomenal geological resources, the monument also contains countless biological and historical values

Ironwood Forest National Monument ñ The Ironwood Forest National Monument is located 25 miles northwest of Tucson, and about one hour by highway south of Phoenix. This 129,000-acre national monument contains a significant system of cultural and historical sites covering a 5,000 year period. Possessing one of the richest stands of Ironwood trees in the Sonoran Desert, the monument also encompasses several desert mountain ranges including the Silver Bell, Waterman and Sawtooth, with desert valleys in between. Elevation ranges from 1,800 to 4,261 feet. Three areas within the monument, the Los Robles Archeological District, the Mission of Santa Ana del Chiquiburitac and the Cocoraque Butte Archeological District are listed on the National Register of Historic Places. This monument is managed by the BLM Tucson Field Office.

Sonoran Desert National Monument ñ This monument is located approximately 60 miles southwest of the Phoenix metropolitan area, straddling U.S. Interstate 8. The outer boundaries encompass approximately 496,337 acres. The monument contains magnificent examples of untrammeled Sonoran Desert landscape. The Sonoran Desert is the most biologically diverse of the North American deserts, and the monument captures a significant portion of that diversity. The most striking aspect of the plant community within the monument is the extensive saguaro cactus forest. The monument contains three distinct mountain ranges, the Maricopa, Sand Tank and Table Top Mountains, as well as the Booth and White Hills, all separated by wide valleys. The monument also contains three congressionally designated wilderness areas and many significant archeological and historic sites, and remnants of several important historic trails. This monument is managed by the BLM Phoenix Field Office.

Vermilion Cliffs National Monument ñ This remote and unspoiled 294,000-acre monument is a geologic treasure, containing the Paria Plateau, Vermilion Cliffs, Coyote Buttes, and Paria Canyon. Elevations range from 3,100 to 6,500 feet. It is located in north central Arizona bordering the State of Utah on the north, and the Colorado River to the east. This monument is managed by the BLM Arizona Strip Field Office.

3.3.4.4 National Conservation Areas

BLM manages three national conservation areas. These include the following sites:

Gila Box Riparian National Conservation Area ñ On November 28, 1990, Congress created the Gila Box Riparian National Conservation Area (RNCA) in section 201 of the Arizona Desert Wilderness Act, Public Law 101-628. As stated in the Act, the principle objective for establishing the RNCA was to ìconserve, protect, and enhanceî the riparian and associated values of the area. Four perennial waterwaysñthe Gila River, Bonita Creek, Eagle Creek, and San Francisco Riverñare the lifeblood of this remarkable place. Not only does the RNCA hold one of the most significant riparian zones in the

Southwest, it offers tremendous scientific, cultural, scenic, recreational, and other associated values. It is one of only two Riparian National Conservation Areas in the Nation.

A 15-mile segment of Bonita Creek and 23 miles of the Gila River have been included in this special natural area designated by Congress. Bonita Creek, popular for birding and picnicking, is lined with large cottonwoods, sycamores, and willows. Cliff dwellings, historic homesteads, Rocky Mountain bighorn sheep, and over 200 species of birds make this cool year-round desert oasis worth the short drive from Safford. The Gila River section, known as the Gila Box, is comprised of patchy mesquite woodlands, mature cottonwood trees, sandy beaches, and grand buff colored cliffs.

Las Cienegas National Conservation Area ñ President Clinton signed a bill creating the Las Cienegas National Conservation Area (NCA) and Acquisition Planning District in southeastern Arizona on December 6, 2000. The designation was the result of Congressí passage of H.R. 2941 (Congressman Jim Kolbe). The new 42,000-acre NCA consists entirely of public lands managed by the BLMís Tucson Field Office. The NCA is bordered on the north and east by lands within the Acquisition Planning District.

These lands are located about 50 miles southeast of Tucson. Combined, the NCA and Acquisition Planning District total 142,800 acres of public, private, county, and state trust lands. They form a scenic landscape of vast desert grasslands and rolling oak-studded hills connecting several ìsky islandî mountain ranges. Cienega Creek, with its perennial flow and lush riparian corridor, forms the lifeblood of the NCA. The area is home to a great diversity of plant and animal life, including several threatened or endangered species. Protection of this regionally significant open space safeguards a network extending south of Interstate 10 to protected lands in northern Sonora, Mexico. The BLM Tucson Field Office manages the NCA, which includes the Empire-Cienega Resource Conservation Area. Lands within the Acquisition Planning District are owned and managed by Pima County, National Audubon Society, the State of Arizona, and numerous private landowners.

San Pedro National Conservation Area ñ The San Pedro riparian area, containing about 40 miles of the upper San Pedro River, was designated by Congress as a National Conservation Area (NCA) on November 18, 1988. The primary purpose for the designation is to protect and enhance the desert riparian ecosystem, a rare remnant of what was once an extensive network of similar riparian systems throughout the Southwest.

The word riparian refers to an area where plants and animals thrive because of an availability of water, either at or near the soil surface. Riparian areas are the shores of lakes and reservoirs, the banks and floodplains of intermittent or perennial (year- round) streams, rivers and springs. Managed by the Tucson Field Office, the San Pedro Riparian NCA contains over 58,000 acres of public land in Cochise County, Arizona, between the international border (United States and Mexico) and St. David, Arizona.

3.3.4.5 Areas of Critical Environmental Concern (ACECs)

BLM manages 50 Areas of Critical Environmental Concern (ACEC) in Arizona encompassing some 638,110 acres of public lands (see **Table 3.10**). ACEC designations highlight areas where special management attention is needed to protect, and prevent irreparable damage to, important historic, cultural, or scenic values; fish or wildlife resources; or other natural systems or processes. ACECs may also be designated to protect human life and safety from natural hazards. The ACEC designation indicates that the BLM recognizes that an area has significant values and has established special management measures to protect those values. For more information on the designation of ACECs, see BLM Manual 1613, Areas of Critical Environmental Concern.

3.3.4.6 The Arizona Trail

The Arizona Trail will eventually be a 790-mile non-motorized trail that traverses Arizona from the borders with Mexico and Utah. The Arizona Trail is intended to be a primitive, long distance trail that highlights the State's topographic, biologic, historic, and cultural diversity. The primary users are hikers, equestrians, and mountain bicyclists (outside of wilderness or other specially managed areas). Opportunities will also exist for cross-country skiers, snowshoers, joggers, and packstock users. More than 600 miles of the Arizona Trail have been officially designated and signed. In 1993, an Intergovernmental Agreement was established between Arizona State Parks, U.S. Forest Service, National Park Service, and the BLM (known as the Arizona Trail Partners) that allows these agencies to cooperatively plan for the development and completion of the Arizona Trail. An estimated 8 percent of the trail is on BLM-administered public lands.

Table 3.10 ñ Areas of Critical Environmental Concern (ACEC) in Arizona

ACEC Name	Size (Acres)	Reason for Designation	Field Office
Virgin River Corridor	8,100	Fish, Riparian, Scenic	Arizona Strip
Beaver Dam Slope	51,400	Wildlife, Desert Tortoise	Arizona Strip
Little Black Mountain	200	Cultural Resources	Arizona Strip
Fort Pierce	900	Botanical, Watershed	Arizona Strip
Lost Spring Mountain	9,800	Cultural Resources, Botanical	Arizona Strip
Moonshine Ridge	5,500	Cultural Resources, Botanical	Arizona Strip
Witch Pool	260	Cultural Resources	Arizona Strip
Nampaweap	550	Cultural Resources	Arizona Strip
Marble Canyon	10,700	Botanical	Arizona Strip
Johnson Spring	2,400	Cultural Resources, Botanical	Arizona Strip
Virgin Slope	41,410	Desert Tortoise	Mojave Desert EA
Pakoon	76,350	Desert Tortoise	Mojave Desert EA
Perry Mesa	9,440	Cultural Resources	Phoenix
Coffee Pot Botanical	9,600	Botanical	Lower Gila South
Vekol Valley Grasslands	3,520	Botanical	Lower Gila South
Larry Canyon	80	Riparian, Botanical	Phoenix
Joshua Tree Forest/Grand Wash Cliffs	39,060	Vegetation, Scenic, Cultural Resources	Kingman
Black Mtns. Ecosystem Mgmt.	114,242	Bighorn Sheep Habitat, Plants, Scenic, Cultural Resources	Kingman
Wright-Cottonwood Creek Riparian & Cultural	27,285	Riparian, Cultural Resources	Kingman
Hualapai Mtn. RNA	3,303	Vole Habitat, Riparian	Kingman
White-Margined Penstemon Reserve	17,489	White-Margined Penstemon Habitat	Kingman
Carrow-Stephens Ranches	542	Historic, Paleontological	Kingman
McCracken Desert Tortoise Habitat	21,740	Desert Tortoise Habitat, Scenic	Kingman
Poachie Desert Tortoise Habitat	32,752	Desert Tortoise Habitat, Scenic	Kingman
Aubrey Peak Bighorn Sheep Habitat	3,460	Bighorn Sheep Habitat, Scenic	Kingman
Burro Creek Riparian & Cultural	22,682	Riparian, Cultural Resources, T&E, Bald Eagle Habitat	Kingman
Clay Hills RNA	1,114	Arizona Cliffrose Habitat	Kingman

ACEC Name	Size (Acres)	Reason for Designation	Field Office
Three Rivers Riparian	32,043	Riparian, T&E, Bald Eagle Habitat	Kingman
Tanner Wash	950	Botanical	Phoenix
Table Mountain RNA	1,220	RNA, Botanical	Safford
Turkey Creek Riparian	2,326	Riparian	Safford
Bear Springs Badlands	2,927	Paleontological, Scenic	Safford
Swamp Springs/Hot Springs	10,838	Riparian, T&E Species, Cultural Resources	Safford
111 Ranch RNA	2,688	RNA, Paleontological	Safford
Bowie Mountain	4,190	Scenic	Safford
Guadalupe Canyon ONA	2,159	ONA, Riparian, Botanical	Safford
Willcox Playa NNL	2,475	Botanical, National Natural Landmark	Safford
Dos Cabezas Peaks	25	Scenic, Cultural Resources	Safford
Eagle Creek Bat Cave	40	Critical Bat Maternity Cave	Safford
Desert Grasslands RNA	530	Relict Desert Grasslands	Safford
Gila River Cultural Area	1,150	Cultural Resources	Lower Gila South
Big Marias	5,280	Cultural Resources, Botanical	Yuma
St. David Cienega RNA	350	RNA, Botanical	Safford
San Rafael RNA	370	RNA,, Botanical, Riparian	Safford
San Pedro River RNA	1,340	RNA, Botanical, Riparian	Safford
Appleton Whittell RNA	3,141	RNA, Botanical	Phoenix
Waterman Mountains	1,960	Botanical	Phoenix
White Canyon	300	Scenic, Wildlife, Cultural Resources	Phoenix
Baboquivari Peak	2,070	Scenic, Wildlife, Botanical, Cultural Resources	Tucson
Empire-Cienega	45,859	Riparian, T&E Species, Wildlife, Cultural	Tucson

Common Abbreviations: ONA = Outstanding Natural Area; RNA = Research Natural Area; NNL = National Natural Landmark

3.3.5 Land Uses

The BLM administers 11.6 million surface acres of public lands, along with another 17.5 million subsurface acres within Arizona (Arizona BLM 2003). The land use planning process adapted by BLM allows the public to be involved from the very beginning. Uses of these public lands are diverse and include livestock grazing, recreation, and forestry. The Arizona BLM also issues leases, rights-of-way and a wide variety of use permits, including parks, power transmission lines and roads. BLM offices in Arizona are currently processing right-of-way applications for fiber optic projects which cross public land in Arizona. Additionally, BLM administers both mining claim records and mineral leases, which are on lands managed by other federal agencies.

3.3.5.1 Grazing Management

Livestock grazing is permitted on nearly 12 million acres of public lands in Arizona. Approximately 847 livestock operators graze more than 56,000 cattle and 2,000 sheep on more than 800 grazing allotments (Arizona BLM 2003). Livestock grazing on BLM rangeland is administered through the Taylor Grazing Act of 1934, which called for grazing management through the use of permits. Livestock grazing is an important use of BLM-administered rangeland in Arizona. Livestock grazing is sometimes managed through allotment management plans referenced in exiting LUPs. Grazing management practices adhere to the *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration* (BLM 1997). The goals of grazing management are to maintain and, where necessary, improve rangeland health. BLM is initiating the ìSustaining Working Landscapeî concept, to improve rangeland health through changes to rangeland grazing policy based on partnerships with ranchers.

3.3.5.2 Recreation

Arizona BLM rangelands are a popular destination for recreationists that are drawn to open spaces, diverse landscapes, and freedom from the restrictions of urban areas (Arizona BLM 2003). There are a wide variety of high quality outdoor recreational opportunities on BLM rangeland including camping, hiking, off-highway vehicle (OHV) travel, bird watching, wildlife viewing, photography, mountain biking, hunting, nature study, mining/prospecting, and horseback riding. BLM provides approximately 50 established trails for hiking and 15 trails/by ways set aside for OHV travel. The San Pedro Riparian National Conservation Area is internationally renowned for birdwatching. Hundreds of birdwatchers annually visit the area to observe over 250 migratory and wintering birds. There are approximately 15 areas set aside by BLM to observe wildlife including Bonita Creek, Muleshoe Ranch, and the Painted Rock Petroglyph Site.

3.3.5.3 Forestry

Forested lands include ponderosa pine forests, pinyon and juniper woodlands, and mixed conifer and deciduous woodlands (Arizona BLM 2003). Forest products include mainly firewood and fence posts. The collection of firewood and fence posts can lead to human-caused wildfire if permittees are not careful. Sparks from chain saws and parking vehicles over dried vegetation are ways to inadvertently start wildfires. To alleviate these problems, spark arrestors are required on chain saws and vehicles must not park over dried vegetation.

3.3.5.4 Minerals

The Arizona BLM administers approximately 17.5 million subsurface acres, and supervises about 72,900 acres of Indian and mineral leases in Arizona (Arizona BLM 2003). The minerals program includes locatable, leasable and salable minerals. In locatable minerals, there are 24,135 active mining claims, which are recorded on Arizonaís public lands. Mining claim activity includes exploration and development of gold, silver, copper and other hard rock minerals. Arizonaís public lands also provide a good source for salable minerals, such as sand, gravel, stone and clay. Oil and gas leases fall under the leasable minerals program. Approximately 100 separate oil and gas leases are located on 160,000 acres in Arizona. The only oil and gas production in Arizona comes from leases located on the Navajo Indian Reservation. There are approximately 11 leases, containing 49 producing wells on 42,550 reservation acres. The BLM New Mexico Farmington District manages these producing leases. The BLM also manages the Indian mineral leasing program. The major minerals leased on Indian land in Arizona are coal, copper, sand and gravel. Currently, there are 15 Indian leases under BLMís supervision.

3.3.6 Socio-economic Conditions

The economy of Arizona is highly diversified, and the state is home to a culturally rich population. During the 2000 census, residents of Arizona reported their ethnic heritage to be: 76% white, 25% white of Hispanic or Latino origin, 5% American Indian and Alaska native, 4% Black or African American, 2% Asian, 0.1% Native Hawaiian and

Other Pacific Islander, with 12% reporting some other race and 3% reporting two or more races.

Between 1970 and 2000, the stateís population grew by 3.6% per year, compared to the U.S. annual growth rate of 1.1% over the same time period. Between 1990 and 2000, the state of Arizona experienced a 40% increase in population. Pinal, Yavapai, and Mohave Counties experienced population increases of 54.4, 55.5, and 65.8%, respectively. Greenlee and Apache Counties grew much slower with a growth rate of 6.7 and 12.7%, respectively. In 2000, 88.2% of Arizona residents live within urban areas, while 11.8% live in rural areas. In Mohave, Yuma, Pima, and Maricopa Counties, 75.3, 86.9, 91.6, and 97.1% of the population lives in urban areas. Apache County has the lowest portion of residents living in urban areas at 24%. The number of residents living in urban areas has steadily increased, from 79.6% of the stateís population in 1970 to over 88% in 2000.

In 2001, Yuma County had the highest unemployment rate at 24.4%, followed by Santa Cruz, Apache and Navajo counties at 13%, 12%, and 11%, respectively. Yavapai County had the lowest unemployment rate at 2.9%, followed by Pima and Maricopa Counties at 3.5% and 3.9%, respectively.

Between 1990 and 2000, employment in all industries grew by 629,000 workers. The percentage of total employment has increased in the service industries (finance, insurance, real estate, entertainment, recreation, education and other services) from about 42% of all workers to about 51% of all workers. Industries that have decreased as a percentage of total employment include manufacturing, wholesale and retail trade, agriculture, forestry, and mining. The importance of federal rangelands to livestock production can be measured by rancher dependency on federal forage. Average dependency of permittees on federal forage is highest in Arizona compared to other western states with BLM-administered public lands (U.S. Census Bureau).

In 2002, a total of 88,458 wildland fires were reported nationwide. These fires burned some 6.9 million acres, burned 815 structures, and cost an estimated $1.6 billion in fire suppression (Federal agencies only). This was an increase from the 2001 fire season, which saw 84,079 wildland fires that burned about 3.6 million acres and 731 structures, and cost approximately $542 million for fire suppression. In 2000, there were 122,827 wildland fires that burned 8.4 million acres, burned 861 structures, and cost $1.3 billion for Fire Suppression.

Over 200 wildfires occur annually on BLM-administered lands within Arizona, with the recent ten year average of 235 wildland fires for 24,241 acres burned per year. Between 1998 - 2000, Arizona BLM responded to an average of 704 fires per year which burned approximately 148,35 acres. The cause of the wildland fires varies from year to year. From 1998 to 2000 67% of the fires were caused by humans, accounting for 75% of the acres burned. This has increased from the previous five years (1993-1997) in which only 42% of the fires were human caused accounting for 25% of the acres burned (NIFC).

The economic cost of suppressing large, catastrophic wildland fires varies wildely. All wildland fires start small and initial or extended attack operations usually put them out. When the initial attack will not stop the fire, another level of firefighting response is activatedó the Incident Management Team (IMT). Headed by an experienced Incident Commander (IC), an IMT may manage over 2,000 people and hundreds of pieces of equipment on a large wildland fire. The costs for these fires can run millions of dollars. A 2002 study from the National Academy of Public Administration[3] on Wildfire suppression costs studied six fires, and found that suppression costs ranged from $26 per acre at the 83,673-acre Sheep fire to $2,975 per acre at the 4,470-acre Green Knoll fire.

The costs of fuels treatment can also vary widely. A June 2000 survey from the U.S. Forest Service, Southern Research Station, found few sources of data on the per-acre costs of prescribed burns. The total cost of prescribed burning includes components incurred during planning and layout, fire-line construction and burn preparation, ignition, and mop-up. Fixed costs include burn plan preparation, NEPA analysis and public involvement, compliance with other laws, smoke management precautions, postfire evaluation, and general overhead. Per-acre planning costs can vary depending on operational efficiency and unit size. Project costs include firebreak construction, igniting and conducting the bum, mopping up, postfire monitoring, and contractor costs. Costs may differ from unit to unit because of differences in topography, weather conditions, and other factors. Different burning objectives also cause variations in planning, personnel and equipment needs, and the precautions that are necessary. Overall cost will reflect differences in timber types and fuels treated, safety precautions, the objectives of the bum

[3] Fairbanks, Frank A, November 2002. *Wildfire Supression: Strategies for Containing Costs*, National Academy of Public Administration.

program, overall efficiency, and cost-collection methods.

Unit size is one of the most important factors in per-acre costs: larger burns have smaller per acre costs. Costs also vary with the shape and configuration of the treatment area, especially in slashreduction/site-preparation burns. Irregularly shaped units are more difficult to burn and monitor than more geometric tits of the same size. Small and irregularly shaped units usually cost more to treat, although they may be more environmentally and aesthetically desirable. The survey found reported a U.S. Forest Service-wide mean cost of $78.13 per acre, but ranged from $22.80 per acre in Region 8 to $223.38 per acre in Region 5. The Arizona BLM reports the mean cost of prescribed fire to be $22.58 per acre; the cost of chemical treatments to be $80.00 per acre; and the cost of mechanical treatment to be $179.00 per acre. **Table 3.11** details the average annual number of wildland fires on BLM lands in Arizona.

Table 3.11 ñAverage Annual Number of Wildland Fires on BLM-Administered Lands in Arizona

Year (annual average)	Human Caused Fires (HCF)	Acres Burned by HCF	Lightning Caused Fires (LCF)	Acres Burned by LCF	Percent of Fires Human Caused	Percent of Acres Burned by HCF
1983-1987	73	3,453	67	8,429	51%	31%
1988-1992	87	3,160	91	3,747	50%	41%
1993-1997	104	7,228	147	23,969	42%	25%
1998-2002	108	7,685	121	8,451	48%	54%

The social and economic impacts from wildland fires in Arizona can be measured by estimated property losses from wildland fires, fire suppression costs, and watershed restoration costs. Economic impacts arise both directly from fire damage and indirectly from changes in local economic activity, such as a drop in tourism. Both direct and indirect effects of wildfires have exacted a heavy economic toll on many communities. In addition to these types of direct, out-of-pocket impacts on communities and government agencies, it is likely that losses in resource values will total many millions of dollars. The consequences of recent wildfires on Arizonaís natural resources are as vast as they are varied. Wildland fires burned both public and private lands over a broad spectrum of rangeland and forested ecosystems, often encompassing entire watersheds critical to community water supplies. Compared to historic fire events, recent fires have burned with such intensity that the ecosystems of many of these extensively burned areas have been drastically changed. Without intervention, these burned lands will recover slowly and be susceptible to undesirable changes in vegetation composition. For example, plant species such as cheatgrass often become established in burned areas, creating additional fire risks and disrupting natural systems. The cost to eradicate unwanted invasive species such as cheatgrass, although unquantified, is very large. It is also difficult to quantify the costs or benefits of wildland fires in terms of lands, lives, and other values lost or saved from the fire. Resource benefits can include restoring the health of natural ecosystems, enabling native species to thrive, and preserving the many natural and cultural resources located on Federal lands.

3.3.7 Environmental Justice

Title VI of the Civil Rights Act and Executive Order 12898 (ìEnvironmental Justiceî) require Federal agencies to identify and address ìdisproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.î ìEnvironmental justiceî means ensuring that low - income populations and minority populations are not exposed to disproportionately high or adverse environmental impact. In December 1997 the Council on Environmental Quality (CEQ) issued guidance on environmental justice. In addition, Executive Order 13045 (ìProtection of Children from Environmental Health Risksî) requires that actions be evaluated to identify and assess environmental

health risks and safety risks that may disproportionately affect children.

As discussed previously in this section, Arizona is home to a culturally rich population, including many minority populations. In accordance with CEQ Environmental Justice Guidelines, minority populations should be identified when 1) the minority population of the affected area exceeds 50 percent; or 2) the minority population of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate use of geographic analysis. Although the population of Hispanics, Latinos, or American Indians does not exceed 50 percent, their population in portions of the analysis area is ìmeaningfully greaterî than the minority population in the general population (State of Arizona). Therefore, for the purposes of screening for environmental justice concerns, a minority population exists within the planning area.

The portion of Arizona residents living below the poverty level was 13.9% in 1999 (latest data available), compared to the U.S. average of 12.4%. Several counties had large portions of their residents living below the poverty level: Apache County (37.8%), Navajo County (29.5%), Santa Cruz County (24.5%), Graham County (23.0%), La Paz County (19.6%), Yuma County (19.2%), and Cochino County (18.2%; U.S. Census Bureau).

Section 4.0 Environmental Consequences

The resources discussed in this section were identified as the resources potentially affected by the Proposed Action, and include applicable ìCritical Elementsî of the human environment whose review is mandated by Executive Order, regulation or policy. Each of these resources has been reviewed for the Proposed Action and the No-Action Alternative. The following resource values were not present, not affected, or not identified as a resource of concern during scooping: hazardous/solid wastes, prime/unique farmlands, and floodplains.

The analysis includes direct, indirect, and cumulative impacts. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative effects are impacts that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). The cumulative impact analysis included the anticipated effect of the Proposed Action and the anticipated actions of other agencies as determined through a review of public documents, information gained from public meetings, and coordination with multiple agencies.

4.1 Air Resources

Fire management activities could affect air quality through smoke emissions from wildfires, prescribed burn, exhaust from machinery used in site preparation, fire control, monitoring, and thinning activities. Smoke from wildfires and prescribed fire is a complex mixture of carbon, tars, liquids, and gases. The major pollutants are particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), and volatile organic compounds (VOC). Nitrogen oxides (NOx) are also produced in relatively small quantity compared to the other pollutants. Sulfur oxides (SOx) compounds are produced in negligible quantities due to low elemental sulfur content of forest fuel. SOx, is not identified as a problem in prescribed burning and therefore not included in the analysis. The most effective method of controlling wildfire emissions is to prevent the occurrence of wildfires. Prescribed burning is one of the most frequently used techniques as a preventive measure for reducing wildfire occurrence. Although some air pollution is generated, the net amount of air pollution is a relatively smaller quantity than that produced by wildfires.

To quantify smoke emissions that would result from each of the alternatives in each of the planning areas, the First Order Fire Effect Model version 5 (FOFEM) was utilized. FOFEM is a computer-based planning tool that provides quantitative predictions for planning prescribed fire, for impact assessment, and for long-range planning and policy development. FOFEM is designed to provide quantitative fire effects information for tree mortality, fuel consumption, soil heating, and smoke. FOFEM was utilized to generate emission factors for PM_{10}, $PM_{2.5}$, CO, carbon dioxide (CO_2), and VOC (as CH_4). FOFEM does not provide emission factor for NOx. NOx factor was estimated using AP-42, EPA Compilation of Emission Factors. AP-42 estimates NOx emission factor from wildfires and prescribed fires to be approximately 35 times less than those for CO. Therefore, the CO emission factor generated by FOFEM was scaled down proportionally to produce NOx emission factor.

The vegetation zones defined within the planning areas based on the Ecological Aggregation of GAP Vegetation data set (**Table 3.4**) were correlated with the Society of American Foresters (SAF)/Society for Range Management (SRM) cover types available within FOFEM. Defaults within FOFEM were used. In some cases, direct correlation between cover types was not possible, and a surrogate SAF/SRM cover type was selected. Some areas include bare rock or water for which no emissions are expected. The SAF/SRM and FOFEM cross-referenced vegetation cover types used in the air quality analysis are provided in **Table 4.1**.

The variations in vegetation cover types and associated fuel loads from one planning area to another and in some cases within one planning area warrant separate FOFEM runs for each area. The emission factors generated, using FOFEM along with appropriate fuel loading conditions for each vegetation type, are segregated by areas and provided in **Table 4.2**.

Table 4.1 ñ Vegetation Cover Types Used in Air Quality Emissions Analysis

GAP Vegetation Type	Plant Growth Form	SAF/SRM Type	Comments
Lower Sonoran Desert Scrub	Shrub-microphyllous	SRM 729, 506, 414, 211	FOFEM default used under typical condition
Upper Sonoran Desert Scrub	Shrub-microphyllous	SRM 507, 506	FOFEM default used under typical condition
Great Basin Conifer Woodland	Tree-conifer	SAF 238, 220 and SRM 412, 107	FOFEM default used under typical condition
Mojave Desert Scrub	Scrub-microphyllous	SRM 506, 501, 414, 211	FOFEM default used under typical condition
Great Basin Desert Scrub	Shrub	SRM 405, 401, 320, 314, 107	FOFEM default used under typical condition
Plains and Great Basin Grasslands	Grass	SRM 712, 709, 708, 705, 612, 611, 502, 310, 301	FOFEM default used under typical condition
Semidesert Grassland	Grass	SRM 707, 703, 505	FOFEM default used under typical condition
Interior Chaparral	Schrub-sclerophyll	SRM 503, 208, 207	FOFEM default used under typical condition
Chihauhuan Desert Scrub	Scrub-microphyllous	SAF 242, 068 and SRM 729, 211	FOFEM default used under typical condition
Riparian	Tree-cottonwood-willow	SRM 422	FOFEM default used under typical condition
Madrean Evergreen Woodland	Tree-mixed	SAF 241, and SRM 734, 733	FOFEM default used under typical condition
Petran Montane Conifer Forest	Tree-conifer	SAF 240, 237, 210, and SRM 110, 109	FOFEM default used under typical condition

Table 4.2 ñ Average Emission Factors

Planning Area (RMP/MFP)	Part of Planning Area	Emission Factor (ton/acre)				
		PM_{10}	$PM_{2.5}$	CH_4	CO	NOx[a]
Arizona Strip	Eastern half of area	0.135	0.114	0.064	1.327	0.038
	Western half of area	0.130	0.111	0.063	1.309	0.037
Phoenix	Northern half of area	0.135	0.114	0.064	1.327	0.038
	Southern half of area	0.138	0.117	0.065	1.339	0.038
Kingman	Northern half of area	0.031	0.027	0.016	0.330	0.009
	Southern half of area	0.026	0.022	0.007	0.078	0.002
Safford	Northern half of area	0.099	0.084	0.047	0.958	0.027
	Southern half of area	0.090	0.077	0.042	0.856	0.024
Lower Gila South	Entire area	0.013	0.011	0.005	0.063	0.002
Lower Gila North	Entire area	0.013	0.011	0.005	0.063	0.002
Yuma	Entire area	0.013	0.011	0.005	0.063	0.002

[a]Based on CO factor

4.1.1 No-Action Alternative

Under this alternative, air quality would be periodically impacted for sustained periods by smoke and particulate matter produced by large wildfires. Negative impacts to air quality could be exacerbated by multiple large wildfires occurring simultaneously, as has historically happened under this alternative. Smoke dispersal and particulate matter content is unregulated during these wildfire episodes.

4.1.2 Proposed Action Alternative

Direct, Indirect, and Cumulative Impacts:

Under this alternative, short-term, minor adverse impacts to air quality with respect to PM_{10} and CO are anticipated. Minor increases in PM_{10} or CO concentrations would not be sufficient to cause any change in the NAAQS attainment status. Adverse impacts on visibility resulting from smoke emissions would be localized and only last for the duration of the burn since prescribed burns are likely to be conducted during optimal smoke dispersion periods. Adverse health impacts are not anticipated.

The proposed action in the long run improves air quality and visibility compared to the No-Action Alternative for the following two reasons. Prescribed fires produce less smoke emission than wildfires because they are normally conducted during optimal smoke dispersion periods, under less extreme conditions, and in forest environments fires primarily affect ground level fuel. Secondly, areas that have been treated with prescribed fires have reduced fuel loads. This decreases the potential for catastrophic wildfires that might occur in those areas resulting in a net reduction in smoke emission.

The adverse air quality impacts would be short-term. Cumulative effects of air emissions (PM_{10} and CO) and visibility problems from existing sources, such as stationary point sources, fireplace, road ducts, construction sites, agricultural activities, automobile, etc., in the areas or contiguous land across state line could have minor to moderate adverse impacts. The proposed action would bring about an improvement in air quality in the long-term due to reduction in fuel load and less fire fighting activities.

4.2 Soil Resources

Fire can have a wide range of impacts on soils because of the inherent variability of soils, vegetative cover, fire behavior, environmental conditions, and treatment method. These impacts can be evaluated most effectively on a site-specific basis. This section evaluates general impacts to soils from the No-Action and the Proposed Action Alternatives.

4.2.1 No-Action Alternative

Suppression of all wildfires in accordance with the current fire management plans would have no new impact on soils. Existing impacts in fire-affected areas include greater susceptibility to accelerated soil erosion and sedimentation due to fire suppression activities and the loss of vegetative cover. The severity of the erosion is dependent on soil texture, slope, vegetative cover return intervals, and the precipitation intensity after the soil is disturbed. At the same time, the absence of fire can lead to greater fuel loads that could increase the frequency and intensity of fires in the long-term. As the intensity of the fire increases, the severity and duration of impacts on soils also generally increases.

Fire affects the physical, chemical, and microbial properties of soil. Catastrophic, high intensity fires have the most severe and long-lasting negative impact on soils. Higher temperature fires occur where thick, dry litter layers accumulate, heating soils to a greater depth (up to 4 inches) and a higher surface temperature (approximately 750∞F or higher) compared to lower intensity fires (less than 1 inch and 250∞F or lower). Above ground vegetative cover and organic matter, and below ground root systems provide structure and stability for the soil. Intense fires remove organic matter and vegetative cover more completely and deeply, leaving soil more susceptible to large-scale, accelerated erosion.

Soil heating also reduces soil organic matter and can cause shifts in microbial populations that affect nutrient cycling. Organic matter helps regulate soil moisture, the carbon/nitrogen ratio, microbial populations, and maintains soil structure, porosity and cation exchange capacity. Although many soils on BLM administered land in Arizona are low in organic matter, even small amounts contribute to these important soil properties.

One of the more severe affects of fire on soils is the formation of water-repellent layers through heating of organic compounds. This phenomenon, known as hydrophobicity, most commonly occurs on dry, coarse textured (sandy) soils that support shrub vegetation communities, such as chaparral. Hydrophobicity is most severe in soils heated to intermediate temperature (approximately 350 to 550∞F). The formation of water-repellent layers can dramatically increase soil erosion, directly by inhibiting moisture infiltration, and indirectly by

inhibiting vegetative recovery. Higher intensity fires can also increase impermeability in the limited areas with soils containing higher clay content.

Fire suppression is preferred on BLM administered lands with soils supporting non-fire adapted vegetation (**Table 4.3**). These non-fire adapted areas are generally characterized by soils that are low in nutrients, organic matter and water holding capacity, and associated with arid or semi-arid environments. These characteristics would indicate slow fire return intervals, which would prolong the exposure of the soil surface to accelerated erosion from wind or precipitation. Soils on steeper slopes are especially vulnerable.

Other fire-related activities that disturb the soil surface or vegetative cover, such as road and fireline construction, or mechanical fuel reduction, would also increase susceptibility of the soil to erosion.

4.2.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Prescribed fires, and/or mechanical, chemical, or biological fuels reduction treatments would be considered on BLM administered lands with soils supporting fire adapted vegetation communities (**Table 4.4**). The direct impact of these actions would include effects on erosion, soil permeability and soil fertility.

Table 4.3 ñ Percentage Of Non-Fire Adapted Vegetation Supported On Soil Suborders On BLM Administered Land In Arizona

Non-fire adapted vegetation communities	Soils suborders					
	Orthids	Argids	Orthents	Ustolls	Fluvents	Ustalfs
Lower Sonoran Desertscrub (%)	35	20	19	0	3	0
Upper Sonoran Desertscrub (%)	28	28.5	44	2.0	6	11
Mojave Desertscrub (%)	8.5	15	4.5	0.4	4	0
Chihuahuan Desertscrub (%)	0.5	8.5	0.2	0.5	11	0
Total (%)	**72**	**72**	**67.7**	**2.9**	**24**	**11**

Table 4.4 ñ Percentage Of Fire Adapted Vegetation Supported On Soil Suborders On BLM Administered Land In Arizona

Fire adapted vegetation communities	Soils suborders					
	Orthids	Argids	Orthents	Ustolls	Fluvents	Ustalfs
Great Basin Woodland (%)	9.5	6.7	6.4	42.5	11.1	70.6
Great Basin Desertscrub(%)	11.6	4.6	4.9	2.5	13.3	7.0
Plains and Great Basin Grassland (%)	5.4	4.1	6.0	2.7	33.3	4.8
Semidesert Grassland (%)	0.3	7.9	3.7	32.9	3.8	2.1
Interior Chaparral (%)	0.1	2.8	8.8	11.9	0	4.1
Madrean Evergreen Woodland (%)	0	0.2	0.7	2.9	0	0.1
Montane Conifer Forest (%)	0	0.01	0.1	1.6	0	0.4
Riparian (%)[1]	0.9	1.2	2.1	0.1	7.1	0
Total (%)	**27.8**	**27.5**	**32.7**	**97.1**	**68.6**	**89.1**

[1] Riparian areas are not generally considered fire adapted, however prescribed fires may be necessary in some instances.

Prescribed fires and mechanical fuel reduction treatments would directly impact soil by increasing erosion rates due to fireline construction or road building, especially on steeper slopes. Heavy equipment could increase soil compaction, slowing the re-establishment of vegetative cover. Chemical fuel reduction treatments may leave residues that can alter soil microbial populations or vegetative recovery, affecting the productivity of the soil and increasing the vulnerability to erosion. Care should be taken to minimize soil disturbance, and chemical residuals, and preserve some vegetative cover and root systems to stabilize the soil and speed recovery. Over time, less mechanical and chemical fuels treatments would be needed to reduce fuel loads.

Prescribed fire can also impact soil properties and permeability as previously mentioned, especially if fires are allowed to reach higher temperatures. However, the frequency and intensity of the fires would decrease over time as fuel loads decrease, reducing some of the impacts on soil properties.

Soils in riparian areas are not generally considered fire-adapted, but tend to be less vulnerable to detrimental soil heating due to the inherently higher water content. However, vegetative buffer strips should be maintained along these sensitive riparian areas to decrease stream sedimentation. Furthermore, organic soil that becomes dry will burn deeper and at higher temperatures, destroying the organic reserves and soil structure. If prescribed burns in riparian areas are necessary, they should be conducted when the soil and vegetation reach higher moisture contents, which decrease the likelihood of excessive soil heating and are favorable for rapid recovery of vegetation. Mechanical or chemical fuel treatments are not generally considered feasible in riparian areas for logistical reasons and the close proximity to water.

Fire alters the microbial communities and nutrient cycling. Microbial populations can shift after fires or decline entirely for periods of time depending on the intensity of the fire. However, fire effects on soil microorganism communities are complex and not fully understood. Fire also effects nutrient cycling, primarily by increasing the pH in more acidic soils, which would affect nutrient availability to plants. However, arid and semi-arid soils, like those common in Arizona, are typically alkaline, and therefore pH is less likely to be affected (Clark, 2001). Fire does increase nitrogen available for plant growth by converting nitrogen previously bound in unavailable forms, such as organic matter or woody material, into ash and a more plant available form of nitrogen (ammonium). However total nitrogen decreases from losses due to erosion or volatilization. Over time, nutrient deficiencies, particularly nitrogen, may result (Caldwell et.al., 2002; Macadam, 1989). Sulfur and phosphorous are also more readily lost, but to a lesser extent. Information is conflicting on the impact of these changes in nutrient availability, and the degree of long-term nitrogen loss is largely dependent on the intensity and frequency of the fire.

The occurrence of catastrophic wildfires should decrease over time as fuel loads decline. Reducing severe wildfires can protect soils from long-term damage and degradation of the soil properties, fertility and structure. Improving the long-term stability of the soils also improves the viability of the native fire-adapted vegetative communities the soil supports. Fire-adapted areas are less likely to be affected by repeated cycles of nutrient losses, and frequent, low-temperature fires have fewer, and shorter-lived effects on soils (McNabb, et al., 1990). Additionally, recent studies have shown erosion and sedimentation is up to 10 times lower following prescribed fires compared to high intensity wildfires (Wohlegmuth et.al. 1999).

4.2.3 Mitigation Measures

Soil management considerations for prescribed fire.

Erosion

- Accelerated post-fire erosion is most dependent on slope steepness and the vegetative recovery interval.
- Preserve some coarse, woody material, vegetative root systems, organic matter and duff to help protect against soil erosion.
- Minimize impacts of firelines and road construction by rehabilitating through replacement of soil or plant material as soon as possible.

Soil Heating

- Minimize soil heating whenever possible by removal of excess or piled duff.
- Conduct prescribed burns while moisture content of fuels and soils is higher, limit the duration of the fire and penetration of the heat into the soil.

Riparian Areas

- Leave buffer zones along riparian areas to stabilize soils and decrease stream sedimentation.
- Use prescribed burns in riparian areas only when necessary and during higher soil and vegetative moisture conditions to minimize soil heating and organic matter loss, and speed vegetative

recovery. Fuels can be removed by mechanical treatment prior to prescribed burns.

4.3 Water Resources

This section describes potential consequences of fire on water resources and identifies the likely effects of fire management alternatives on water resources on BLM lands in Arizona. Potential effects of fire were considered in terms of effects on surface water quantity and quality and on groundwater resources. The effects of fire on water resources are largely indirect and delayed in time; when fires burn to surface waters, there can be substantial deposition of ash to the water, heating of the water, and loss of cover. More significant effects, however, typically result from water flow and erosion that occur with rainstorms and snowmelt that might not occur until many months after the fire.

4.3.1 No-Action Alternative

Under the No-Action Alternative, increased fire frequency, size and severity would have extensive effects on water quality. As the area burned by fires increased, the effects would be reflected in an increase in the number of stream reaches in which water quality is affected, and by more severe degradation of waters within some stream systems (i.e., as the proportion of burned area increases in a given watershed). The overall extent of disturbance can be expected to increase at least in proportion to increases in the area burned; to the extent that fires burn hotter, with greater damage to soils, relative aggregate disturbance would be even greater. The extent of actual effects cannot be quantified, because the extent of damage depends, as noted above, on the area burned, severity of fire, slope, and erodability of soils in the burned area, and with the amount and intensity of subsequent rainfall in the area.

Most of the important effects of fire on water quantity and quality ultimately result from destruction of vegetation and soil litter by fire. Destruction of vegetation and litter can affect water in several ways, including decreased soil stability, leading to increased erosion of upland soils during rainstorms or snowmelt, and to loss of bank stability along streams. The ultimate effect is increased loadings of solutes, suspended solids and bedload to surface waters, adversely affecting water quality and aquatic flora and fauna. The suspended solids are eventually deposited, either within the stream channel, near the stream mouth in standing waters, or in adjacent bank and wetland/riparian areas. Loss of vegetation can also result in a temporary decrease in the infiltration capacity of soils, causing increased surface runoff and exacerbating erosion until the vegetation has been re-established in a burned area.

In riparian areas, fire can have several consequences that result from loss of vegetation and soil litter, including loss of shading (leading to elevated water temperature), decreased retention of nutrients and toxins by vegetation and soil microfauna, and decreased retention of particulates from surface runoff across the riparian buffer. Fire suppression can also affect water resources; soils and vegetation in riparian areas by being disturbed or damaged by heavy equipment traffic, and components of foams and aerial retardants can be toxic to aquatic fauna if released into or near surface waters.

The aggregate effect of these processes is primarily as changes to water quality ñ minor to very significant increases in suspended solids, and some times increases in temperature, nutrient and metal concentrations. The degree and duration of change are influenced by several factors, including size and severity of the fire, proximity of the burned area to surface waters, slope, erodability of soils, and amount and intensity of precipitation. Changes to conditions in the water column are temporary, and would wane as vegetation is re-established and erosion is controlled, but deposition of sediments can lead to long-term changes in stream morphology and habitat.

4.3.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Under the Proposed Action, fire and fuels would be managed in ways intended to create a more natural role for fire within ecosystems. Water resources have not been a major factor in planning fire and fuel management, except for management of streamside and riparian areas. As a critical element of the desired future conditions articulated for BLM-administered lands, nearly all waterways, creeks, and riparian areas would be managed as allocation 2, ìAreas not suitable for wildland fire use for resource benefitî. Under this approach, these areas would be subject to full suppression of all unplanned fires to protect endangered species and to maintain the values and condition of these systems. Fire suppression tactics in riparian areas would largely exclude use of heavy equipment to avoid disturbance and damage to the area, and would include restrictions on the use of foam and aerial retardants except as a ìlast resortî to avoid total loss of habitat. Use of prescribed burns would be limited to areas where they would favor protection or regeneration of native species (and suppression of exotic species), such an approach has been proposed along the San Pedro River and

Cienega Creek as a tool to reduce fuels and reduce potential mortality of cottonwood/willow gallery forest that would occur with high-intensity fire. Conversely, mechanical treatment has been proposed for riparian areas in the Yuma/Lake Havasu management zone to create fire breaks between fire intolerant (native) and tolerant (exotic) species, in an area where fire would favor the invasive species.

As vegetation conditions move toward desired conditions over a period of several years, fuel loads would decrease in many areas. As this occurs, it is expected that there would be a decrease in the occurrence of catastrophic fires, with fewer large, intense fires. Part of the decrease would be offset by increasing the area and frequency of prescribed burns, but these would be planned and implemented as smaller, cooler fires, with correspondingly less impact to vegetation and soil, in turn reducing the potential extent of erosion and degradation of water quality.

In considering environmental consequences of management decisions related to fire and fuel management, it is unlikely that management decisions would cause any substantive or long-term changes in the occurrence of surface water resources. Disturbance by fire, mechanical removal of vegetation, changes in plant species, etc., have the potential to cause at least transient changes in water quality, particularly for suspended solids and nutrients, as discussed in Section 3.1.3.3.

As desired conditions are attained, direct effects of fire on water quality would be expected to decrease, for two reasons. First, the frequency of fires burning into, and through, streamside and riparian areas can be expected to decrease as a consequence of the overall decrease in the number of large, catastrophic fires. In addition, as suppression policies change and vegetation conditions improve, fire management resources would be focused on suppression of fires in allocation 2, ìAreas not suitable for use for resource benefitî. Effects on groundwater resources are expected to be negligible.

As desired conditions are attained, the occurrence and degree of water quality degradation resulting from indirect effects of fire (primarily erosion), can also be expected to decrease. By replacing large, hot fires with smaller, cooler fires, survival of desirable vegetation would increase, and damage to the soil would decrease. Decreases in the extent and duration of erosion should follow, reducing the number and length of stream reaches affected. More importantly, by decreasing the severity of fire and managing the size and location of fire, the severity of erosion and extent of water quality degradation within an affected watershed would be expected to decrease. Recent analyses by the Forest Service (USFS 2003) suggest that use of thinning and prescribed fire could reduce sediment yields in western ecosystems by a factor of 30 to 70 compared to losses following wildfire. To insure that water quality considerations are included in planning for fire management, including planning of prescribed burns, it would be desirable to adjust land categories to minimize effects of fire on water quality for areas where: potential for soil erosion is high due to slope and/or erodability of soils (Section 4.2); water quality is known to be impaired (e.g., 303(d) or planning listed waters); or where waters have been identified by the Arizona Department of Environmental Quality as ìunique watersî because of their ìexceptional recreational or ecological significanceî or because they provide critical habitat for endangered species.

Effects of fire on water quality are generally of short duration, lasting only until vegetation is re-established on a burned area. As such, cumulative effects of fire on water quality are best considered in terms of the area affected, and by the degree of water quality degradation, rather than in terms of long-term temporal changes to a water body. As described in Section 4.3.2, implementation of the Proposed Action would be expected, as fuels and fire management evolve over several years, to decrease both the extent and severity of water quality degradation attributable to direct and to indirect affects of fire. Under the National Fire Plan, all federal land managers are mandated to reduce occurrence of catastrophic fires through changes to fire and fuels management. As programs are implemented on other federal and tribal lands, the occurrence of catastrophic fires in Arizona should decrease, and cumulative extent and severity of water quality degradation should likewise decrease.

4.4 Vegetation Resources

The purpose of this section is to identify the likely vegetation resource outcomes associated with the BLM management alternatives. Direct, indirect, and cumulative impacts to vegetation are discussed generally; the actual impacts would vary among the 12 vegetation communities. The following address a useful comparison of the scope and type of effects that are expected under the No-Action and the Proposed Action Alternative.

4.4.1 No-Action Alternative

The No-Action Alternative would result in no new impacts to the 12 vegetation communities. All wildfiresó regardless of ignition sourceó would be suppressed in accordance with current LUPs and fire management plans. The primary impact would the continuation of periodic wildfires, including large catastrophic wildfires (Brown 2000). It is anticipated that the number and acres burned will increase in future years following the trend in past years as shown in **Table 4.5**. Under the No-Action Alternative, hazardous fuels will continue to accumulate in the vegetation communities at rates respective to past years. The accumulation of hazardous fuels is a continuing concern especially in the WUI. The WUI will probably increase in importance as people continue to build houses near forests and rangelands.

Continuation of the current policies would lead to changes in the composition and structure of vegetation communities that eventually would lead to a loss of native plant diversity (Brown 2000). Fire dependant plant communities would continue to change as a result of continued fire suppression. Ecological conditions for vegetation would continue unchanged from the current state; however, this current state is quite different from the conditions under which these communities evolved.

Under the No-Action Alternative, it can be expected that ponderosa pine and pinyon-juniper forests would trend towards over-dense conditions, leading to forest health problems associated with insects, disease, drought, and fire. Grasslands would continue to be encroached upon by woody species such as sagebrush and juniper. Interior chaparral would continue to be encroached upon by forest/woodlands species at higher elevations. Exotic weeds would continue to increase in all vegetation communities.

4.4.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

The landscape under the Proposed Action would be divided into four fire management categories regardless of vegetation community. The fire management categories would be defined based on wildfire threat to human life and property, and historic fire return intervals. Hazardous fuel reduction would be vigorously pursued to reduce the risk of wildfire in the WUI and improve rangeland and forest health. The degree of fire suppression varies among the two allocations. **Table 4.6** documents the hazardous fuel reduction projects under the no-change scenario (years 1990-2003).

Table 4.5 ñ Comparison Between the Annual Average Number and Burned Acres of Human-Caused and Lightening-Caused Fire on BLM Lands in Arizona

Year	Human Caused Fires		Lightening Caused Fires	
	Number	Acres Burned	Number	Acres Burned
1983-1987	73	3,453	67	8,429
1988-1992	87	3,160	91	3,747
1993-1997	104	7,228	147	23,969
1998-2002	108	7,685	121	8,451

Table 4.6 ñ Types of Fuels Reduction Treatments on BLM Lands in Arizona Since 1990

Year	Fuel Reduction Treatment			
	Prescribed Fire	Mechanical	Biological	Chemical
	Acres	Acres	Acres	Acres
1990-1994	600	0	0	0
1995-1999	21,060	18	0	8,382
2000-2002	16,532	128	0	9,560
2003	31,000	2,720	0	2,000

Under the Proposed Action, it is assumed that the Desired Future Conditions would be achieved over the next several years. As the Desired Future Conditions are achieved there would be fewer impacts to vegetation communities from catastrophic wildfire losses. The need for emergency post-fire rehabilitation to control soil erosion, the loss of wildlife habitat and livestock grazing land, and other effects would decrease. The continuing trend of building houses in the WUI is expected but with the reduction of hazardous fuels the risk of wildfire loss should also decrease.

The Proposed Action would have a direct impact on existing vegetation communities in that hazardous fuel reduction would occur to decrease the probability of catastrophic wildfire from occurring (Paysen et al. 2000). Over the long-term, the Proposed Action would reduce hazardous fuels using management tools such as prescribed fire, mechanical, biological (including livestock grazing), and chemical treatments. Vegetation communities should return to their historic range of variability with regards to fuel load and type. Also, the natural occurrence of fuels and the historic fire regime reflective of a vegetation community should occur.

The direct effect on vegetation from hazardous fuels reduction by prescribed fire, mechanical, biological, and chemical tools would be primarily short-term and temporary and would be in the form of soil erosion, inadvertent damage to habitat, and damage to desirable plants. However, vegetation is resilient and recovery should be short term. Fuels reduction treatments would need to be re-administered every few years to maintain the normal range of variability. The management of natural occurring wildfire would remove unwanted hazardous fuels and improve wildlife habitat. The implementation of prescribed fire, mechanical, biological, and chemical treatments each pose direct negative impacts to vegetation communities such as soil erosion and damage to desirable plants. The removal of diseased, invasive, and overstocked plants would encourage the growth of healthy forest and rangeland vegetation. Under certain conditions, the re-seeding of desirable plant species may be necessary to inhibit weed establishment in areas where fuel reduction treatments have been implemented.

Impacts to vegetation from the Proposed Action are inherently direct, so there would be few indirect impacts. The ability of weeds to become established would decrease as desirable plant competition for space, light, nutrients, and water increases. As a result of prescribed fires, animals that are able would emigrate to adjoining suitable habitat, which could cause short-term (one year) impacts to vegetation habitats from this shift in population.

Vegetation communities in Arizona and throughout the United States have been impacted by the introduction of invasive species or noxious weeds (Howey and Ruyle 2002).. The ability of noxious weeds to become established and dominate would be reduced under the Proposed Action.

4.5 Fire Ecology

This section identifies the potential changes in fire ecology associated with the BLM management alternatives. Fire ecology of a vegetation community refers to fire behavior, return interval, and fuel load. Fire ecology is inseparable from the type of vegetation community. Therefore, changes to the character of a vegetation community will also affect its fire ecology.

4.5.1 No-Action Alternative

Under the No-Action Alternative, wildfire and vegetation community management would occur as in past years with a fire suppression policy and the continued accumulation of hazardous fuels. The fire suppression policy of past years has allowed high accumulation of hazard fuels, an increase in undesirable woody species, insect and mistletoe damage to woody plants, and weeds to increase dominance, which all contribute to unnatural, catastrophic wildfire (Howey and Ruyle 2002). **Table 4.5** illustrates the increasing trend in the number of fires and acres burned during the years 1983ñ2000. Continuation of this management approach would result in continued alterations to the natural fire regime (preventing fire from being a natural disturbance with a predicable return frequency), increased fuel loads outside the normal range of variability, and catastrophic wildfires because of the abnormally high accumulation of fuel. Fire would not be used to control the accumulation of fuel and help maintain normal vegetation composition, structure, and productivity characteristic of the vegetation community. Under the No-Action Alternative, fire would not be consistently managed by BLM across Arizona.

4.5.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Historically, fire was a natural component of many forest and rangeland ecosystems in Arizona (Swetman and Baisan 1994). To manage fire as a

natural component of ecosystems and achieve the Desired Future Conditions, the landscape under the Proposed Action would be divided into two allocations related to vegetation community, the role fire plays within that community, and resource objectives. The fire management categories would be defined based on wildfire threat to human life and property, and historic fire return intervals. Hazardous fuel reduction would be pursued to reduce the risk of wildfire in the WUI and improve rangeland and forest health. The immediate direct affect of the Proposed Action is the reduction of hazardous fuels.

The Proposed Action would have a direct impact on existing fire ecology in that hazardous fuel reduction would decrease the occurrence of catastrophic wildfire (Brown 2000). Over the long-term, the Proposed Action would reduce hazardous fuels using management tools such as prescribed fire, mechanical, biological (including livestock grazing), and chemical treatments. The natural occurrence of fuels and the historic fire regime reflective of a vegetation community should occur.

The direct effect on fire ecology from hazardous fuels reduction by prescribed fire, mechanical, biological, and chemical tools would be long term and would encourage normal fire behavior and return intervals. Fuels reduction treatments would need to be re-administered every few years to maintain a normal range of variability. The management of natural occurring wildfire would remove unwanted hazardous fuels, improve wildlife habitat, and increase the health and vigor of vegetation (Brown 2000). The implementation of prescribed fire, mechanical, biological, and chemical treatments would each directly impact vegetation communities through soil erosion, damage to desirable plants and wildlife habitat. However, because vegetation is resilient these effects would be short term. The removal of diseased, invasive, and densely-growing vegetation would encourage the growth of healthy forest and rangeland vegetation. Under certain conditions, the re-seeding of desirable plant species may be necessary to inhibit weed establishment in areas where fuel reduction treatments have been implemented.

Impacts to vegetation and fire ecology from the Proposed Action are inherently direct, no other indirect impacts to fire ecology were identified.

The National Fire Plan applies to the U.S, Forest Service, National Park Service, U.S. Fish and Wildlife Service, the Bureau of Indian Affairs, as well as the BLM. All of these agencies administer federal land in Arizona and have fire management responsibilities. These agencies are mandated to take the necessary measures to reduce the occurrence of catastrophic wildfire through the reduction of hazardous fuels and improvements in forest and rangeland health. Cumulatively, as these agencies seek to return vegetation communities to their normal composition, structure, and productivity, there should be an overall improvement in forest and rangeland health and wildlife habitat throughout the state. The overall occurrence and acres burned from catastrophic wildfire should decrease. State and local agencies, and Private land owners may become involved in this effort through partnerships with federal agencies.

4.6 Invasive or Noxious Weeds

4.6.1 No-Action Alternative

The No-Action Alternative represents continuation of current invasive or noxious weed management. No new impacts would occur under this alternative. The primary impacts from continuing the current fire management practices are periodic catastrophic wildfire which may contribute to the continued spread of invasive and noxious weeds (McAuliffe 1995, Brooks and Pyke 2002). Fire leaves various-sized parcels of land denuded of vegetation. This situation is conducive for the rapid colonization and establishment of invasive or noxious weeds. Each catastrophic fire and suppression effort opens up the burned area to infestation of invasive or noxious weeds. The re-occurrence of a fire shortly after a previous fire usually worsens weed infestation. Furthermore, continued development of new houses in the WUI also creates disturbed areas where weeds or invasive species can become easily established and would contribute to increased fire hazard. The ability of many weeds to rapidly colonize recently disturbed areas results from the production of numerous seeds capable of wide dissemination and germination under a wide range of environmental conditions. Weed seedlings are able to grow rapidly and out-compete desirable plants for water, nutrients, light, and space. Once weeds are established, it is difficult for desirable vegetation to displace them without management intervention. Many weeds contribute to hazardous fuel loads because the senesced leaves and stems are highly flammable (Brooks 2002). When wildfires take place on sites where weeds constitute a high proportion of the plant mix, they usually burn hotter and faster than those with fuels comprised solely of native vegetation, and as such, can pose an increased risk to human life and ecosystem processes. Once the weeds are sufficiently abundant the

likelihood of fire increases with the fire return interval becoming higher/more frequent.

4.6.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Under the Proposed Action, the Desired Future Condition should be achieved over a period of several years. As the Desired Future Condition is achieved, weed invasion into new areas in response to catastrophic fire should decrease. Weed control would be vigorously pursued to reduce the risk of wildfire in the WUI and improve rangeland and forest health. The immediate direct affect of the Proposed Action is the reduction of hazardous, highly flammable fuels. Over the long-term, the Proposed Action would reduce and replace weed populations with desirable, less flammable native vegetation.

Hazardous fuel reduction projects targeted at weeds such as buffalograss or cheatgrass may reduce total infested acreage. Invasive or noxious weed control to reduce fire hazard can occur by a variety of ways including chemical, prescribed fire, biological, and mechanical or a combination of techniques (Howey and Ruyle 2002). After any weed control treatment is administered it is essential to deter the re-establishment of weeds. Encouraging the growth and productivity of desirable vegetation would most likely inhibit the re-establishment of the invasive weeds. The degree and type of rehabilitation management would depend of the nature and severity of the weed control treatment. Changes in plant composition may be all that is needed on rangelands where minimal weed control has been implemented. However, rangelands where wildfire or prescribed burns have occurred would need aggressive rehabilitation practices to reduce the chances of weed domination before desirable plants can become established. Management practices may include soil erosion control and the seeding of desirable native and non-native perennial grasses, and shrubs and forbs. Appropriate seed mixtures of native and non-native plants seeded at appropriate times are effective in becoming quickly established and not allowing weed seedlings to take root and would also minimize soil erosion.

The desired improvement to vegetation communities and the WUI from the Proposed Action would not occur immediately but may require 10ñ15 years to achieve. Vegetation communities should return to their normal composition, structure and productivity which, in turn, would affect the nature and severity of fires. Prior to European settlement, fire was a common and widespread ecological disturbance in Arizona (Swetman and Basian 1994). The fragmentation of ecosystems and reduction of fuels caused by grazing and cultivation that came with European settlement, along with fire suppression, caused a significant decrease in fire occurrence and size in comparison with the historic natural range of variability. Indicative changes in plant composition, structure and productivity that have occurred on some sites would unlikely have occurred in the pre-European settlement environment. Over the long term, vegetation communities should return to their natural composition, structure, and productivity resulting in improved health and vigor with the return of a natural fire regime. Wildlife habitat quality and diversity would increase with improved vegetation community health. The ability of invasive species to become established would decrease as desirable plant competition for space, light, nutrients, and water increases. The occurrence of catastrophic wildfire would decrease as vegetation communities achieve their normal composition, structure, and productivity.

The National Fire Plan applies to the U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service, the Bureau of Indian Affairs, as well as the BLM. All of these agencies administer federal land in Arizona and have fire management and weed control responsibilities. These agencies are mandated to take the necessary measures to reduce the occurrence of catastrophic wildfire through the reduction of hazardous fuels including weeds and to improve forest and rangeland health. As these agencies seek to return vegetation communities to their normal composition, structure, and productivity through weed control practices, there should be an overall improvement in forest and rangeland health and wildlife habitat. The overall occurrence and acres burned from catastrophic wildfire should decrease. State and local agencies and private land owners may become involved through partnerships with federal agencies.

4.7 Wild Free-Roaming Horses and Burros

4.7.1 No-Action Alternative

Information on the effects of wildland fire on WHBs and the animalís response to fire is limited. Information is available on some large mammals that share habitat with Wild Free-Roaming Horses and Burros (WHBs). For example, WHBs share habitat with desert bighorn sheep, desert mule deer, coyotes, fox and jackrabbits.

The primary impacts to WHBs from continuing the current fire management practices are from large, catastrophic wildfires. Wildland fires generally kill or injure a relatively small proportion of large mammal populations, although large, intense, stand-clearing fires are dangerous to animals caught in its path. In large wildfires, large mammals must find a safe location in unburned patches or outside the burn. Large mammal mortality would be most likely from fires with wide and fast moving fronts, that are actively crowning, and that have thick ground smoke occurs (USFS, 2000).

Large wildfires would indirectly affect WHBs through the loss of habitat and the reduction of forage and available cover. Wildland fires would force WHBs to travel long distances out of fire areas to find food and water. Because large mammals depend on vegetation for forage, bedding, cover, and thermal protection, they would abandon burned areas if fire removes many of the habitat features they need. Thus, catastrophic fires and understory burns that are severe enough to top-kill shrubs and young trees would likely trigger higher rates of emigration than patchy or low-severity fires. Impact would be greatest to mares with foals. The season of burn could also be an important factor in mortality. During winter months, many WHBs would be stressed by being on unfamiliar rangeland which has little available forage and water. Herd areas would be disrupted and movement patterns could also be interrupted by large-scale fire rehabilitation efforts. As a result of large wildland fires, WHBs could be moved under an emergency gather, or WHBs could also seek forage on other HMAs, leading to overuse of that vegetation.

4.7.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Under the Proposed Action, there would be few direct impacts to WHBs from chemical, mechanical, or biological treatment methods. WHBs would be expected to avoid human contact associated with treatment activities. Prescribed fires and natural-start fires would impact WHBs through the temporary loss of habitat and the reduction of forage and available cover. Small, patchy or low-severity fires associated with prescribed fire would have less impact than large, catastrophic fires. Prescribed fire would not be large enough to force WHBs onto unfamiliar rangeland.

Most of the literature regarding the relationship between fire and large mammals focuses on fire-caused changes in vegetation and how habitat changes influence animal populations. As discussed in Section 4.4.2, burning often increases and improves forage, the biomass of forage, and sometimes the nutritional content and digestibility of plants. Prescribed burns would improve WHB habitat by diversifying the plant community and increasing the percentage of perennial grass and desirable shrub ground cover. Because ungulates are sensitive to alterations in vegetation structure, however, their net response to fire depends on its severity and uniformity (USFS, 2000).

The Proposed Action would result in temporary reduction in available forage for WHBs. Large scale, intensive fire in contiguous stands of grass and shrub communities would affect WHBs by decreasing availability of forage and cover. The impact would be greater if the treated area is favored for forage, foaling, or cover. This should extend the period of time WHBs can use any given area. Fire can also negatively affect habitat when range condition is poor and forage species cannot recover, when nonsprouting species that provide forage are eliminated, or when too much area is burned and forage is inadequate in the home range until the next growing season.

To mitigate potential impacts to WHBs, naturally-ignited fires and prescribed fires should not be allowed to burn extensive, contiguous areas of any one HMA in the same year. Because horses are terrified of fire and will run wildly, when horses are present in the area, prescribed fires set in close proximity to fences should be started in such a way to decrease the likelihood of horses running through the fence. Burning should also be limited during the peak foaling period from March 1 through June 30.

In addition to the BLM, other Federal agencies that manage lands in Arizona are expected to undertake actions to reduce the occurrence of catastrophic wildfire through the management of hazardous fuels. As the Federal agencies, including BLM, implement fire management activities (both wildfire suppression and treatment activities to reduce wildfire fuels) on the ground, the frequency and location of effects to WHB populations and habitats increase across the landscape. WHBs may cross administrative boundaries onto other federal, state, or private lands. In the short-term (0-3 years), fire management activities in habitats proposed for intensive fuels reduction treatments (prescribe fire or mechanical, chemical, or biological treatments) would need to be coordinated among the Federal agencies to reduce the combined effects of lost habitat and forage on various Federally administered lands. The overall reduction in catastrophic wildfires on all Federal lands within

Arizona would also reduce the chance for direct mortality or emergency gathers of WHBs.

4.8 Fish and Wildlife Resources

The purpose of this section is to identify and predict the likely outcomes for fish and wildlife species and their habitats associated with BLM fire management alternatives. Direct impacts to fish and wildlife resources from fire or fire management activities may result in mortality or displacement of individuals, disturbance in reduced air or water quality from smoke and ash, and alteration of immediate post-fire or post-treatment environments through loss of or changes to key habitat components (*e.g.,* food availability or quality, cover from predators, thermal refugia, nesting/denning habitat, water availability and quality, travel corridors, etc.) (Smith 2000, Esque *et al.*, 2003). These direct impacts may affect wildlife populations or habitats for one or two seasons or for several years after a fire or a vegetation treatment activity, depending on the ability of the fish or wildlife species to recolonize burned or altered habitats, the severity of the habitat alteration, and the recovery time of the habitat. Indirect impacts to fish and wildlife resources from fire or fire management activities typically result from influences of post-fire succession, recovery, or rehabilitation of the habitat. These impacts may be long-term, depending on the severity of the habitat alteration, and may change species assemblages (relative abundances or species composition), species behaviors, or overall population trends, benefiting some species and negatively affecting others (Smith 2000, Esque *et al*. 2003).

The direct and indirect effects of wildfire (either catastrophic or managed) on fish and wildlife resources may vary widely, depending on a variety of factors such as animal species complex; size, shape, and habitat types of a fire-created mosaic; fire intensity, duration, and frequency; fire location, shape, and extent; season of burn; rate and composition of vegetation recovery; change in vegetation structure; type of soils; topography and microsites; and mobility of fish or wildlife species (i.e., ability to leave a site during a fire or recolonize a site after a fire). In addition, many of these same factors influence the effect of fire management activities (*e.g*., prescribed fire; mechanical, chemical, or biological treatments of fuel loads; and fire suppression) on fish and wildlife populations and habitat. Any effects to vegetation communities would affect the resident wildlife and fish populations. Vegetation characteristics such as structure, production, and composition provide or influence habitat suitability, such as seasonal cover and food availability, for particular predator and prey species.

The following discussion presents a comparison of the scope and type of effects that would be expected under the No-Action Alternative and the Proposed Action Alternative. Because of the variety of fish and wildlife species occupying BLM-administered lands in Arizona, and their diverse habitat requirements, it is difficult to generalize the effects of wildfire and fire management activities on these resources. Direct, indirect, and cumulative impacts are discussed generally, and the actual range of impacts would vary among fish and wildlife species and habitat types.

4.8.1 No-Action Alternative

Under the No-Action Alternative, BLM would continue to suppress all wildfires, regardless of ignition source or vegetation type, in accordance with current LUP and Fire Management Plan direction. Continuing fire management under this alternative would result in no new impacts to fish and wildlife species and their habitats. Both direct and indirect effects to fish and wildlife resources from implementing the No-Action Alternative would be widespread, intense, and long-term or permanent.

The primary effects to fish and wildlife resources under the No-Action Alternative would be continuing, periodic loss or alteration of habitats from large, catastrophic fires, or conversely, from aggressive fire suppression techniques that alter the natural density, structure, and composition of fire-adapted or fire-threatened habitats. The number of fires and acres burned as well as the intensity and severity of the burns is likely to increase. In Arizona, many fire-adapted vegetation communities (*e.g.,* Great Basin Desertscrub, grassland, semi-desert grassland, chapparal, woodland, and forested habitats) on BLM-administered lands are overgrown with dense shrubs and young trees because they have been subjected to a regime of aggressive fire suppression and fire exclusion. The Sonoran Desertscrub and Mojave Desertscrub communities, which are not fire-adapted, are susceptible to and have been altered by unnatural fires because of the introduction and proliferation of non-native annual plants. The severe alteration of riparian areas from a variety of causes has left this important habitat type threatened by fire. The conditions of these vegetation communities affect the abundance and diversity of wildlife species directly by creating unfavorable habitat conditions for some species, while favoring

others. In addition, these fire-adapted and fire-threatened vegetation communities are at high risk of unnatural, high-intensity wildfire events.

Under the No-Action Alternative, the likelihood of catastrophic stand-replacing or stand-altering fires in these habitats would increase, with the direct effects on fish and wildlife resources varying among species. Depending on species mobility, wildlife would experience impacts from mortality or displacement, harassment during fire suppression activities, and reduction of air quality from smoke and ash. For those species that cannot flee a burn, the most exposed habitat sites are dry, exposed slopes, hollow logs with a lot of exposed wood, burrows less than 5 inches deep, lower branches of trees and shrubs, and poorly insulated underground or ground-nesting areas (Lawrence 1966 as cited by Peek 1986). While small animals (mammals, reptiles and amphibians) are most at risk for mortality because of their limited mobility, occasionally large mammals are killed by severe fast-moving wildfires, typically from smoke inhalation (Smith 2000). Catastrophic fires would also continue large-scale or intense alterations of habitat components for many fish and wildlife species, which would favor some species and displace others. Immediate post-fire conditions raise light penetration and temperatures on and immediately above and below soil surfaces and can reduce soil moisture, affecting ground-dwelling species (Lyon *et al*. 1978). Burning of cover and destruction of trees, shrubs, and forage modify habitat structure (Lyon *et al.* 1978, Smith 2000, Esque *et al.* 2003). The loss of small ground cover and charring of larger branches and logs would affect small animals and birds that use these components for nesting, thermal or escape cover, or foraging. Early vigorous vegetation growth immediately after a fire would alter feeding and nesting behaviors of some species (Lyon *et al*. 1978, Smith 2000, Cunningham *et al*. 2001). Alterations in terrestrial or riparian habitats would also affect water quality and habitat components for fish and other aquatic species. Catastrophic wildfires leave the surrounding soil and accumulated ash vulnerable to erosion and remove shading streamside vegetation, increasing sedimentation and water temperature.

Catastrophic wildfires or long-term fire suppression strategies, as implemented under the No-Action Alternative, would also continue the indirect effects of changes in population dynamics (abundance, density, and reproduction) and long-term alteration of vegetation components over a large land area. Although fires may cause direct mortality to animals, the indirect effects to populations of different species are highly variable. Large-scale losses of small animals may be off-set by high reproductive potential and ability to recolonize burned sites. Animals with lower reproductive potential would experience longer term recovery from loss. Loss of a few large mammals from fire may not affect the overall population (Smith 2000). Overall, indirect effects to populations highly depend on the species and the severity of the habitat change caused by the fire.

Catastrophic fires may frequently create more homogeneous habitats within and among vegetation communities, thereby reducing or changing the assemblage of species occupying these altered habitats. While a shift in vegetation composition and succession is natural after a catastrophic fire, an extensive conversion with no interspersed patches of the former habitat type is not characteristic of the fire regime in most vegetation communities of Arizona. These unnaturally large or severe habitat changes present several problems for resident wildlife and fish populations that could extend many years into the future.

For example, fires burning a ponderosa pine/mixed-conifer forest in which years of fire exclusion have created unnaturally high fuel loads can potentially kill virtually all of the trees and understory vegetation with extensive crown runs. Because of this severe habitat alteration and the slow recovery of forested habitats (large, old-growth trees), the burned area may spend decades as a site dominated by a shrub community interspersed with numerous large snags. While these new conditions may favor bird species inhabiting dense shrub communities or woodpecker species requiring snags, forest-dependent species would be excluded from the site. High-intensity fires create large numbers of snags that are normally of high value to many wildlife species (Smith 2000). Their value, however, is reduced for some species if the area of snags is too large and surrounding vegetation does not afford other necessities, such as food and cover. Also, high-intensity fires result in fewer snags several years later as the fire created snags fall and growth of the single-age class forest to a snag-producing age takes many decades (Smith 2000).

In lower elevation vegetation communities, such as Sonoran or Mojave Desert Scrub, increases in invasive grass and shrub species have altered these habitats to a point where fires now carry in habitats that are intolerant of fire or fire suppression activities. Wildfire can cause rapid and profound changes in desertscrub habitats, both in the short-term and long-term, because many desert plants are not well adapted to large disturbances by fire (Esque *et al*. 2003). For example, the large cactus species that provide critical nesting and foraging habitat for many wildlife

species, may take decades or centuries to recover from fire. In addition, fires now burn hotter and farther, reducing the natural mosaic pattern (patchy distribution of plants and open space) typical to desertscrub communities (Esque *et al*. 2003). Although aggressive suppression of wildfires would continue under the No-Action Alternative, catastrophic fires in these fire-intolerant habitats would lead to mortality, displacement, loss of food and shelter, and changes in animal communities for fish and wildlife species not historically impacted by fires or fire suppression activities. While extirpation (100% mortality) of entire populations in burned areas is unlikely, direct mortality of wildlife (particularly small animals) in desert fires is fairly common, although highly variable (Esque *et al*. 2003).

Under the No-Action Alternative, it is unlikely that resource objectives to return altered wildlife and fish habitats to a more desired condition (*e.g*., increases in native vegetation communities, return of vegetative structure to more natural conditions, reduction of invasive weed species, increases in habitat heterogeneity) could be achieved, as severity and suppression of catastrophic wildfires would continue to dominate wildfire management activities. Indirect effects to wildlife and fish habitats and populations from long-term changes in vegetation composition and structure caused by aggressive fire suppression and catastrophic wildfires would continue in all vegetation communities under the No-Action Alternative.

Fire suppression activities also have direct and indirect effects on fish and wildlife species and their habitats. Water that is removed from small bodies of water for helicopter bucket drops may affect aquatic organisms by depleting their habitat, removing individuals (particularly in small isolated populations), or spreading disease or non-native, predatory species (*e.g.*, bullfrogs) among different water sources. Conversely, water drops can, in some circumstances, be used instead of hand line construction ("wet-lining") to control fire movement. This tactic would result in less impact to soil, forest litter, and vegetation than hand line construction and, therefore, would have less impact on wildlife, both in intensity and duration. Some terrestrial wildlife could be struck by water or retardant drops, resulting in injury or chemical contamination or be disturbed by the low-flying aircraft. Construction of helispots often results in the felling of trees and snags, which are important habitat components. In addition, helicopter traffic would likely disturb wildlife, such as nesting raptors. Hand line construction would remove and disturb soil and forest litter, possibly affecting animals such as small mammals, amphibians, invertebrates, and ground-nesting birds. The presence of hand line crews in remote locations could cause direct disturbance of some wildlife species and introduce unnatural food sources. Removal of forest litter and live vegetation can also lead to soil erosion and increased siltation in adjacent lakes and streams. These suppression related impacts are, when looking at the "big picture", short-term and overall insignificant. Any fire suppression action that requires the felling of snags to protect human safety and the integrity of the fire line would potentially affect wildlife by reducing the availability of snags to species such as woodpeckers, squirrels, or some bat species. The number of snags lost would vary, depending upon factors such as the type and age of tree stand, its history of fire and/or disease or insect infestation, and the intensity of the fire. Direct and indirect impacts from most of these fire suppression techniques would be short-term, temporary, and localized, particularly if sensitive habitats (*e.g.,* raptor nests, riparian areas) are avoided to the extent possible and rehabilitation of fire lines are completed. However, suppression actions in the arid desertscrub communities may be longer term or more intense, since these vegetation communities have much longer recovery periods from activities that highly disturb the soils or vegetation, thereby having a longer term effect on the wildlife species that inhabit them.

Direct effects from mortality or displacement of individuals and from loss of key habitat components and indirect effects from long-term changes in habitat composition or quality would be more widespread and intense in a greater variety of habitat types under the No-Action Alternative compared to the Proposed Action. Because of the higher risk of wildfire and its potential greater severity, impacts from fire suppression activities are also more likely to occur under the No-Action Alternative than under the Proposed Action.

4.8.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Under the Proposed Action, BLM-administered lands would be assigned to one of four fire management categories, based on the wildfire threat to human life and property and the historic fire regime (fire return interval or fire-adaptability of vegetation). Under the Proposed Action, BLM would use a variety of treatments and fire management activities to reduce hazardous wildland fire fuels in the WUI and to improve rangeland and forest health in fire-adapted and fire-threatened vegetation communities. The

degree of fire suppression would vary among the four categories. In general, BLM would implement the proposed new fire management actions and treatments in habitats that are fire-adapted or fire-threatened; habitats that are not fire-adapted or have long fire-return intervals would continue to be managed with aggressive fire suppression. In addition, as the Desired Future Conditions are achieved in various locations, BLM may change the fire management category for a particular site. For purposes of this analysis, it is assumed that implementation of the Proposed Action, including achieving wildfire and other resource objectives through a variety of fire management activities, would be accomplished over the next 15-20 years.

The various treatments and fire management actions under the Proposed Action would have a variety of direct effects on the resident fish and wildlife species. Adverse impacts would be decreased for some species if the timing of the prescribed fire or vegetation treatment avoids critical seasons, such as reproductive periods, when the loss of cover would be critical to wildlife or fish; for example, the bird nesting season or prior to wet weather conditions that may increase runoff into aquatic habitats.

Fish and wildlife species occupying particular sites would experience repeated direct effects from the various treatments, particularly prescribed fire and mechanical or manual treatments, since these fire management activities would need to be repeated periodically to maintain reduced fuel loads or retain particular resource objectives or conditions. However, as the Desired Future Conditions of a site are achieved, the intensity and scope of these effects would be reduced, as habitat conditions are restored or fuel loads are minimized and stabilized.

Catastrophic Wildfires. Under the Proposed Action, the risk and scope of the direct effects to fish and wildlife from catastrophic wildfires would be substantially reduced compared to the No-Action Alternative. The appropriate management response to wildfires and the treatment activities to reduce wildfire fuel loads in both allocations would reduce the severity and size of catastrophic wildfires in a variety of habitats and vegetation communities. Fewer and less severe catastrophic wildfires would reduce mortality and loss of key habitat components, and retain a greater percentage of unburned habitats for refuge and recolonization of burned habitats by various wildlife species and for reduced sedimentation into aquatic habitats.

Managed Wildfire. Under the Proposed Action, the average annual number of acres burned by managed wildfires would increase in allocation 1, ìAreas suitable for wildland fire use for resource benefitî. Conditions for wildland fires would vary among years, with little burning occurring in some years, and much burning occurring in others.

Wildlife and fish species occupying the fire-adapted communities (and their associated waterways) on BLM-administered lands in Arizona would be most directly affected by managing naturally-ignited fires under the Proposed Action. Because natural ignitions are random events, areas burned would not necessarily be those of highest management priority. Also, some areas would likely burn at higher than natural intensities due to current levels of fuel accumulation, even when prescriptions were designed to minimize these effects. As a result, consumption of large woody debris (which provides habitat diversity) and removal of shrub cover would be greater than typically found within the natural range of variation for an area, while creation of habitat mosaics would be less than typical. Loss or alteration of these habitat components would directly affect species that favor dense habitat types; for example, shrews, brown creepers, or tiger salamanders in forested habitats, or bird species that prefer heavy shrub cover in chaparral habitats. Wildlife species would experience direct mortality or displacement from these managed wildfires, particularly in years of extensive burning or higher-intensity burns before fuel loads are reduced. In addition, fish species occupying waterways within these habitat types could be subjected to the direct effects of increased sedimentation and water temperatures from removal of upland vegetation. As with catastrophic fires, the duration, intensity, and scope of these direct effects to wildlife and fish depends on the species and the characteristics of the fire. In years of high wildland fire activity, large areas of habitat would likely be affected, changing their suitability for species favored under the altered habitat conditions created by a history of fire suppression. Some species occupying burn sites would show an initial decline in populations immediately following a fire, but would recover quickly with early successional recovery of the habitat or recolonization of the burned site (Smith 2000, Cunningham *et al*. 2001). Other species would exhibit long-term changes in populations or community assemblages if key habitat components are slow to recover or are targeted for permanent change in structure or composition by BLM fire management or resource objectives.

Direct effects to fish and wildlife resources from managed wildfires would be greater under the Proposed Action, compared to the No-Action

Alternative, since more areas would be allowed to burn rather than be aggressively suppressed. However, these direct effects under the Proposed Action would still be less than the direct effects to fish and wildlife habitat and populations from the higher risk of catastrophic fires that would continue under the No-Action Alternative.

Because fire suppression would continue as a primary fire management activity in non-fire adapted habitats, fish and wildlife species occupying these habitats would not experience direct impacts from appropriately managed wildfires.

Prescribed Fire. The use of prescribed fire would selectively be used in allocation 1, ìAreas suitable for wildland fire use for resource benefitî. Areas furthest from the natural fire regime, with identified threats to wildlife populations and habitats, could be targeted for treatment. Prescribed fires would be planned to occur under conditions that maximize achievement of resource objectives, including rehabilitation of wildlife and fish habitat, and minimize fire-related impacts to sensitive wildlife resources (*e.g.,* nesting raptors or priority big game species).

Killing vertebrates by prescribed burning is rare (Lyon *et al.* 1978). However, high levels of fuel loading in some sites would cause some prescribed fires to burn at higher than natural intensities, even when fire prescriptions were designed to minimize these effects. Conditions for prescribed fires would also vary among years, with little burning occurring in some years, and much burning occurring in others. As a result, direct effects to fish and wildlife resources from prescribed fires under these more intense conditions would be similar to those described for management of naturally-ignited fires. In addition, escaped prescribed burns could accidentally destroy riparian habitats and impact aquatic resources, causing losses of wildlife and fish through exposure, total loss of habitat, and through increased sedimentation of aquatic habitat from unchecked overland flow and destabilized stream channels.

Burning outside the typical fire season would minimize the direct effects of mortality, harassment, and displacement of some wildlife and fish species by avoiding critical nesting or breeding seasons or reducing the intensity of the fire and subsequent loss of key habitat components. However, some species that are adapted to the natural timing of fires may experience greater effects if they are unable to escape the burn or, if displaced, find adequate habitat resources (*e.g.,* food, shelter) during colder or wetter times of the year (Smith 2000, Esque *et al.* 2003). In addition to reducing wildfire fuel loads and restoring vegetation communities, BLM would use prescribed fires to improve habitat components for big game and other wildlife species. Prescribed fires would change forage quality and quantity, intersperse new feeding areas with areas providing cover, and/or rejuvenate decadent browse plants for some priority wildlife species. For example, an important factor in the degree of use of burned juniper habitats by deer and elk is the interspersion of burned habitats, which provide food, and unburned sites, which provide thermal and hiding cover (Smith 2000).

If prescribed fire is used in fire-threatened, but non-fire adapted communities, such as Sonoran and Mojave Desertscrub, the effects to resident wildlife species would be highly variable, and management of the fire (including determining if or when to implement prescribed fire, as well as managing the prescribed fire itself) would be essential in ascertaining the direct effects to these populations. In these arid environments, use of plants that provide thermal cover, nurse-plants for plant re-establishment, and plants that provide cover from predators would all be directly affected by prescribed fire, thereby affecting the wildlife species that use them (Esque *et al*. 2003).

Fire Suppression Actions. Maintaining control of managed wildland fires and prescribed fires would involve fire suppression actions such as hand line construction, snag removal, and water drops. As described under the No-Action Alternative, some direct effects to fish and wildlife resources would occur from these wildfire management actions because of the increased use of managed wildfire and prescribed fire under the Proposed Action compared to the No-Action Alternative. However, such efforts are necessary and likely to be less intense than they would be during fire suppression activities associated with the current policy to aggressively suppress all wildfires or with suppression of catastrophic wildfires.

Manual Vegetation Treatment. Manual vegetation treatments involve the use of hand-operated power tools and hand tools to cut, clear, or prune herbaceous and woody plant species to reduce wildland fire fuel loads. This method is labor intensive, but can be extremely species selective and can be used in areas of sensitive fish or wildlife habitats, such as riparian habitats. This method would be used on sites where fire (prescribed or naturally ignited) is undesirable or where significant constraints prevent widespread use of fire as a management tool. These sites comprise a

range of vegetation communities or habitat types, and include areas where there may be wildlife concerns, yet it is deemed beneficial to remove trees, shrubs, or other fuel loading vegetation. Manual vegetation treatments cause less ground disturbance and generally remove fewer amounts of vegetation than is associated with other treatment methods (prescribed fire or mechanical treatments). Thus, direct impacts to wildlife species, such as mortality, displacement, or loss of key habitat components, from this treatment method would be minimal and short-term for most species. This method would also minimize direct effects to fish species, since retention of more vegetation would reduce the likelihood of decreased bank stability, increased sedimentation, and increased water temperatures.

Mechanical Vegetation Treatment. Heavy equipment would be used where critical fuel conditions demand immediate, efficient action, and where natural resources can acceptably withstand the impacts associated with this method. This method would include a range of vegetation communities, primarily habitats with dense shrub or woody components. Feller-bunchers, and other tracked or wheeled vehicles in these habitat types would create ground disturbance that would directly affect ground-dwelling animals, including salamanders, reptiles, and small mammals that occupy forest litter or low-growing shrubs. Adjacent habitats would remain unaffected, allowing recolonization. The noise of heavy machinery would cause some short-term disturbance of wildlife in treatment sites, and in adjacent areas.

Biological Vegetation Treatment. Biological methods of vegetation treatment employing grazing by cattle, sheep, or goats would be used as biological control methods to reduce fuel loads on sites within both allocations. This method is extremely selective in controlling a target plant species; however, only a few plant species can be controlled in this manner. Typically biological control methods would not eradicate the target plant species, but merely reduce the target plant densities to more tolerable levels. Direct impacts on fish and wildlife species would be short-term and minimal, since direct mortality is unlikely, changes to habitat components would be gradual and targeted, and sufficient habitat would be retained for displacement and recolonization.

Chemical Vegetation Treatment. Chemical herbicides would be applied to reduce fuel loads in a variety of habitat types. Chemicals would be applied aerially with helicopters or fixed-wing aircraft, or on the ground using vehicles or manual application devices. Herbicide applications would be scheduled and designed to minimize potential effects to non-target plants, as well as fish and wildlife species. The chemical drops could inadvertently strike some terrestrial animals or aquatic habitats, resulting in injury or chemical contamination to wildlife and fish. The low-flying aircraft could also disturb some wildlife. Direct impacts to fish and wildlife species would be short-term, localized, and minimal, since direct mortality is unlikely, sufficient habitat would be retained for displacement and recolonization by wildlife species, and most aquatic habitats would be buffered from the chemical application.

Under the Proposed Action, the combination of appropriately managing wildfires, and reducing fuel loads or restoring historic fire regimes through prescribed fire, and mechanical, chemical, and biological vegetation treatment methods, would indirectly affect wildlife habitat and populations in the long-term by restoring wildlife habitats and reducing the threat of catastrophic fires in a variety of habitats managed by BLM in Arizona. Managed wildfires or treatments would increase species diversity and ecosystem resiliency by restoring habitat heterogeneity and lost or degraded habitats for indigenous species.

Managed wildland fire and prescribed fire would be valuable tools in restoring natural, fire-influenced wildlife habitat. In more arid habitats, the indirect effects from using prescribed fire to reduce non-native plant species would need to be carefully balanced with the direct effects of the fire itself (Esque 2003). Applying a diversity of treatment types both within particular vegetation communities and among the variety of BLM-managed lands, as proposed in this alternative, would provide for a range of variability in habitat types, including density and composition of vegetation, structural components, and course woody debris. Using the variety of proposed fire management actions to restore riparian or desertscrub habitats, and continuing aggressive fire suppression tactics, would improve vegetation composition and structure and reduce the amount of habitat lost or degraded by wildfires in these non-fire adapted habitats.

These long-term changes in vegetation would affect the species composition of wildlife occupying habitats on public lands in Arizona. For example, in the few BLM-administered forested habitats, fire management activities under the Proposed Action that create a more open forested environment (i.e., less understory vegetation) and remove down wood or snags would alter important habitat components for wildlife species that depend upon this type of dense, habitat complexity, such as salamanders,

lizards, small mammals, and ground-nesting birds. The overall conditions achieved, however, would benefit a larger number of species by restoring a forest structure that is within the range of natural variability for this fire-influenced vegetation community, with gaps and edge communities interspersed among the forest habitat. In juniper sites, complete type conversion to grassland using fire management activities would reduce wildlife diversity; however, creating a mosaic of successional stages and habitat composition, structure, and complexity with managed wildfire, prescribed burning, or mechanical treatments would favor a diversity of rodent and bird species, as well as providing restored browse species interspersed with cover sites for deer, elk, and other game species (Smith 2000). Old growth juniper stands may offer unique and valuable wildlife habitats, adding to the variety within juniper stands. Appropriately managing wildfire and using a variety of site-specific treatments would allow BLM to increase, restore, or maintain habitat and species diversity in the long-term by retaining old-growth juniper communities as islands and edge communities to the treated areas. In the arid desertscrub communities, using various treatments to reduce non-native grasses, such as red brome and buffelgrass, would reduce the occurrence of unnaturally severe wildfires that currently threatens the biotic diversity in these habitats (Esque *et al.* 2003).

Using a variety of fire management techniques that vary in their intensity and length of time for application and effectiveness would also assist in maintaining a range of variability of habitats. Methods that are less intensive (e.g., manual treatments), highly specific (e.g., chemical or biological treatments) or take a long time for effective reduction in fuel loading (biological treatments) may delay achievement of target habitat conditions in some areas, and limit the amount of vegetation removed. Such management would have different effects on wildlife. On one hand, delay in achieving target conditions would allow altered habitat conditions to continue and extend the threat of high-intensity fire in those areas. On the other, retention of more vegetation in treatment areas would favor species that prefer denser habitats. Conversely, treatment methods that provide quicker, more intensive, or widespread changes, such as managed wildfire, prescribed fire, or mechanical removal of hazardous fuels, may result in a more rapid return of habitat types to a more natural condition, with a corresponding more rapid, long-term return of the wildlife community to historic species composition. With all treatment types, reducing the risk of catastrophic wildfires would allow wildlife species and communities to move among and adapt to the altering habitat conditions accomplished by the fire treatment methods. Using a full range of fuel-reduction techniques would allow flexibility in achieving habitat rehabilitation goals while minimizing adverse impacts to fish and wildlife species.

The National Fire Plan applies to the U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service, and Bureau of Indian Affairs, all of which manage federal land in Arizona. These agencies are also mandated to take the necessary measures to reduce the occurrence of catastrophic wildfire through the management of hazardous fuels. As the Federal agencies, including BLM, implement fire management activities (both wildfire suppression and treatment activities to reduce wildfire fuels) on the ground, the frequency and location of effects to fish and wildlife populations and habitats increase across the landscape. Because high-mobility wildlife populations do not recognize administrative boundaries, many species use or move through habitats on a variety of federal, state, and private lands. In the short-term (0-3 years), fire management activities in habitats proposed for intensive fuels reduction treatments (prescribe fire or mechanical, chemical, or biological treatments) would need to be coordinated among the Federal agencies, in cooperation with the state wildlife agency, to reduce the combined effects of mortality or displacement of species or altering large acreages of habitats on various Federally administered lands. Maintaining a mosaic of habitats across the landscape and across administrative boundaries would minimize any cumulative effects to fish and wildlife resources. In the long-term (4-10 years), the overall improvement in structure, composition, and productivity in vegetation communities on all Federally administered lands within Arizona would improve the habitat quality and quantity (food, shelter, water, nesting/denning sites, etc.) and habitat variability for fish and wildlife species across the landscape. The overall reduction in catastrophic wildfires on all Federal lands within Arizona would also reduce the chance for large-scale direct losses of fish and wildlife populations and habitat within the state, increasing the chances for populations of some species to stabilize, and increasing ecosystem resiliency against other types of habitat disturbance (*e.g.*, human population expansion and associated infrastructure development on private lands, particularly those adjoining BLM-administered or other federal lands).

4.9 Special Status Plant and Wildlife Species

The purpose of this section is to identify and predict the likely outcomes for no new impacts to special status species and critical habitats associated with BLM fire management alternatives. The following discussion presents a comparison of the scope and type of effects that would be expected under the No-Action Alternative and the Proposed Action Alternative. Direct, indirect, and cumulative impacts are discussed generally, and the actual range of impacts would vary among the special status species and habitat types.

4.9.1 No-Action Alternative

Under the No-Action Alternative, BLM would continue to suppress all wildfires, regardless of ignition source or vegetation type, in accordance with current LUP and Fire Management Plan direction. Continuing fire management under this alternative would result in no new impacts to special status species and their habitats. Effects to special status wildlife, fish, and plant species from the No-Action Alternative would be similar to those described for Vegetation Resources (**Section 4.4**) and Fish and Wildlife Resources (**Section 4.8**).

Some special status species would benefit from continued aggressive fire suppression activities that minimize loss of individuals, populations, key habitat components, or critical habitats, particularly in habitats that are fire-threatened but not fire-adapted (e.g., desertscrub or riparian habitats). Conversely, fire suppression activities can also affect special status species through mortality, disturbance, or displacement; and removal, damage, or alteration of key habitat components. Currently, fire suppression operations that occur on BLM-administered lands in or near sites occupied by Federally protected species, or designated or proposed critical habitat, require emergency consultation or conference to comply with Section 7 of the Endangered Species Act, as amended. The need for Emergency Consultations would continue under the No-Action Alternative.

The long-term alterations in habitats and increased risk of catastrophic fires under the No-Action Alternative would also increase the risk to speciesí viability from large-scale losses of populations or habitat. This risk is particularly high for the small and/or disjunct populations or ranges of many special status species, which are more vulnerable to catastrophic events. Both direct and indirect effects to special status species from implementing the No-Action Alternative would be widespread, intense, and long-term or permanent compared to the Proposed Action Alternative.

4.9.2 Proposed Action

The Proposed Action would utilize appropriately managed wildfire, prescribed fire, mechanical, biological, and chemical fuels treatments, combined with fire suppression and rehabilitation, in order to achieve desired future conditions. Site-specific assessments would determine if and when fire suppression operations or the proposed fire management activities would be appropriate management tools in sites or habitats occupied by, suitable for, or adjacent to special status species.

This section conveys general, potential effects to special status species from implementing fire suppression and the proposed fire management activities under the proposed action. The duration, intensity, and scope of effects to special status species and their critical habitats depend on the species and the characteristics of the activity. General and species-specific Conservation Measures (Appendix D) would be implemented to the extent possible during fire suppression operations and would be mandatory during fuels treatment activities to minimize effects to the species.

A Biological Evaluation (BE) was prepared that contains detailed analyses of all federally listed (endangered or threatened), proposed, and candidate species (herein referred to as ìFederally protectedî species), and designated or proposed critical habitat that may be affected by the proposed action. It includes analyses of all direct, indirect, and cumulative effects, as well as any interrelated and interdependent actions, of the Proposed Action, including fire suppression operations. The comprehensive analysis of fire suppression activities in the BE, combined with implementing Conservation Measures, would result in greater consistency statewide for managing Federally protected species, as well as minimizing or eliminating the need for future emergency consultations when fire suppression activities occur within the range of these species or their critical habitats.

The species-specific analyses within the BE for this project are incorporated here by reference. **Appendix H** provides a summary of the BE. **Table 4.7** provides a summary of the effects determination for each Federally protected species within the action area. Based on discussions and analyses during informal consultation, determinations were made that

Table 4.7 ñ Summary of effects for protected species in Arizona considered in the Biological Evaluation for the proposed action.

Common Name	Federal Status[a]	ESA Species Determinations[b]	ESA Critical Habitat Determinations
Amphibians			
Chiricahua leopard frog	FT	LAA	n/a
Relict leopard frog	FC	NLAA	n/a
Birds			
Cactus ferruginous pygmy-owl	FE, PCH	LAA	LAA
California brown pelican	FE	NLAA	n/a
California condor	FE, 10(j)[c]	LAA	n/a
Masked bobwhite	FE	NLAA	n/a
Northern aplomado falcon	FE	NLAA	n/a
Southwestern willow flycatcher	FE	LAA	n/a
Yuma clapper rail	FE	LAA	n/a
Bald eagle	FT	LAA	n/a
Mexican spotted owl	FT, CH	LAA	LAA
Yellow-billed cuckoo	FC	LAA	n/a
Fish			
Bonytail chub	FE, CH	NLAA	NLAA
Desert pupfish	FE, CH	LAA	NE
Gila topminnow	FE	LAA	n/a
Razorback sucker	FE, CH	LAA	LAA
Virgin River chub	FE, CH	LAA	LAA
Woundfin	FE, CH 10(j)[d]	LAA	LAA
Yaqui chub	FE, CH	LAA	NLAA
Yaqui topminnow	FE	LAA	n/a
Beautiful shiner	FT, CH	NLAA	NLAA
Little Colorado spinedace	FT, CH	LAA	LAA
Loach minnow	FT, CH	LAA	LAA
Spikedace	FT, CH	LAA	LAA
Yaqui catfish	FT, CH	NLAA	NLAA
Gila chub	PE, PCH	LAA	LAA
Flowering Plants			
Arizona cliffrose	FE	LAA	n/a
Brady pincushion cactus	FE	LAA	n/a
Holmgren (Paradox) milk vetch	FE	LAA	n/a
Huachuca water umbel	FE, CH	LAA	LAA
Kearneyís blue-star	FE	LAA	n/a
Nichol Turkís head cactus	FE	LAA	n/a
Peebles Navajo cactus	FE	LAA	n/a
Pima pineapple cactus	FE	LAA	n/a
Jones cycladenia	FT	LAA	n/a

Common Name	Federal Status[a]	ESA Species Determinations[b]	ESA Critical Habitat Determinations
Siler pincushion cactus	FT	LAA	n/a
Acuna cactus	FC	LAA	n/a
Fickeisen plains cactus	FC	LAA	n/a
Mammals			
Black-footed ferret	FE, 10(j)	NLAA	n/a
Hualapai Mexican vole	FE	LAA	n/a
Jaguar	FE	NLAA	n/a
Lesser long-nosed bat	FE	NLAA	n/a
Mexican gray wolf	FE, 10(j)	NLAA	n/a
Ocelot	FE	NLAA	n/a
Sonoran pronghorn	FE	NLAA	n/a
Black-tailed prairie dog	FC	NLAA	n/a
Reptiles			
Desert tortoise, Mojave population	FT, CH	LAA	LAA
New Mexico ridgenose rattlesnake	FT	LAA	n/a

[a] Federal status designations are Endangered (FE), Threatened (FT), Proposed Endangered (PE), Proposed Threatened (PT), Federal Candidate (FC), Designated Critical Habitat (CH), Proposed Critical Habitat (PCH).
[b] Determinations for Federally listed (endangered or threatened), proposed, and candidate species and designated or proposed critical habitat are: 1) no effect (NE); 2) may affect, is not likely to adversely affect (NLAA); and 3) may affect, is likely to adversely affect (LAA).
[c] Species listed as ì10(j)î are designated experimental/non -essential populations under Section 10(j) of the Endangered Species Act, as amended. This designation provides greater management flexibility. For BLM, 10(j) populations of Federally listed species are equivalent to a ìproposedî status.
[d] In addition to the full protection of this listed species under the ESA, experimental/non-essential (10(j)) populations have been designated, but not yet re-introduced, into designated sites outside its historic range.

the proposed action would have no effect on 25 species within the action area of the project (see Appendix B of the BE).

Direct Impacts of Proposed Action:

Terrestrial Wildlife Species

Direct effects to special status wildlife species from fire suppression and the proposed fire management activities would be similar to those described in the Environmental Consequences for Fish and Wildlife Resources (**Section 4.8**). These effects would include, but are not limited to:

- Mortality or injury of adults, young, or eggs from smoke inhalation or crushing by vehicles or equipments used during fire management operations.
- Disturbance or displacement of individuals from smoke, noise, and other human activities associated with the operations, affecting foraging, roosting, or reproductive behavior.
- Nest abandonment or mortality of young, resulting in the loss of one yearís recruitment.
- Loss of key habitat components for nesting, foraging, roosting, or cover.

Fish and Other Aquatic Species

Direct effects to special status fish and aquatic species from fire suppression and the proposed fire management activities would be similar to those described in the Environmental Consequences for Fish and Wildlife Resources (**Section 4.8**). These effects would include, but are not limited to:

- Mortality of adults, young, or larvae from using occupied water sources during fire suppression or proposed fire management activities.
- Loss of habitat (water quantity) from dewatering during low flow periods.

- Spread of disease or non-native, predatory species (*e.g.*, bullfrogs) among different water sources.
- Chemical contamination of individuals or aquatic habitats from fire retardant drops or herbicide applications.
- Damage or loss of riparian or upland vegetation, resulting in:
    - decreased channel stability and alteration of channel morphology;
    - increased erosion and sediment and ash levels within and adjacent to the stream channel;
    - increased water temperature;
    - degraded water quality (nutrient, temperature, and sediment levels);
    - reduced riparian and instream habitat cover and woody debris necessary for properly functioning riparian areas and aquatic habitat;
    - altered water velocities and substrate composition; and
    - decreased and altered composition and abundance of aquatic and terrestrial food sources.

Plant Species

Direct effects to special status plant species would include, but are not limited to:

- Heat stress from prescribed fire or suppressed wildfire
- Mortality from prescribed fire or suppressed wildfire
- Crushing from use of vehicles during treatments
- Crushing from human foot traffic in treatment areas
- Accidental crushing during mechanical treatments/piling of slash
- Accidental removal during mechanical treatments
- Stress or mortality to non-target organism during chemical treatments
- Stress or mortality to non-target organism during biological treatments
- Damage to the seedbank due to fire severity or mechanical disruption

Indirect Impacts of Proposed Action:

In addition to the indirect effects described below, some special status species may experience interdependent effects from aggressive fire suppression actions that minimize the amount of riparian or upland vegetation lost from catastrophic wildfires, as well as interrelated effects from post-treatment activities that quickly restore riparian and upland vegetation. These effects would be similar to the No-Action Alternative.

Implementation of the proposed fire management actions to reduce fuel loads and improve forest and range conditions over the long-term would also reduce the risk of catastrophic wildfires on riparian and upland habitats that are within or adjacent to special status species and their critical habitats. This would reduce the large-scale loss of populations, and occupied, suitable, or critical habitat, resulting from these severe wildfires.

Terrestrial Wildlife Species

Indirect effects to special status wildlife species from fire suppression and the proposed fire management activities would be similar to those described in the Environmental Consequences for Fish and Wildlife Resources (**Section 4.8**). These effects would include, but are not limited to:

- Increased risk of predation from removal of cover.
- Changes in food quality and quantity or foraging habitats.
- Long-term changes in habitat quality or quantity for nesting, roosting, foraging, or cover, affecting the ability of a species to continue occupying a site, or facilitating the return of a species to its historic range.

Fish and Aquatic Species

Indirect effects to special status fish and aquatic species and their habitat typically include degradation and alteration of hydrologic processes, functions, and watershed conditions, such as decreased water quality and quantity, increased soil erosion and compaction, alteration of overland and stream sedimentation rates. These effects would result in similar impacts as the direct effects, but are typically later in time or long-term, creating chronic adverse effects to fish species and their habitats.

In the Southwest, the fire season starts around March and ends around the end of June. This fire season is immediately followed by the summer monsoon season of July to August. Consequently, watersheds occupied by or upstream from special status fish species or critical habitats in which fire suppression activities have impacted riparian or terrestrial vegetation would potentially be followed by localized heavy precipitation and runoff into streams.

Plant Species

Indirect effects to special status plant species would include, but are not limited to:

- Soil erosion within the area of its habitat following prescribed fire or suppressed wildfire
- Change in vegetative composition in the habitat from management of fire, or mechanical/biological/chemical treatments
- Change in vegetative structure in the habitat from management of fire, or mechanical/biological/chemical treatments
- Increase in invasive species in the habitat which may outcompete this species due to management of fire, or mechanical/biological/chemical treatments

Cumulative Impacts of the Proposed Action:

Cumulative impacts to special status wildlife, fish, and plant species include the past, present, and reasonably foreseeable future actions or management strategies that, when taken together, result in the gradual loss of individuals or populations of special status species. Cumulative effects to special status species under the proposed action would include, but are not limited to, the following broad types of impacts:

- Changes in land use patterns or practices that adversely affect a speciesí habitat or potential habitat.
- Encroachment of human development into a species habitat or potential habitat.
- Fire management actions by some, or all, of the following groups, on lands adjoining or upstream of BLM-administered lands:
    - United States Forest Service
    - National Park Service
    - U.S. Fish and Wildlife Service
    - Bureau of Reclamation
    - Tribal Governments
    - State of Arizona
    - County Governments in Arizona
    - Local Governments in Arizona

As fire management and habitat rehabilitation activities are implemented on Federal lands in Arizona over the long-term, a range of variability in upland and riparian habitats would be retained across the state, variously affecting special status species and their critical habitat. In the short-term (0-3 years), fuels reduction or rehabilitation activities in riparian and upland habitats would need to be coordinated among the Federal agencies to minimize any cumulative effects on special status species and critical habitats. In the long-term (4-10 years), the overall improvement in terrestrial and riparian habitats and reduction in catastrophic wildfires on Federally administered lands within Arizona would reduce the chance for large-scale direct losses of the various special status species and critical habitats within the state.

Declines in the abundance or range of many special status species have been attributed to various human activities on Federal, state, and private lands, such as human population expansion and associated infrastructure development; construction and operation of dams along major waterways; recreation, including off-road vehicle activity; and grazing. Many of these activities are expected to continue within the range of the various special status wildlife, fish, and plant species. Improvements in riparian and upslope habitats within or adjacent to sites occupied by special status species or critical habitats on Federal lands in Arizona through fire management or other rehabilitation activities, as well as aggressive ire suppression when necessary, would increase the chances for populations of some special status species to stabilize, particularly in areas with checker-boarded land ownership patterns. These improvements would potentially increase the resiliency of some watersheds and populations of special status species against other human-caused threats to a speciesí viability.

4.9.3 Federal Species of Concern (Conservation Agreement Species and Management Plan Species)

In addition to the general effects described above, and the species-specific analyses for Federally protected species found in the BE, the proposed action may affect four species that are considered Federal Species of Concern and are managed under Conservation Agreements or Management Plans that the BLM participates in. The following analysis discusses the potential effects to these species.

Flat-tailed Horned Lizard (*Phrynosoma mcallii*) Federal Species of Concern (Conservation Agreement)

The current range of the flat-tailed horned lizard includes the extreme southwestern corner of Arizona, much of which has been converted to agriculture or is managed by the Department of Defense (Marine Corps). Only a few very small parcels of public lands occur within the speciesí range. The Lower Colorado River Valley subdivision of Sonoran

Desertscrub habitat, where the flat-tailed horned lizard currently resides, contains minimal vegetation. In Arizona, the lizard typically inhabits sandy flats where galleta grass is abundant. The proposed fire management actions would not be implemented in habitat within the speciesí range, as no vegetation would need to be thinned or removed to reduce hazardous fuel loads or restore range conditions. The sparse vegetation on BLM-administered lands within the horned lizardís range would not carry large, fast-moving, or severe catastrophic fires requiring aggressive suppression activities. Thus, the flat-tailed horned lizard would not experience any direct, indirect, or cumulative effects from implementing the proposed action on BLM-administered lands within the speciesí range.

Kaibab (Paradine) Pincushion Cactus (Pediocactus paradinei), Federal Species of Concern (Conservation Agreement)

Kaibab pincushion cactus has a narrow range, but it spans four separate ecosystems, including Great Basin Desert Scrub, Great Basin PiÒon-Juniper Woodland, Great Basin Plains and Grassland, and Montane Conifer Forest. The historic fire regime in this area varied from low severity with a frequency of 0-35 years, to stand replacement with a frequency of 35-100+ years. The current condition mapping shows a classification of 2 to 3, with class 3 being a regime that significantly departs from the historic model. The proposed action would offer a variety of options for fuel treatments in these diverse ecosystem types. The grassland type would likely be treated with prescribed fire. The piÒon-juniper woodland could be treated with prescribed fire and mechanical thinning. The montane forest could be treated with both prescribed fire and mechanical thinning. The desert scrub would likely feature only mechanical thinning. The potential effects to the Kaibab pincushion cactus from this suite of treatments would include the possibility of fire stress, fire-induced mortality, and seedbank damage from prescribed fire, and accidental crushing/removal during mechanical treatment. Other possible treatments include wildfire suppression and management of natural wildfire starts for habitat benefit. Effects would potentially include fire stress, fire-induced mortality, and seedbank damage. The effects to this species from the proposed action would typically be short-term or localized.

In order to prevent adverse effects from prescribed fire, mechanical treatments, wildfire suppression, and management of natural wildfire starts for benefit in Kaibab pincushion cactus habitat, the following Conservation Measures are suggested:

- Survey probable treatment areas for this species prior to initiation of treatment
- Establish a site-specific and appropriate buffer around populations of this species
- Do not lop, scatter, or pile slash onto this species
- Keep vehicles on existing roads in treatment areas
- Prevent excessive foot traffic through Kaibab pincushion cactus habitat
- Reseed only with native species appropriate to these ecosystem types and monitor for invasive weed infestations

Virgin Spinedace (*Lepidomeda mollinspinis mollinspinis*), Federal Species of Concern (Conservation Agreement)

In Arizona, the tributaries of the Virgin River that support this species occur primarily on state and private lands, with some BLM-administered lands. However, most upland habitat surrounding these occupied reaches is managed by BLM. The Mojave desertscrub upland and riparian habitats within the range of the Virgin River chub are moderately to severely altered from their historic fire regime, putting them at higher risk for wildfires that are larger or more severe, intense, or frequent, and causing greater changes to or loss of the vegetation. This, in turn, puts the downstream or downslope aquatic habitats of the Virgin spinedace at greater risk to direct and indirect effects from wildfires, and, potentially, fire suppression and the proposed fire management activities. For most fire suppression efforts in the vicinity of Beaver Dam Wash, the Virgin River is the largest source of available water. The Virgin spinedace would experience direct and indirect effects from fire suppression actions and the proposed fire management actions on BLM-administered lands within its range as described in the general effects for fishes. Implementation of the Conservation Measures (Appendix D) for riparian and aquatic habitats and for the species would minimize any effects to the species from these actions.

Conversely, Virgin spinedace would experience the beneficial interdependent effects from aggressive fire suppression actions within the riparian and upslope terrestrial habitats surrounding the Virgin River tributaries, which would minimize the amount of vegetation lost from catastrophic wildfires. They would also experience beneficial interrelated effects from post-fire rehabilitation activities, which would restore riparian and terrestrial vegetation, and protect the fishís habitat.

This fish species has been affected by other activities on federal, state, and private lands that have cumulatively contributed to its decline. Many of these activities, such as urbanization, water diversion and impoundment, degradation of water quality, and competition with introduced species (fish and crayfish), are expected to continue within the range of the species. Implementing a combination of the proposed fire management actions to reduce fuel loads and improve riparian and upslope terrestrial habitats, as possible, combined with aggressive fire suppression as necessary, would reduce the risk of catastrophic wildfires and provide long-term improvements in the Virgin River watershed (including its tributaries occupied by the Virgin spinedace). These improvements would potentially increase the resiliency of the watershed, as well as Virgin spinedace populations, against large-scale losses from wildfires as well as other activities that threaten the species viability. These actions would assist in implementing the Conservation Management Agreement to reduce threats to the species.

Desert tortoise, Sonoran population [*Gopherus agassizii (xerobates*)], Federal Species of Concern (Management Plan)

Increases in invasive grass and shrub species have altered the Sonoran desertscrub habitats used by the Sonoran population of desert tortoises to a point where fires now carry in these habitats that are generally intolerant of fire or fire suppression activities. Wildfire can cause rapid and profound changes in desertscrub habitats, both in the short-term and long-term, because many desert plants are not well adapted to large disturbances by fire (Esque *et al*. 2003). In addition, fires now burn hotter and farther in desertscrub habitats, reducing the natural mosaic pattern (patchy distribution of plants and open space) typical to these communities (Esque *et al*. 2003).

In some instances, the proposed fire management actions would be used to restore and maintain habitats, to reduce accumulated hazardous fuels, and to reduce the chance of catastrophic fire. Site-specific assessments would determine if and when these activities are appropriate in habitats occupied by desert tortoises. In general, aggressive fire suppression would continue to be the primary fire management activity within habitats for the Sonoran population of desert tortoises. The primary direct and indirect effects to these tortoises would be from fire suppression, prescribed fire, and mechanical vegetation treatments. Wildland fire use, biological and chemical treatments would not likely be used in desert tortoise habitat and, thus, would not affect the Sonoran population of tortoises.

Direct effects to tortoises from these activities would result from mortality or injury and degradation or loss of key habitat components (e.g., cover, forage). Tortoises could be disturbed, injured, or killed and burrows and clutches of eggs could be destroyed during construction of fire lines (using handlines or heavy equipment), campsites, and staging areas; off-road driving; or prescribed fires or backfires lit during fire suppression operations. These effects to tortoises would be more intense during periods of surface activity for tortoises (spring and early summer and post-monsoon in the fall), or when they are occupying shallow cover sites. With the exception of water, which is considered benign or beneficial for tortoises and tortoise habitat, the effects on desert tortoises of retardants used during fire suppression are unknown. Indirect effects to desert tortoises from the proposed action would result from increases in predation through attraction of predators to human-activity sites and increased exposure from loss of cover; disturbance, injury, mortality, or collection by OHV recreationists using roads and fires lines created during treatment or suppression activities; reduced forage quantity and quality; or long-term alterations, degradation, or loss of suitable habitat, particularly from fire suppression (backfires), appropriately managed wildfire, and prescribed fire.

Using the variety of proposed fire management actions, as appropriate and possible, to restore desertscrub habitats, and continuing aggressive fire suppression tactics, as necessary, would, in the long-term, improve vegetation composition and structure and reduce the amount of habitat lost or degraded by wildfires. The risk of catastrophic wildfires would be reduced, by reducing fuel loads, including non-native annual grasses that carry fires in desertscrub habitats. Because use of these fire management techniques would be selective and be implemented in phases, and because individual project sites would typically be small compared to the overall available habitat, a range of variability of tortoise habitat would be retained. The short-term direct loss of habitat in treated locations would be balanced with retention of current habitat conditions in nearby untreated sites, providing refuge and recolonization sources for desert tortoises. These long-term effects would potentially minimize any cumulative effects to the Sonoran population of desert tortoise from activities on Federal, state, and private lands, particularly where land ownership patterns are checker-boarded.

To minimize effects to the Sonoran population of desert tortoise from fire suppression and the proposed

fire management activities, similar Conservation Measures as for the Mojave population of the desert tortoise (Appendix C), including restrictions on timing and locations of activities, should be implemented as appropriate.

4.10 Cultural and Paleontological Resources

4.10.1 No-Action Alternative

4.10.1.1 Prehistoric/Historic Resources

Under the No-Action Alternative, wildland fire would continue to occur, with direct impacts resulting from fire intensity/duration, and from mechanical and/or chemical suppression activities. Direct impacts would include damage or destruction of prehistoric and historic sites and associated artifacts; destruction of organic materials such as bone, plant and animal fibers, and timber elements of historic structures; and destruction or chemical changes in materials used for dating archeological sites. A discussion of potential impacts relating to fire intensity and duration is provided in the discussion of direct impacts of prescribed burning provided below. Uncontrolled wildland fire would be expected to have more severe effects to prehistoric and historic resources than those of prescribed burns, where the intensity and duration of the fire is more controlled. Impacts from mechanical fire suppression activities would include potential destruction of artifacts and other materials, and the disturbance of site context and loss of scientific value of individual sites. Chemicals used for suppression of active wildland fire would not affect prehistoric/historic resources.

4.10.1.2 Places of Traditional Cultural Importance

No places of traditional cultural importance were identified by Indian tribes during preparation of the LUP Amendment EA. See the discussion below for an assessment of potential impacts to such areas from prescribed burns (typically of lesser intensity/duration than wildland fire) and the use of mechanical equipment, such as would be utilized in wildland fire suppression.

4.10.1.3 Paleontological Resources

Under the No-Action Alternative, exposed fossil resources would continue to be subject to scorching or cracking by wildland fire, however, the impact of such fires on such resources has not been quantified. Organic materials (Pleistocene and later), such as the remains of bison and other large land mammals, would potentially be damaged or destroyed by wildland fire and mechanical suppression activities.

4.10.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Implementation of the amendment would lead to direct impacts from fire management activities. Potential direct impacts resulting from the anticipated treatments/processes would be as described below.

Impacts Relating to Prescribed Burning

Prehistoric Resources

Prehistoric resources potentially affected by prescribed burns may be inorganic (lithics, ceramics, etc.) or organic, and certain such resources may be of importance in the potential dating of archeological sites. It must be acknowledged that, in addition to the factors discussed below, the probability or evidence of previous wildland fire events is a significant factor in determining whether prescribed burning (or other treatment methods, for that matter) could cause a direct effect to prehistoric resources which may have been damaged by fire in the past.

Inorganic Resources. The effects of fire on archeological resources are dependent upon the fireís intensity, its duration, and the depth of heat penetration into the soil. For archeological purposes, the severity of a fire is measured by its intensity (low, moderate, or heavy). Fires would burn with increased duration and temperature in proportion to the accumulation of dry fuel on the ground. The depth of heat penetration is dependent upon factors such as soil type, moisture, and coarseness, and the abundance of dry fuel. For inorganic resources such as lithic tools, stone implements, and ceramics, fire may be expected to cause cracking and spalling, darkening of surfaces, and changes in chemical composition (for ceramic paints). Effects of fire would expect to be mitigated somewhat depending upon the depth of the resources below the surface. When fires remain below 500∫ C and occur within half an hour (as is typical for prescribed burns), little damage to artifacts and resources even at shallow depths is likely to occur (Pyne, 1996).

For some rock art sites, such as localities with pictographs or petroglyphs, effects may range from darkening of the surface from soot, obscuring the image, to destruction caused by cracking or

breakdown of the chemical properties of the medium. Intaglios and rock alignments may be less affected due to the typically sparse vegetation in localities where they are present.

Organic Resources. As expected, organic resources such as bone, hair, animal and vegetable fibers, and wood are extremely susceptible to fire, particularly in an arid climate. Even relatively low intensity/duration fires would likely destroy such materials occurring on the surface. The greater the depth of organic materials, the less likely they would be affected by fire.

Dating Resources. Radiocarbon dating of organic materials (such as charcoal or bone fragments) associated with archeological sites is a common procedure. The destruction of such material would adversely effect the ability to date such sites. In addition, exposure to high temperatures could cause chemical changes in organic material which would compromise the ability to accurately radiocarbon date such material.

Obsidian is a siliceous mineral found in numerous volcanic area around the world, often collected and traded in prehistoric times and used for artifact production (Delmonte 1985). Obsidian develops hydrated surface layers when exposed to moisture. Hydration rates vary, but 200 to 400 years per micron thickness of the hydrated layer is typical, and these rates are used to date the time elapsed from the exposure of the surface by lithic flaking techniques.

Studies on the effects of prescribed burning on obsidian hydration bands have been conducted. As expected, temperature and duration of exposure are primary factors in the potential for damage to obsidian hydration bands. Laboratory analysis indicates that exposure to temperatures below 100∫ C (212∫ F) for less than 24 hours does not change hydration bands. It was noted that soil temperature during prescribed burns remain below 100∫ as long as moisture remains in the soil (Solomon, 2002). The precise relevance of laboratory experiments to actual prescribed burn situations has not been established.

Historic Resources

Structures built of combustible materials, or containing combustible materials (such as timber elements of adobe structures) are highly susceptible to fire. Other materials, such as machinery utilized in historic mining operations, are less susceptible, depending upon the intensity and duration of the fire. Resources such as historic trails or mine shafts are unlikely to be directly affected by fire, although associated structures could be damaged or destroyed. Organic artifacts associated with historic properties and occurring on the ground surface could be destroyed, while such artifacts beneath the ground surface would likely be protected, depending upon the degree of soil heating.

Impacts Relating to Mechanical Treatment

Prehistoric Resources

Mechanical treatment involves the use of wheeled and crawler-type tractors with attached implements for clearance of undesired plants and fuel accumulations. Direct effects would be damage or destruction of archeological resources occurring on the surface and within the root zones of cleared vegetation, resulting in loss of site integrity and associated scientific values.

Historic Resources

Direct effects of mechanical treatment would be damage or destruction of historic resources including structural remains and associated materials occurring on the surface and within the root zones of cleared vegetation, resulting in loss of site integrity and associated scientific values.

Impacts Relating to Chemical Treatment

Prehistoric Resources

Intense ground disturbance would not result from chemical treatment options. Little information exists regarding the effect of chemical treatment methods on prehistoric (particularly organic) resources. Chemical treatments with an organic component might have the potential to affect ^{14}C material used for site dating, however, such effects would be expected to diminish for subsurface material. Potential contamination of Carbon-14 samples would not preclude dating of archeological sites by other, contextual, methods (i.e. lithics, ceramics).

Historic Resources

Some long term fire retardants containing ammonium phosphate or ammonium sulfate can leave a white residue and attract water, potentially causing damage to wood, which may be present in historic structures. Discoloration of metallic surfaces may also occur. Foam detergents and surfactants (wetting agents), as well as water enhancers, used as fire retardants may also damage wood by causing swelling and contraction.

Impacts Relating to Biological Treatment

Prehistoric Resources

The use of biological treatments would have no direct effect to prehistoric archeological resources. In areas where surface artifacts or features occur, the use of grazing animals could cause damage as the animalsí hooves could displace or damage such resources.

Historic Resources

No direct effect to historic structures would be anticipated as a result of biological treatment options. Fragile surface artifacts, such as glass or ceramics, associated with historic sites would be subject to damage by the hooves of grazing animals, although this would not appreciably affect the scientific/historic value of the site.

Impacts Relating to Manual Treatment

Prehistoric Resources

Direct effects relating to use of manual clearing of vegetation would be disturbance of archeological resources by displacing surface and subsurface material by pulling, grubbing or digging plant root systems. Such activity would compromise the scientific value of archeological sites to the degree that such activities disturbed the surrounding soil matrix. Effects would be related to the destruction or damage of artifacts by breaking or chipping, and to the scientific value of site context by shifting artifacts and disturbing the chronological sequence of deposition. Not to be neglected is the potential for illegal collection of artifacts by workers. It is noted that in vegetated areas, some level of disturbance to archeological resources would have been expected to occur, due to dislocation by plant growth and animal activity (such as burrowing).

Historic Resources

Direct effects to historic structures and structural remains by manual clearing activities would be minimal, and in some instances could be beneficial, as the growth of vegetation within or adjacent to structural remains tends to accelerate the disintegration process. Effects of manual clearing to artifacts associated with historic sites would be similar to those for prehistoric resources, as noted above. With the exception of areas such as trash pits, artifacts associated with historic resources in Arizona tend to occur at the surface or higher subsurface levels.

No indirect impacts to prehistoric or historic resources from the treatment methods described in Section 2.4 have been identified.

Changes in Federal wildland fire management policy are applicable to other Federal agencies in Arizona and would typically have similar potential impacts to cultural resources as described in this EA. These agencies would also be subject to the Section 106 requirements referenced in the next section. The treatment methods described in Section 2.4 would be more aggressively pursued in areas where the risk of wildfire is considered to be higher than average, or where such wildfire is considered undesirable. The potential impacts from these methods would typically be less severe than those from an unmanaged wildfire event. It is therefore considered that - all other past, present, and foreseeable future land management actions in the state of Arizona being equal - the cumulative impacts from the proposed LUP Amendment, would be less severe to cultural resources than the No-Action Alternative.

All treatment actions with the potential to effect cultural resources are subject to the requirements of Section 106 of the National Historic Preservation Act, 36 CFR 800, and the BLM 8100 Manual series. Because many archeological sites may have been exposed to wildland fire in the past, sites identified during field surveys prior to prescribed burning or mechanical treatments will be evaluated to determine whether the sites have been damaged from wildland fire events, and to evaluate the potential effects of proposed treatment methods on such sites. As such, ground disturbing treatment methods described under the Proposed Action would require site-specific cultural resources evaluation, including examination of records of known sites and an intensive cultural resources inventory (Class III). Mitigation, usually in the form of avoidance, would be necessary if a determination was made that NRHP-eligible properties would be impacted by a proposed action. Should undocumented cultural resources be identified in the course of ground-disturbing treatment, the treatment action would immediately cease until appropriate notification procedures have been accomplished and a decision for proper handling of the resource has been made. Wooden structures and metal surfaces will be avoided when applying chemical retardants, except when such features are in danger of imminent exposure to wildland fire.

4.10.3 Places of Traditional Cultural Importance

Areas used traditionally for hunting would be expected to revegetate following a fire event, although this may occur slowly. The loss of game animals and their habitat until such time as revegetation occurred would also be expected. For localities where food and/or medicinal plants are gathered, effects would be dependent upon the amount of time such vegetation would require in order to reestablish. The threat of invasive species occupying areas associated with traditionally important vegetation is also an issue of concern. In areas where invasive species currently predominate, the potential for culturally important native plant species to reestablish following prescribed burns or other treatments may be enhanced.

No places of traditional cultural importance were identified by Indian tribes during preparation of the LUP Amendment EA. However, needs for protecting, and accommodating access to, any such places identified by tribes following approval of the LUP Amendment would be considered prior to implementing individual fire management actions.

4.10.4 Paleontological Resources

Direct, Indirect, and Cumulative Impacts:

Organic materials (typically those associated with extinct Pleistocene land mammals) exposed at or immediately below the ground surface could be damaged or destroyed by manual, mechanical, or prescribed burning treatments. Older, fossilized, remains could potentially be damaged by mechanical vegetation treatments. Although some scorching could be associated with prescribed burns, no serious damage to paleontological resources would be expected. In the event that paleontological resources were discovered in the course of a ground-disturbing treatment, such treatment would cease pending evaluation by a qualified paleontologist.

No indirect impacts to paleontological resources associated with the Proposed Action have been identified. Changes in Federal wildland fire management policy are applicable to other Federal agencies in Arizona. Such policy changes would typically have similar potential impacts to paleontological resources as described in this EA. Such impacts would be mitigated by avoidance of scientifically significant fossil resources.

4.11 Visual Resources

Scenic quality and landscape aesthetics is managed on BLM lands to meet the objectives of four VRM classes established in LUPs, as discussed in Section 3.3.3. The discussion below evaluates how scenic characteristics might change under the No-Action and Proposed Action Alternatives. The level or degree of impact is assessed primarily on basis of VRM classes. Visual impacts are caused by changes in the landscape induced through either ënaturalí processes or management practices and human activities. The acceptable degree of change or contrast is established by the VRM class designations. In terms of impact from wildland fire, the consequences of visual impacts are greatest for VRM classes I and II, lesser for VRM class III, and least for VRM class IV.

4.11.1 No-Action Alternative

Current RMP direction for management of risks and hazards of wildland fire is suppression of unplanned ignitions. The LUPs do not provide direction for management strategies to reduce the risk of wildland fire or rehabilitate areas after wildland fire has passed through an area. Therefore, trends of increased risk and hazard due to the accumulation of fuels are likely to continue for all VRM classes. Wildland fires are expected to increase in occurrence and severity, potentially burning and charring visually sensitive areas.

4.11.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

The Proposed Action would provide vegetation treatment strategies that are consistent with managing scenic quality on BLM lands. Non-fire fuels treatments could be implemented to reduce hazardous fuels with little apparent change to the character or scenic quality of the treatment area. Vegetation treatments using prescribed fire could result in more visual impact on the landscape than non-fire vegetation treatments. With prescribed burning, the treatment areas would be blackened, woody debris would be charred, and, at least during treatment, smoke would reduce visibility. As such, the goal of allowing fire to resume a more natural ecological role across the landscape in consideration of VRM objectives constitutes a conflict between ecological sustainability and scenic aesthetic. VRM classes I and II are at the same time the most ënaturalí and the most sensitive to visual impact. In areas where fire would naturally occur, VRM class restrictions on the

acceptable degree of change may preclude the re-introduction of fire into the ecosystem.

Relatively more aggressive fuels treatment would be allowed in VRM class III and IV areas and could indirectly lead to the protection of the more sensitive VRM class I and II areas where fuels treatments may be more restricted. Unplanned ignitions would be less likely to occur and spread in VRM class III and IV areas due to fuels reduction, thereby reducing overall threat to VRM class I and II areas across the landscape. Fuel hazards may not be reduced in some VRM class I and II areas due to management restrictions based on scenic quality objectives. The threat of unplanned ignitions and spread of wildfire within these areas could remain high. Smoke from prescribed fire in less sensitive VRM class III and IV areas could disperse across VRM class I and II areas and affect visual quality over the duration of the fuels or vegetation treatment.

Site-specific fire management activities are expected to cumulatively contribute to better ecosystem conditions and the reduction of fire hazards across the landscape. This could lead to broad-scale sustained ecosystems and scenic aesthetics. Activities on BLM lands, including recreational use, carry the risk of unplanned ignitions and consequential wildfire that could impact scenic quality. Other management activities on BLM lands or adjacent lands not related to fire management could equally impact scenic quality. The proposed adaptive management approach to managing fire and fuels on BLM lands could, in part, reduce cumulative impacts through area designation of fire management categories, establishment of long-term goals, and emergency stabilization and rehabilitation of areas burned by wildfire.

4.12 Special Designation Areas

4.12.1 No-Action Alternative

The No-Action Alternative would result in continuation of existing fire management direction. As presented in Section 3.3.4, Special Designation Areas are comprised of several types of management areas and both fire adapted and non-fire adapted ecosystem types. Impacts from existing fire suppression policy includes accumulation of hazardous fuels, changes in fire behavior and return intervals, and periodic large, catastrophic wildfires. Continuation of these direct, indirect, and cumulative impacts would be expected under the No Action Alternative.

4.12.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Potential direct impacts in special designation areas would be limited to plant mortality and removal of organic matter in defined areas of treatment. These direct impacts may include a combination of any of the following items: prescribed fire, mechanical construction of fuel breaks, thinning of forested stands (removal of ladder fuels and immature trees), chipping, piling and burning of excess fuels (live plant biomass plus decaying materials), application of chemical treatments, and addition of biological controls for overall vegetative health.

It is intended that no treatments that fall within the Proposed Action would intentionally result in loss of an areaís building facilities (e.g., park visitor centers), roads, utilities, trails, and other manmade infrastructure. Appropriately managed wildland fire would also avoid direct impact to all known cultural resources and sensitive species habitat (e.g., federally listed species). The Proposed Action would rigorously seek to avoid alteration of the natural character of special designation areas, by maintaining the native vegetation of an area and by limiting construction of temporary roads and trails. Depending upon the type of special designation area being managed under the Proposed Action, the use of mechanized tools would be carefully limited to the minimum necessary to accomplish the tasks at hand.

Indirect impacts from the Proposed Action may include mortality to resident animal life in defined areas of treatment. Smoke from prescribed fires may indirectly impact a variety of resources including wildlife and visitors to these special designation areas. Indirect impact from smoke should be temporary. The Proposed Action may initially increase runoff and erosion, thus indirectly impacting riparian ecosystems and water quality downstream of treatment areas. Finally, the uses of prescribed fire, chemical treatment, and biological treatment have some potential to affect areas outside of those targeted by the adaptive management action.

Western ecosystems have been previously altered by the No-Action Alternative, where full suppression is widely believed to have resulted in overcrowded and unhealthy forests and shrublands. In these settings, dense fuel loads exist and catastrophic wildland fires are a result. The Proposed Action would seek to change this paradigm, through adaptive management treatments. Thus, a cumulative impact in special designation areas may include the alteration of vegetative composition and structure at the landscape

level, over time. This may lead to alteration of ecological function of these areas as fire returns to its historic role. This type of cumulative impact is beneficial over the long term.

Mitigation measures for animal mortality should include inventorying treatment areas prior to initiation of proposed adaptive management. Following inventory, animals may be herded, trapped and relocated, or otherwise safeguarded from likely impacts. Mitigation for smoke would involve setting prescribed fires under proper atmospheric conditions and with a focus on limiting or eliminating smoke from certain critical areas, such as around human habitation and critical wildlife habitat areas. Prescribed fires would be properly planned and executed to avoid the likelihood that they may spread into non-target portions of special designation areas.

4.13 Land Uses

4.13.1 No-Action Alternative

Under the No-Action Alternative there would be no new impacts to livestock grazing, recreation, forestry, and mineral resources. All wildfiresó regardless of ignition sourceó would be suppressed in accordance with current LUPs and fire management plans. Recent large fires have burned with such intensity that many land-uses of Arizona rangelands have been altered. The primary impacts from continuing the current fire management practices are periodic disruption to livestock grazing, recreation, forestry, and mineral resources which would have varying impacts depending on the land use. Disruptions to livestock grazing are multi-year because BLM guidance suggests a period of rest to allow desirable forage to re-establish after fire. Recreation disruptions in magnitude and duration would vary depending of the fire location, severity, aesthetics, vegetation recovery, and damage to facilities. Forestry resources in the burned area may be totally or partially lost and decades would be required for trees to again become of product value. Impacts to mineral resources may include disruption of transportation corridors and utilities, and damage to facilities. The WUI would probably increase in the future as people continue to build houses near forests and rangelands.

4.13.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Under the Proposed Action, it is assumed that the Desired Future Conditions would be achieved over the next several years. As the Desired Future Conditions are achieved there would be fewer effects to land uses from catastrophic wildfire losses. The need for emergency post-fire rehabilitation to control soil erosion, the loss of wildlife habitat and livestock grazing land, and other effects would decrease. The continuing trend of building houses in the WUI is expected but with the reduction of hazardous fuels, the risk of wildfire loss should decrease.

Livestock grazing, used in conjunction with fire and land-use management, can be beneficial or detrimental. Livestock grazing may be able to reduce the buildup of hazardous fuels through consumption and trampling. Grazing may be an acceptable approach to reduce hazardous fuels in the WUI where other methods may not be suitable. Goat grazing is beneficial in reducing woody plant material. Cattle and sheep grazing can reduce herbaceous fuel build-up. Livestock trampling may be able to break-up fuels into smaller sizes which enhances the rate of decomposition. On the other hand, improper grazing can lead to increased wildfire hazard through the established of annual weeds such as cheatgrass, buffelgrass, and red brome. The overgrazing of desirable forage reduces plant vigor and encourages annual weeds to become established. Many times the weedy plants acerbate the hazard of wildfire because upon senesces they become highly flammable fuels. Recurring fire would eventually result in the loss of desirable livestock forage with an increase in weed dominance.

Outdoor recreationists and tourists can contribute to wildfire risk on BLM rangelands. Human caused fire is on the increase supposedly in response to increased number of visitors to BLM land and carelessness (**Table 4.5**). However, human caused fire is not new on BLM land. Native Americans purposely used fire for warfare and hunting. Even today, BLM range managers use prescribed fire to reduce the build-up of hazard fuels and to improve rangelands for livestock grazing and wildlife habitat. These fires, however, are carefully planned and controlled under specified conditions defined in a burn plan. Nevertheless, the difference today is that many human-caused wildfires are accidental and caused by neglect. Such things as not completing extinguishing a camp fire, sparks from OHV, chain saw, or railroad car, improper disposal of barbeque ashes, fireworks, and numerous other ways can cause wildfires. Public outreach programs and interpretive signs are ways to educate the public on ways to reduce human-caused fires. BLM seeks to reduce the risk of human-caused fire by strictly enforcing appropriate fire-related activities during certain seasons of the year and in certain localities.

Forest lands include ponderosa pine forests, pinyon and juniper woodlands, and mixed conifer and deciduous woodlands. Forest products are limited to firewood and fence posts. The Proposed Action would reduce hazard fuels in these areas through prescribed fire, mechanical, biological, or chemical treatments would reduce the risk of catastrophic fire. Fires that do occur, whether prescribed of natural fire, would be managed to achieve resource goals. Improvements in rangeland and forest health would also improve forestry resources.

Mineral exploration and extraction activities are directly impacted by fire through disruption of surface resources such as transportation corridors, utility right-of-ways, and buildings. Exploration activities may need to be altered in burned areas to decrease the potential for soil erosion and allow vegetation time to recover. The Proposed Action would reduce the risk of fire to mineral resources by reducing the occurrence of catastrophic fire through hazardous fuel reductions and improvements in forest and rangeland health.

As the Desired Future Conditions are achieved, improvements in land use would occur. Over the long term, vegetation communities should return to their normal range of variability in plant composition, structure, and productivity resulting in improved plant health and vigor, and wildlife habitat. This in turn would improve livestock grazing, the quality of recreation, and forestry opportunities. Mineral resources would not be impacted by any indirect effects.

The National Fire Plan applies to the U.S, Forest Service, National Park Service, U.S. Fish and Wildlife Service, the Bureau of Indian Affairs, as well as the BLM. All of these agencies administer federal land in Arizona and have fire management responsibilities. These agencies are mandated to take the necessary measures to reduce the occurrence of catastrophic wildfire through the reduction of hazardous fuels including weeds and to improvement forest and rangeland health. As these agencies seek to return vegetation communities to their normal composition, structure, and productivity through reduction of hazardous fuels, there should be an overall improvement in forest and rangeland health and wildlife habitat throughout the state. The overall occurrence and acres burned from catastrophic wildfire should decrease and decrease the impact of catastrophic fire on livestock grazing, recreation, forestry, and mineral activities. State and local agencies and private land owners may become involved through partnerships with federal agencies.

4.14 Socio-Economic Conditions

The purpose of this section is to identify/predict the likely social and economic outcomes associated with BLM management alternatives, including impacts to public and firefighter health and safety. Direct, indirect, and cumulative impacts are discussed generally, and the actual range of impact would vary among individuals and businesses. The following discussion presents a useful comparison of the scope and type of effects that would be expected under the ìno -actionî alternative (continuation of current fire management practices) and the Preferred Alternative.

4.14.1 No-Action Alternative

Under the ìNo -Actionî Alternative, there wou ld be no new impacts to the socio-economic environment. Full fire suppression would continue under this alternative. As shown in **Table 4.5**, it is expected that more than 230 fires and 49,000 acres of BLM-administered lands would burn in Arizona each year due to wildfires. Over time wildfires would tend to grow larger in size, intensity, and severity due to unnatural fuel loading conditions. The primary impacts from continuing the current fire management practices are risks to public and firefighter safety during fire suppression activities, loss of income from destruction of resources (timber, pasture, businesses, etc.), fire suppression costs, watershed rehabilitation costs, costs of health impacts (particularly from air or water quality effects), altered transportation patterns, altered sense of place, and impacts to subsistence activities. The movement of people into Wildland-Urban Interface (WUI) areas is expected to continue into the 21st century. Under the No-Action Alternative, protecting communities and private parcels from wildfire would become increasingly more difficult and expensive.

Since 1989, there have been at least nine deaths of firefighters in Arizona while suppressing large, catastrophic wildland fires (including two deaths in 2003). In 2003, the Aspen Fire burned 84,750 acres and destroyed 340 homes before it was contained; and in 2002 the Rodeo-Chediski fire burned 469,000 acres and destroyed 491 homes. Recent catastrophic wildfires have burned with such intensity that the ecosystems have been drastically changed. Economic impacts arise both directly from fire damage and indirectly from changes in local economic activity, such as a drop in tourism. Both direct and indirect effects of wildfires have exacted a heavy economic toll on many communities. The consequences of

recent catastrophic wildfires on Arizonaís natural resources are as vast as they are varied. Wildland fires burned both public and private lands over a broad spectrum of rangeland and forested ecosystems, often encompassing entire watersheds critical to community water supplies. These burned lands are also susceptible establishment of undesirable noxious weeds. The cost to eradicate unwanted invasive species such as cheatgrass, although unquantified, is very large.

4.14.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

Under the Proposed Action, it is assumed that the new Desired Future Conditions would be achieved gradually, over 10 to 15 years or longer. As the Desired Future Conditions are achieved, and a more natural fire regime is established over time, there would be fewer economic losses from large, unplanned, catastrophic wildland fires.

The reduction of hazardous fuel loads would reduce the risk of a wildland fire reaching catastrophic levels and crossing boundaries onto private lands or public lands administered by other agencies. As a result, overall safety for the general public and potential fire hazard conditions facing fire personnel will be greatly improved. Over the long-term, the Proposed Action would enhance public and firefighter safety by reducing the number and extent of catastrophic wildfires, reduce the number of homes and other property destroyed by catastrophic wildfires, and reduce the need for seasonal firefighters and wildfire suppression equipment and support services. This change could affect the income of seasonal firefighters and companies that support wildland fire suppression (air tankers, equipment, logistics, etc.), since there would be fewer large wildland fires. This change would be long-term and permanent.

Direct impacts from increased use of prescribed fire, and chemical, mechanical and biological fuels treatment, would be primarily short-term and temporary (fuel reduction treatments would need to be repeated every few years). The Proposed Action would have higher annual treatment costs to the BLM. These higher treatment costs would result in new opportunities for contractor-provided treatment support services, partially off-setting lost revenue from reduced wildland fire suppression service contracts. During prescribed fires, direct impacts would include altered transportation patterns, altered sense of place, and impacts to subsistence activities. If over the long-term, the public perceives an improvement in wildland fire management, people that were dissuaded from moving into WUI areas due to hazards from catastrophic wildland fires might be more likely to move; thus, the Proposed Action might indirectly support increased movement into WUI areas. Wildfire suppression monies circulate through the region would be reduced, and replaced at a lower amount by monies from chemical, mechanical, biological treatments, or prescribed fire equipment and support services.

Changes in Federal wildland fire management policy also apply to the U.S. Forest Service, National Park Service, and Bureau of Indian Affairs in Arizona. BLMís reduced need for catastrophic wildland fire suppression support could combine with reduced needs for suppression support services by other Federal agencies. Wildfire suppression monies circulating through the region would also be reduced.

4.15 Environmental Justice

4.15.1 No-Action Alternative

Under the No-Action Alternative, there would be no new adverse or disproportionate impacts to minority or low income populations.

4.15.2 Proposed Action

Direct, Indirect, and Cumulative Impacts:

The Proposed Action is not expected to disproportionately affect any particular population. Environmental affects such as air quality would affect the areaís population equally, without regard to ethnicity or income level.

No indirect impacts are expected.

No cumulative impacts are expected.

Section 5.0 Agencies and Individuals Consulted and List of Preparers

5.1 Agencies, organizations and individuals.

BLM consulted with 13 other Federal agencies or bureaus, 24 Tribal entities, 6 state agencies, and 20 county agencies. The mailing list containing all agency points-of-contact is contained in the Administrative Record for this project. Ten groups provided BLM with comments on the LUP Amendment (Appendix A).

5.2 List of Preparers

5.2.1 Dynamac Corporation

Jim Melton, *Project Manager*
M.S., Resource Development, Texas A&M University
B.S., Soils Science, Texas A&M University

Ronald E. Lamb, *Public Involvement, Socio-Economics*
M.S., Environmental Science, Johns Hopkins University
M.A., Political Science/International Economics, University of Nebraska
B.A., Political Science (Economics minor), University of Nebraska

Sarah DeRosear, *Wildlife Biology, T&E and Sensitive Species*
M.S., Wildlife Management, University of Maine
B.A., Biology, Earlham College

Anthony Horne, *Cultural Resources*
B.A., Anthropology, University of Texas at Austin

Steve Yarbrough, *Biology, T&E and Sensitive Species, Special Designation Areas*
M.A., Plant Science/Biology, University of Colorado at Denver
B.A., Environmental Studies, University of Kansas

Dale Lindeman, *GIS and Visual Resources*
M.S., Geography, Oregon State University
B.S., Wildlife Management, University of Wisconsin
A.A., Columbia College

Jeff Bass, *Fire Management, Fire Ecology*
B.S., Range Science, Utah State University

Jerry Barker, *Vegetation, Fire Ecology, Invasive Weeds*
Ph.D., Range Ecology, Utah State University
M.S., Range Ecology, Utah State University
B.S., Botany, Brigham Young University

Joan Gaidos, *Soil Resources*
Ph.D., Crop and Soil Environmental Science, Virginia Tech
M.S., Animal Science, University of Kentucky
B.S., Animal Science, Virginia Tech

Pius Sanabani, *Air Quality*
M.S., Mechanical Engineering, University of Miami
B.S., Mechanical Engineering, University of Miami
H.N.D., College of Science and Technology, Port Harcourt

5.2.2 BLM ID Team

Sherry Hirst, *Team Lead*
Zone Kingman/Phoenix Field Offices - Fire and Fuels NEPA coordinator and Environmental Planner
Kingman, AZ
14 years of experience

Dave Mueller, *Fuels Management Specialist/ COR*
Arizona State Office
16 years of experience

Mark Pater, *Fire Ecologist/Rangeland Management Specialist*
Stafford/Tucson Field Office
16 years of experience

Hillary Boyd, *Fire Ecologist/Wildlife Biologist and T&E Specialist*
Fire Ecologist Arizona Strip Field Office
9 years of experience

Paul Hobbs, *Soil Scientist/Soil, Water & Air Specialist*
Kingman Field Office
23 years of experience

Patricia Bailey, *Planning & Environmental Coordinator*
Yuma Field Office
2 years of experience

James McCray, *Fuels Management Specialist*
Assistant Fire Manager for Fuels Yuma Field Office
25 years of experience

Lisa Stapp, *Management Assistant/ Administrative Coordinator*
Lake Havasu Field Office
16 years of experience

Timothy Duck, *Ecologist*
Ecologist Parashant National Monument
St. George, UT
22 years of experience

5.2.3 Contributing Interdisciplinary Team Members

Bill Coulloudon, *Rangeland Management Specialist*
Arizona State Office
27 years of experience

Ted Cordery, *T&E Specialist*
Arizona State Office

Gary Stumpf, *Archeologist*
Arizona State Office
26 years of experience

Bill Grossi, *Wildlife Biologist*
Arizona State Office

Jim Renthal, *Soil, Water & Air Specialist*
Arizona State Office
25 years of experience

Bruce Olson, *Fuels Technician Liaison*
Phoenix Field Office
1 year of experience

Ken Moore, *Forester*
Arizona State Office
8 years of experience

LD Walker, *Weed Specialist*
Arizona State Office

Jack Johnson, *GIS Specialist*
Arizona State Office

Mike Fisher, *Fire Management Specialist*
Arizona State Office
27 years of experience

Rebecca Davidson, *Land and Resource Planning Coordinator - Liaison*
Arizona Game and Fish Department
6 years of experience

Gregg Simmons, *Planning and NEPA Program Lead*
Arizona State Office
28 years of experience

Carrie Templin, *External Affairs*
Arizona State Office

5.3 BLM Response to Public Comment Letters Received

Arizona BLM released a preliminary Finding of No Significant Impact (FONSI) and supporting EA on September 26, 2003, seeking public review and comment on our intent to find no significant impact as documented in the supporting EA. The comment period closed October 27, 2003. Seven public comment letters were received, six of which contained comments needing a response. **Table 5.1**, BLM Response to Public Comment Letters Received, provides a summary of BLM responses to specific comments.

All public comments received will be available for public review at Bureau of Land Management, 222 North Central Avenue, Phoenix, Arizona 85004, during regular business hours (8:00 a.m. to 4:00 p.m.), Monday through Friday, except holidays.

Table 5.1 ñ BLM Response to Public Comment Letters Received

Commenter	Comment	Response
Tom Fry Wildfire Program Coordinator Four Corners Regional Office The Wilderness Society 1660 Wynkoop Street, #850 Denver, CO 80202 303.650.5818x110 tom_fry@tws.org	Given the geographic scope of the plan amendment, the diversity in both the human and physical landscapes within the state of Arizona, and the outdated environmental documentation that this LUP amendment is tiered to, we are concerned that an Environmental Assessment is an inadequate level of analysis. Of additional concern are several suppositions and apparent errors contained within the analysis. Regardless of the value/resource in question, the No-Action Alternatives is nearly uniformly portrayed as follows: ìThe No -Action Alternative would result in no new impactsÖThe primary impact would be the continuation of periodic wildfiresÖIt is anticipated that the number and acres burned will increase in future years following the trend in past yearsÖUnder the No -Action Alternative, hazardous fuels will continue to accumulate in the vegetation communities at rates respective to past yearsÖ(EA at 4 -8)î Certainly the supposition of this argument may apply to certain vegetation communities but not to all. Further, this assertion, in its generality, is misleading, and you have provided no support for the assertion of increasing fuel accumulations. Another issue that we would like to make you aware of deals with a more specific statement occurring in reference to section 4.4.2, the environmental consequences of the proposed action to vegetation communities. The EA states: ìThe landscape under the Proposed Action would be divided into four fire management categories regardless of vegetation community. The fire management categories would be defined based on the wildfire threat to human life and property, and historic fire return intervals.î Surely the division of fire management categories (A-D) will be described at the site-specific level according to vegetation communities. Vegetation communities are an indicator of fire return interval and cannot be taken in account independently of each other. We expect that the four BLM individual fire management zones and their respective FMPs will taken into consideration vegetation communities as a function of fire return intervals in defining the boundaries of fire management categories. We understand that this LUP amendment is to be used as a planning tool to give direction in the preparation of updated and compliant Fire Management Plans for the four fire planning areas on BLM lands within the state of Arizona. As such, we expect that a more thorough and detailed examination of specific landscape conditions will occur in these planning processes and directly influence specific management actions. We appreciate your consideration in informing us when these more site-specific planning processes will occur so that we might offer site-specific relevant information and comment. We would like to commend the BLM office for recognizing that It is expected that acreage allocations in each of the four fire management categories will change over time with acreage in categories B and C gradually declining and acreage in category D gradually increasing. We likewise applaud the EAís recognition that naturally occurring fire is a critical process to ecosystem health and underscoring this recognition by both amending an existing policy of suppressing all fires regardless of ignition source or location and removing prescribed burning acreage limitations. While our reservations concerning the quality of environmental review are outstanding, we appreciate the trajectory that this document sets in the future of fire management on BLM lands within the state of Arizona.	The categories (A-D) are based on vegetation and also resource management objectives. We agree that vegetative communities are the causal factors for the identification of fire return intervals. More specific information will be provided in BLMís Fire Management Plans (FMPs) to meet the resource objectives as stated.
Gary V. Christensen P.O. Box 308 Springerville, AZ 85938	The goals (Desired Future Conditions, pg 2) identified in this plan are desirable and achievable. With conditions as they are we need to be very careful with controlled burning, but be willing to accept some risk to achieve the goals. Most knowledgeable persons now realize the benefits of fire as it relates to a healthy environment. Once the goals have been achieved commitment must be made to ìmaintainî the desired condition. Most government agencies seem to have short term goals, but no long term co mmitments. If the BLM really wants to do something positive for these resources it needs to solve the range abuse problems. I realize that this amendment relates to fire, fuel loads and air quality, but domestic livestock grazing as it exists at present is much more detrimental to the land than fire have ever been.	Thank you for your comment [no change necessary].
Yuma Valley Rod & Gun Club, Inc. P.O. Box 10450 Yuma, AZ 85366	In particular, the FONSI [Finding of No Significant Impact] is clearly adequate in determination that the amendment is not a major Federal Action and will have no significant effect on the quality of the human environment, other than those previously addressed in aforementioned Environmental Impact Statements (EIS). The YVRGC [Yuma Valley Rod and Gun Club] also concludes a new or supplemental EIS is unnecessary and should not be prepared. If there is any concern to be addressed by our organization, it is the assurance that BLM State Director Zielinski, Director Shroufe of the Arizona Game and Fish Department and Mr. Coffeen of US Fish and Wildlife Service Ecological Services mutually agree, prior to any projects taking place. This will ensure litigation expenses (should they occur) to remain minimal.	Thank you for your comment [no change necessary].
Kathleen Hemenway, PhD Senior Consultant, Wildfire Panel National Academy of Public Admin. PO Box 2109 Snowflake, AZ 85937	Thank you very much for sending me a copy of the LUP. It is very nice.	No change necessary.

Commenter	Comment	Response
Rebecca Davidson Land and Resource Planning Coordinator Arizona Game and Fish Department	1. Readability/Clarification: We appreciate the clarity in the document that specifies that the Department will be included in future planning efforts to address federally protected species in site-specific Fire Management Plans (page 2-4). However, it is not clear how fire management activities that may affect other non-listed, yet sensitive and important species and/or their habitats might be addressed in cooperative efforts with the Department. Both big game and nongame species are described in detail in the Affected Environment Section and Appendices (pages 3-19, 3-20 and Appendix C), yet it is unclear how the Habitat Management Plans that are developed cooperatively between the Department and BLM (pages 2-14 Sikes Act, 3-19 MOU) will relate and integrate with the Fire Management Plans to ensure that any wildlife-related species concerns, whether federally listed or not, will be considered and addressed when fire management plans are developed and implemented.	BLM and Arizona G&F will continue to cooperate as outlined in the agencyís MOU.
	The LUP Amendment, because of its programmatic nature, covers fire management on a large scale across Arizona. It should be clarified in the document that not all BLM lands and vegetation communities in Arizona would be subject to the same intensities of fire management activities.	
	For instance, Table 3.4 ñ To clarify which vegetation communities were historically fire adapted and are now more likely to have active fire management prescriptions, include the fire return rate (mentioned in the text as examples on page 3-8) for each vegetation community. This will better assist a reader in understanding that not every vegetation community would fall under every management prescription. The desired future conditions, now listed in Appendix C, might also be included within this table to further describe how fire might be used as a tool to promote ecological function, but would be based on the historic and current nature of each vegetation community.	Figure 3.5 provides clarification for the location of various fire adapted vegetative communities and also illustrates the fire return frequency. Figure 3.6 displays the condition class of these vegetative communities as related to the historic fire return frequency.
	Appendix E ñ For each Herd Management Area (HMA) not incorporated by reference (page 3-18), and therefore described in Appendix E, please include the Appropriate Management Levels (AML) of burros and/or horses that were established in Herd Management Plans in addition to, or instead of an estimated population. This will ensure that estimated populations are not mistaken for the AML. For instance, the Cibola-Trigo HMA has a current estimated number of 300 burros (as written); however the AML set for this HMA is 165 burros.	AML references have been removed.
	2. Format/Content: Page 1-4 ñ Section 1.5 references incorrectly Table 2.2, iExisting LUP Decisionsî ñ text should reference Table 2.3.	Change table to 2.3.
	Table 3.4 ñ Elevation and Precipitation in table are listed in feet and inches (respectively), however the vegetation communities described in Appendix C have these same components listed in meters and centimeters (respectively). Ensure consistency within document.	Change elevation and precipitation to feet and inches in Appendix C.
	Table 3.4 and Figure 3.4 ñ Ensure that Vegetation Community types match between map and table. For instance, the table lists Great Basin Conifer Woodland, the map lists Great Basin Pinyon-Juniper Woodland.	Vegetation community types matched.
	Appendix C (Vegetation Communities and Associated Wildlife Species) ñ In July 2003, the Department provided comments on wildlife species representative of each vegetation community. However, these comments have not been incorporated into this latest version dated September 2003. The species information we provided included a more accurate account of those species that are representative of specific vegetation communities, replacing those that were uncommon, rare, outside their range, or have been extirpated entirely from Arizona. Other keystone and important species, including both big and small game species, were recommended for inclusion. We again include these recommendations in table format as an attachment to this letter.	
	Appendix F (F-4) ñ Desert Pupfish (*Cyprinodon macularius*) ñ edit to species description: When the desert pupfish was listed as endangered on March 31, 1986, the listing included the Quitobaquito pupfish, which at the time was a subspecies of desert pupfish. However, recent genetic work has suggested that the Quitobaquito and the desert pupfish be recognized as full species (*C. eremus* and *C. macularius,* respectively).	
	No natural populations of *C. macularius* remain in Arizona. In Arizona, reintroduced populations exist only at Cold Springs (Graham County) and Lousy Canyon (Yavaipa County). AD Wash (Maricopa County) was stocked in 1993, but persisted for only a short time and pupfish have not been collected there since 1993. Therefore, only two reintroduction sites are considered extant, Cold Springs and Lousy Canyon. The population of pupfish established at Finley Tank in the 1970s is of questionable heritage originating from the University of Arizona, and is of limited value to conservation and recovery purposes.	Change made.
	Critical habitat designations are primarily pertinent to Quitobaquito pupfish. These critical habitat segments are located upstream of BLM lands in Arizona and are outside the proposed action area in California.	
	Appendix F (F-4) ñ Gila topminnow (*Poeciliopsis occidentalis*) ñ edit to species description: Currently, disjunct populations exist in 14 natural locations and 17 reestablished locations within the Gila River drainage and one location in the Bill Williams River drainage. Of the reintroduced locations, 15 are in spring habitats.	Review changes made to BE and include those changes in the EA.
	References ñ Correct the third reference listed on page R-1: Should read Wildlife 2006. Not 2005.	Insert additional references.
	Add to references (from Appendix C, Table C2): Arizona Game and Fish Department. Hunt Arizona 2002 Edition ñ Survey, Harvest and Hunt Data for Big and Small Game.	
	The Department supports an adaptive management approach to manage natural fire starts for the benefit of natural resources, to utilize prescribed fire as a tool to promote ecological function, and to allow for change in suppression responses for varying circumstances. Again, we appreciate the continued efforts by BLM to ensure that the LUP Amendment was developed cooperatively and that decisions impacting wildlife resources were made with the support of the Arizona Game and Fish Department.	

Appendix A ñ

BUREAU OF LAND MANAGEMENT
Arizona State Office

Statewide Land Use Plan Amendment

DETERMINING THE SCOPE
PROCESS SUMMARY

April 2003

This report documents comments and recommendations gathered from public meetings and other outreach activities conducted by the Bureau of Land Managementís (BLM) seven field offices throughout the state of Arizona. These field offices include those in Phoenix, Safford, Tucson, Lake Havasu City, Yuma, Kingman, and St. George, Utah (Arizona Strip Field Office). These comments were collected and this scoping report prepared in accordance with NEPA requirements in preparation of the Arizona Statewide Land Use Plan (LUP) Amendments and Environmental Assessment (EA).

Completion of the LUP Amendments is expected by the end of 2004. Throughout the development of the LUP Amendments, the public, government agencies, and organizations are encouraged to review this scoping report along with other documents and information formulated during the planning process.

To provide comments and recommendations, contact the BLM through Sherry Hirst, Team Leader/NEPA Coordinator and Environmental Planner at the Kingman Field Office, or through Dave Mueller at the Arizona State Office in Phoenix.

www.blm.az.gov
AZ_STATEWIDE_LUP@blm.gov

TABLE OF CONTENTS

1.0 INTRODUCTION

The Bureau of Land Management (BLM) has begun a statewide effort to amend its seven Land Use Plans (LUPs) in Arizona in order to provide a consistent approach to the management of fire across BLM lands, and coordinate this effort with other federal, state, and local land management entities, the tribes, and the public. The LUPs are six Resource Management Plans (the Phoenix, Kingman, Arizona Strip, Safford, Yuma, and Lower Gila South RMPs) and one Management Framework Plan (the Lower Gila North MFP).

This effort is being undertaken because LUP evaluations in 2001 for each of the field offices resulted in a finding that existing LUPs were consistently inadequate to address todayís fire management concerns and issues. The LUPs did not address the use of prescribed fire as a management tool; the issue of hazardous fuel buildup; the wildland-urban interface (WUI) and special fire management procedures in these areas; or emergency fire rehabilitation plans, and generally favored suppression as a means of fire management. Catastrophic fires across the west and particularly in Arizona have forced a rethinking of previous fire management strategies and as such, each of the seven LUPs will be amended to incorporate new fire science, management direction and policies such as the National Fire Plan and the 2001 Federal Wildland Fire Management Policy.

1.1 Description of the Planning Area

The LUP Amendment/Environmental Assessment (EA) covers approximately 12 million acres of public lands consisting of 2 million acres of Ponderosa Pine, Pinion/Juniper woodlands, 10 million acres of South West desert vegetation, and 43,000 acres of riparian vegetation. Over 200 wildfires occur annually on BLM-administered lands within Arizona, with the recent ten year average of 235 wildland fires for 24,241 acres burned per year. Wildfires can threaten human life and property, and disrupt the proper functioning of hydrology, soils, plants, animals, and ecological relationships. The BLMís goal is to reduce the number of unplanned human caused wildfires, thus reducing the need, costs and risk incurred during fire fighting efforts. Other primary goals for BLM are, the reduction of hazardous fuels, providing for increased safety to the public and local communities, while reducing the need for rehabilitation of burned acres and, where needed, use prescribed or natural fires to maintain or improve Arizonaís native habitats.

General Land Ownership in Arizona	Acres	Percent of Total
Bureau of Land Management	12,000,000	16.5%
Other Federal Agencies	18,704,000	25.6%
State of Arizona	9,335,000	12.8%
Indian Trust	19,910,000	27.3%
Private	12,982,000	17.8%

2.0 PUBLIC INVOLVEMENT PROCESS

The LUP amendment process has begun. Under the National Environmental Policy Act (NEPA), in accordance with BLM planning requirements (43 CFR 1600), policies, and handbooks, an Environmental Assessment (EA) is underway to analyze the potential impacts of the proposed management direction on critical elements and resources of the human environment such as wildlife habitat, livestock grazing, invasive plant species, socio-economics, and health and human safety. As part of the EA, wildlife biologists and range scientists from BLM, Dynamac, the U.S. Fish and Wildlife Service, the state, and other federal agencies have begun consultation procedures under section 7 of the Endangered Species Act (ESA) (16 USC ß1536) to determine whether there may be an impact on endangered or threatened or candidate plant and animal species or their habitats through any potential actions the BLM might take.

To ensure that the most appropriate measures of managing wildland fire in Arizona are selected from numerous options and alternatives, BLM considers public input essential to the LUP Amendment process. BLMís planning regulations at 43 CFR 1600 set out specific procedures describing how to involve the public. In many instances, the BLM in Arizona is going beyond what is required to obtain input from as many diverse stakeholding parties as possible, and incorporate this public input into the EA, the Record of Decision, and the final LUP Amendment.

2.1 Public Meetings

The principle means by which BLM obtained public input was to host a series of eight open-house style meetings across the state. The meetings occurred during the first two weeks of March, and were held in Phoenix, Flagstaff, Tucson, Yuma, Safford, Kingman, Lake Havasu City, and St. George, Utah (Arizona Strip). The meetings were held in public locations between 6:00 to 9:00 p.m. More than 100 people attended at least one of the meetings.

An open house format was used for the public meetings. Information and educational materials were available for the public to review at their own pace and interact with BLM, Dynamac and The Nature Conservancy (TNC) staff in an informal setting. At every meeting, attendees were greeted, given a copy of the planning bulletin, provided with an overview of the meeting format, and invited to view the exhibits and ask questions. If they were not already on BLMís mailing list, they were also offered the opportunity to be placed on the mailing list to obtain future Planning Bulletins.

Exhibits and posters presented an overview of the BLM planning process and the NEPA process, firewise educational material, the Wildland-Urban Interface (WUI), the role of fire in a natural ecosystem, and invasive species. Maps of the community assessment area will be available for the participants to review and comment on. BLM, Dyanamac and TNC staff engaged the participants in discussions to identify values at risk from wildland fire, their perspective on proposed BLM actions to manage fire, and actions that could be undertaken to reduce the risk of wildland fire. The meetings were also an opportunity for the public to learn about the LUP amendment process, why BLM is undertaking the process, and general information about the benefits and/or dangers of fire in arid or semi-arid ecosystems, fire-resistant plants, and ways in which individuals could reduce the risk posed by wildfire to their homes and property. Attendees were asked to fill out a planning worksheet/survey form describing their ideas, suggestions, and

concerns about the LUP amendment process. The information that BLM obtained from members of the public who attended these meetings is the subject of this report.

2.2 Planning Worksheet

As mentioned above, at each public meeting attendees were asked to fill out a planning worksheet. Questions on the planning worksheet were:

1. What do you value about these public lands and why?
2. What resource objectives should be used to guide fire and fuels management activities?
3. How should the BLM work with your community to reduce wildland fire hazards?
4. How would you like to see the wildland fire suppressed, fuel treatments implemented, and/or air quality monitored, on BLM administered lands in Arizona or by specific BLM Field Office administered lands?
5. Is there anything else you want to tell us?

Respondents also had the opportunity to be added to BLMís mailing list. The planning worksheet was in the form of a postage-paid mailer. Responses could also be sent to BLM via e-mail at AZ_STATEWIDE_LUP@blm.gov. Additional planning worksheets will be included in future planning bulletins.

2.3 Publicizing BLM Activities on the LUP Amendment Process

BLM undertook activities to inform and obtain input from other Federal, state, Tribal and local agencies of the proposed LUP amendment process. The following describes other efforts BLM has undertaken thus far to publicize the LUP amendment process, and to obtain public input.

- BLM published a Notice of Intent (NOI) to amend the seven LUPs in the *Federal Register* on January 27, 2003.
- Planning Bulletin, volume 1, was mailed in mid-February to more than 3,500 names on BLMís statewide contact list. This Planning Bulletin introduced the LUP Amendment process to many various types of interested parties, and listed a schedule for public scoping meetings, which were to take place in March.
- BLM also publicized these meetings through published notices in the Arizona Republic (Phoenix), the Arizona Daily Sun (Flagstaff), Arizona Daily Star (Tucson), the Tucson Citizen, Eastern Arizona Courier (Safford), the Kingman Daily Miner, The Spectrum (St. George) and Today's News Herald (Lake Havasu City) newspapers, and by listing a meeting schedule on its website, www.az.blm.gov, under ìPlanningî.
- News releases were sent to daily and weekly newspapers, radio and TV outlets statewide.
- Agencies were given the opportunity to participate and comment. In January and February, 2003, letters were sent by the BLM, Deputy State Director, to Arizona Federal, State, and County agencies, and to Tribal contacts. These letters provided background information on BLMís statewide fire, fuels and air quality LUP amendment process, and invited them to attend one of the public meetings or to contact BLM if they would like a separate meeting.
- In May 2003, Planning Bulletin #2 was mailed to each of BLMís 3,500 contacts, as well as new stakeholding parties that indicated at the meeting that they would like to be included on the mailing list.

3.0 PUBLIC SCOPING RESULTS

3.1 Summary of Meetings, Attendees, and Issues and Alternatives Raised in the Scoping Process

BLM, TNC, and Dynamac spoke with many individuals representing a wide variety of interests and viewpoints at each of the scoping meetings in March. Some individuals were very knowledgeable about fire issues and potential management concerns, and offered suggestions or ideas as to how they thought BLM should best manage certain areas to reintroduce fire to the landscape. Others came to the meeting for their own education regarding fire management on BLM lands in Arizona, and either declined to comment or were not yet ready to offer suggestions and voice their concerns before gaining more information about the LUP amendment process and what BLM proposed to do.

BLM heard from the following groups, which commented on the Arizona state LUP amendments either face-to-face at the scoping meetings, or responded via U.S. Post or email to BLMís Planning Bulletin #1, which was mailed to BLMís constituents statewide.

Groups from which BLM has Received Comments on LUP Amendment

Prescott National Forest
Kaibab National Forest
White Mountain Apache Tribe
Las Vegas Paiute Tribe
Mescalero Apache Tribal Historic Preservation Office
Bureau of Indian Affairs (BIA), Ft. Yuma Agency
Arizona Game and Fish Department
Yuma County
Laguna and Yuma Natural Resource Conservation Districts
Public Lands Foundation

3.2 Summary of Reasons Why Meeting Attendees Value Public Lands

As mentioned in Section 2.2 above, the first question meeting attendees were asked on the planning worksheet was, ìWhat do you value about these public lands and why?î The following is a summary of their responses:

- Undeveloped character as wilderness or as rural lands
- Biodiversity and habitat
- Recreational experiences
- Habitat interactive experiences
- Contributions to the economy and development of resources and schools through grazing leases.
- Rich diversity of plants and animals
- Beauty of the valleys and mountains
- Public access
- Hunting
- Camping

3.3 Issues Raised

BLM equates land use planning with problem solving and issue resolution, as it must according to planning regulations 43 CFR Part 1600. An initial step in developing the LUP amendments is to identify relevant issues and concerns that are within the scope of the task BLM is seeking to accomplish, in this case, the reintroduction of fire to the ecosystem as a management tool. An issue is defined as an opportunity, conflict, or problem regarding the use or management of public lands. As discussed previously, at each public meeting BLM, Dyanamac and TNC staff engaged attendees in discussions on their perspective on proposed BLM actions to manage fire, and actions that could be undertaken to reduce the risk of wildland fire. The planning worksheet given to meeting attendees asked several open-ended questions regarding BLMís fire management activities. The following is a summary of the publicís responses: BLM received many comments regarding how BLM should incorporate fire management into its existing LUPs. To ensure all comments were addressed in this summary report, these comments are listed below, grouped into areas of greatest concern, analyzed to determine whether the issues raised are within the scope of the LUP amendment process, and restated as an issue question to clarify needed decisions. The reasons that any comments may be determined to be outside of the scope of the current planning process are detailed in footnotes below the comment.

Although BLM listened to many different types of issues raised by the public, certain major concerns were raised frequently. The comments received were alternately approving or disapproving of past or current management practices, and were sometimes accompanied by suggestions for future fire management. Generally, these ìrecurring themesî consisted of concerns about the following: 1) the impact of fire management on livestock grazing; 2) prescribed and naturally-ignited burns; 3) hazardous wildland fuels and fuels reduction; 4) wildland-urban interface fires; and 5) air and water quality. The comments below were distilled from completed planning worksheets, from conversations between BLM staff and the public at the public meetings, and from meeting notes taken by the planning team.

Issue 1: The Impact of Fire Management on Livestock Grazing

Comment from Public	Within Scope?	Issue Question	Change Proposed?
Concern about the potential effects of BLM fire management on livestock grazing permits.	Yes	How will new fire management techniques affect grazing permits, if at all?	No
Concern that prescribed burns and allowing natural starts to burn will have at least a short term effect on livestock forage availability.	Yes	Will the increased use of fire as a management tool affect livestock forage, and if so, how shall BLM notify those potentially affected?	No
There should be less grazing on public lands in the west.	No[1]	N/A	No
Concerned that rangeland fires could reduce the amount of available forage for cattle.	Yes	How will the increased use of fire impact the amount of forage on leased grazing lands and adjacent property?	No
Livestock operations have contributed to the proper management of fires as well as maintaining native grasses, vegetation, and habitat. We hope BLMís new fire management plan will not make the same mistake the Forest Service has made in Arizona, Colorado and New Mexicoó eliminating livestock grazing.	Yes	What is the appropriate level of grazing to maintain optimum fire conditions in an ecosystem?	No
Proper vegetative management will reduce widespread fuel and fire excesses. A most efficient and economical biological control is livestock grazing. We recommend liberal public access and that grazing on public lands is permitted as part of the plan.	Yes	Is grazing a viable form of biological treatment to control hazardous fuel loads?	No

[1] Livestock grazing on western public lands may have wildland fire management implications, but whether or not it should occur at all, or the extent to which it is permitted, is beyond the scope of this LUP amendment, which deals strictly with issues directly related to fire.

Issue 2: Prescribed and Naturally-Occurring Burns

Comment from Public	Within Scope?	Issue Question	Change Proposed?
The use of prescribed fires to improve natural resources is a good idea.	Yes	N/A	No
Support expanding the prescribed burning programs as well as thinning where appropriate. There needs to be a strong emphasis on fuels reduction via prescribed burning, in those areas where fuels are at unhealthy levels.	Yes	Where is prescribed fire appropriate?	No
Natural cyclic fire management practices based on historical data and current fuel loads [should be used to guide fire and fuels management activities]. Fires should be regular enough to keep flame lengths to a ìcreepingî or low level.	Yes	N/A	No
Would prefer NO suppression unless absolutely necessary.	Yes	When, if ever, is suppression necessary/should suppression be used as the optimum method of fire management?	Permitted fuelwood harvesting, grazing/mowing, and herbicidal applications determined appropriate by agency personnel and stakeholders, in addition to natural fire cycles.

Issue 3: Hazardous Wildland Fuels and Fuels Reduction

Comment from Public	Within Scope?	Issue Question	Change Proposed?
How will BLM maximize timber production while preserving scenic values?	Yes	How will BLM maximize timber production while preserving scenic values?	No
Concerned that big trees will be logged, that BLMís proposed action is just an excuse for doing more than what is really needed to reduce the risk of wildland fire, such as clearing out large parcels of land around houses based on WUI concerns.	Yes	How will BLM integrate hazardous fuels reduction with the need to maintain forested lands as forests (on BLM land, and in conjunction with adjacent USFS lands)?	No
Fire breaks (clear cuts) are a proper management tool.	Yes	N/A	No
Private logging companies should be required to reduce fuel loads before being awarded timber contracts	Yes	What is the best means of encouraging fuels reduction by private timber companies?	No
ìI do not support the Bush administrationís plan for wholesale for-profit loggingî	Yes	N/A	ìScrapî the Bush ëhealthy forestí plan and instead vastly expand existing wildland fire agencies, or else reviving something like the old Civilian Conservation Corps to do the thinning and prescribed burning.
Regarding the flooding of Wickenburg, we need to investigate tree trimming/fuelwood cutting along drainage into the Hassayampa River, and controlled burning.	Yes	What impact does fuels reduction have on flooding in watersheds where it is practiced?	No

Issue 4: Wildland-Urban Interface Fires

Comment from Public	Within Scope?	Issue Question	Change Proposed?
General concern for WUI fire issues.	Yes	How will the BLM manage fire in WUI areas in the LUP amendment?	No
We are not sympathetic to the individuals living in rural areas that are highly susceptible to wildfire. Government money should not be spent on protecting private property in fire-prone areas.	Yes	Is the protection of private property in fire-prone areas an appropriate expenditure of firefighting resources, and if so, at what level should BLM protect private property?	No

Issue 5: Air and Water Quality

Comment from Public	Within Scope?	Issue Question	Change Proposed?
BLM shouldnít undertake burns that will affect air quality during hunting season.	Yes	When is the most appropriate time of year to conduct prescribed burns, so as to have the smallest adverse effect on air quality?	(Implied in comment): Undertake burns during other times of the year than hunting season.
On tribal lands, there can be fire and smoke that is a problem.	No	N/A	No
Air quality monitoring should be sub-contracted to private business.	No	N/A	No
Regarding the flooding of Wickenburg, we need to investigate tree trimming/fuelwood cutting along drainage into the Hassayampa River, and controlled burning.	Yes	What impact does fuels reduction have on water quality in watersheds where it is practiced?	No

Miscellaneous Resource Comments

Comment from Public	Within Scope?	Issue Question	Change Proposed?
BLM should develop Fire Use areas adjacent to USFS Fire Use areas.	Yes	What BLM-managed lands are adjacent to USFS-managed Fire Use areas, and are they appropriate for designated Fire Use areas themselves?	Aqua Fria grasslands and the south end of the Bradshaws below the Prescott National Forest boundary.
Pursuant to the National historic Preservation Act (NHPA) and other related authorities, all BLM fire and fuels management planning should reflect clear and consistent consideration that fire is the single greatest threat to organic components of cultural, archaeological, and historical resources.	Yes	How does BLM minimize the impact of fire on historic and cultural resources?	The Amendments to the Land Use Plans should ensure that adequate steps are systematically taken to identify, document, and protect from fire all structures and sites that contain organic components, notably rockshelters, brush and wooden structures, sensitive plant species having cultural values, etc.
BLM must adequately address the environmental consequences of its fire management actions. (No specific environmental consequences mentioned).	Yes	What are the environmental consequences of each of BLMís fire management actions?	No
Fire policy should be based on sound ecological policies and science, with the main guiding objective being the preservation of biodiversity.	Yes	How can fire be managed to increase biodiversity? How does fire affect biodiversity in an ecosystem?	No
We are seriously disappointed that our government has refused to stand up to the silly notions of eastern environmentalists. Eliminating fires and livestock grazing has taken a grave toll upon the health of public lands and wildlife, citizensí homes and businesses and our governmentís credibility and ability to ìmanageî.	Yes	N/A	No
Use fire to remove invasive species such as tamarisk. Let it burn all the way down so maybe the fire can kill some of it!	Yes	How can fire be used to control invasive species? How does BLM ensure that more invasive species will not overtake recently burned areas?	No

General Comments about Meetings and BLM Efforts

Comment from Public	Within Scope?	Issue Question	Change Proposed?
There is a heightened awareness of wildfire because of the large fires in Arizona last year. However, many people were present for information and were not yet prepared to discuss new management techniques or alternatives regarding fire reintroduction.	N/A	N/A	N/A
Universal public support for BLM being proactive about wildland fire management issues.	N/A	N/A	N/A
Using fire to manage ecosystems is a good idea.	N/A	N/A	N/A
Open forum meetings are an excellent forum	N/A	N/A	N/A
Better publicity is needed for the meetings.	Yes	How can BLM inform more people about public meetings?	No
How will BLM maximize timber production while preserving scenic values?	Yes	How will BLM maximize timber production while preserving scenic values?	No
Past fire suppression has led to problems.	Yes	N/A	N/A
Will the LUP amendments consider how fire will be managed within the monuments?	Yes	How does BLM ensure that management is consistent across public lands including national monuments?	N/A
The areas set aside by presidential proclamation should remain as public lands to be administered under the BLMís current multiple use concepts.	No	N/A	N/A
Concerned about representation of the Nature Conservancy being one of the main players or drivers of the LUP and EA Process.	Yes	Is there balanced representation of interests at the planning level?	Think about having a rep. From The Farm Bureau or Arizona Cattle Growers or some group that lives on the land.

3.4 Additional Suggestions for BLM Fire Management and Public Involvement

The following suggestions were provided by the public to BLM:

- Restrict camp fires during fire season
- Require spark arrester mufflers
- Interact with stakeholders first and foremost. Involve all local/federal agencies that have an interest in the affected resource.
- Look at the recent Mittry Lake fire area and note ìhow fast it will green upî.
- Interact with stakeholders first and foremost. Involve all local/federal agencies that have an interest in the affected resource.

4.0 FIRE ISSUES RAISED AT OTHER ARIZONA PLANNING EFFORTS

In addition to this planning effort, BLM has several other land use planning efforts ongoing in Arizona. These include the Resource Management Plan (RMP) and Environmental Impact Statement (EIS) for the Lake Havasu and the Arizona Strip BLM Districts, and the RMP/EIS for the Agua Fria National Monument/Bradshaw-Harquahala planning areas. The scope of these planning efforts was much wider, focusing on many issues such as public access, mineral development, recreation, visual resources, hazardous materials and solid waste, and others. Still, throughout the scoping process for each of these efforts, wildland fire management issues were raised on several occasions. As these comments may be relevant to the statewide LUP amendment for appropriate fire management practices, they are summarized below:

Fire Issues Raised Through the Scoping Process for the Agua Fria National Monument/Bradshaw-Harquahala Planning Areas:

- Debris and brush clearing programs need to be expanded.
- Return natural fire cycles.
- Return natural fire regime to mesa tops.

Through this planning effort, a fire management plan is being developed for the Agua Fria National Monument. BLMís fire management plan will be structured in accordance with the Agua Fria management Plan now being developed.

Fire Issues Raised Through the Scoping Process for the Lake Havasu Field Office RMP/EIS:

- Is there a danger or risk to the public from field office-controlled burns and illegal burns on BLM lands? Is the current Fire Management Plan sufficient?

Fire Issues Raised Through the Scoping Process for the Arizona Strip Field Office RMP/EIS:

- Several comments urged returning fire to the ecosystem, mostly by letting fire run its course or a ìlet-burnî policy. Some stated that fire management practices should be allowed. One comment stated that fire, reseeding and land restoration should be allowed.
- Several people expressed concern about the build-up of high fuel loads, stating that logging and/or cattle grazing are effective methods of reducing high fuel loads. Over-regulation and past land management [were] also cited as causes of high fuel loads.
- Is there a need to change any present cultural use allocations based on new information, public demand, or research needs?
- Where are the WUI areas that are threatened by wildland fire on the Arizona Strip? What criteria will be used to prioritize these areas and how will future impacts from wildland fire be reduced?
- Where are other areas where wildland fire is not desired? What criteria will be used to prioritize these areas for future fuels treatments to reduce the negative impact of wildland fire?
- Where are the areas where wildland fire may be used to further resource objectives or achieve desired future conditions? What criteria will be used to prioritize or manage these areas effectively with wildland fire?

- How will areas of high priority for using prescribed fire as a management tool be identified and prioritized?
- Are there any general restrictions on fire management practices (including wildfire suppression and fuels management) needed to protect other resource values?

Appendix B ñ Applicable Laws, Regulations, Policies and Planning Criteria

When considering the affected environment, physical, biological, economic, and social environmental factors must be considered. In addition to NEPA there are other environmental laws as well as Executive Orders (EOs) to be considered when preparing EAs and EISs. These laws are summarized below.

Clean Air Act (CAA) of 1970 and Amendments of 1977 and 1990
The CAA recognizes that increases in air pollution result in danger to public health and welfare. To protect and enhance the quality of the Nation's air resources, the CAA authorizes the Environmental Protection Agency (EPA) to set six National Ambient Air Quality Standards (NAAQSs) which regulate carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter pollution emissions. The CAA seeks to reduce or eliminate the creation of pollutants at their source, and designates this responsibility to State and local governments. States are directed to utilize financial and technical assistance as well as leadership from the Federal government to develop implementation plans to achieve NAAQS. Geographic areas are officially designated by the EPA as being in attainment or non-attainment to pollutants in relation to their compliance with NAAQS. Geographic regions established for air quality planning purposes are designated as Air Quality Control Regions (AQCR). Pollutant concentration levels are measured at designated monitoring stations within the AQCR. An area is designated as unclassifiable where insufficient monitoring data exists. Section 309 of the CAA authorizes the EPA to review and comment on impact statements prepared by other agencies.

An agency should consider what effect an action may have on NAAQS due to short-term increases in air pollution during construction as well as long-term increases resulting from changes in traffic patterns. For actions in attainment areas, a Federal agency may also be subject to EPA's Prevention of Significant Deterioration (PSD) regulations. These regulations apply to new major stationary sources and modifications to such sources. Although few agency facilities will actually emit pollutants, increases in pollution can result from a change in traffic patterns or volume. Section 118 of the CAA waives Federal immunity from complying with the CAA and states all Federal agencies will comply with all Federal and State approved requirements.

Clean Water Act (CWA) of 1977
The CWA, a 1977 amendment to the Federal Water Pollution Control Act of 1972, is administered by the EPA and sets the basic structure for regulating discharges of pollutants into U.S. waters. The CWA requires the EPA to establish water quality standards for specified contaminants in surface waters and forbids the discharge of pollutants from a point source into navigable waters without a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permits are issued by EPA or the appropriate State if it has assumed responsibility. Section 404 of the CWA establishes a Federal program to regulate the discharge of dredged and fill material into waters of the United States. Section 404 permits are issued by the US Army Corps of Engineers (USACE). Waters of the United States include interstate and intrastate lakes, rivers, streams, and wetlands which are used for commerce, recreation, industry, sources of fish, and other purposes. The objective of the Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Each agency should consider the impact on water quality from actions such as the discharge of dredge or fill material into U.S. waters from construction, or the discharge of pollutants as a result of facility occupation.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act of 1986 (SARA)
CERCLA authorizes the EPA to respond to spills and other releases of hazardous substances to the environment, and authorizes the National Oil and Hazardous Substances Pollution Contingency Plan. CERCLA also provides a Federal "Superfund" to respond to emergencies immediately. Although the

"Superfund" provides funds for clean up of sites where potentially responsible parties (PRPs) cannot be identified, the EPA is authorized to recover funds through damages collected from responsible parties. This funding process places the economic burden for cleanup on polluters. SARA mandates strong cleanup standards, and authorizes the EPA to use a variety of incentives to encourage settlements. Title III of SARA authorizes the Emergency Planning and Community Right to Know Act (EPCRA), which requires facility operators with "hazardous substances" or "extremely hazardous substances" to prepare comprehensive emergency plans and to report accidental releases. EO 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements," requires Federal agencies to comply with the provisions EPCRA. If a Federal agency acquires a contaminated site it can be held liable for clean up as the property owner/operator. A Federal agency can also incur liability if it leases a property, as the courts have found lessees liable as "owners." However, if the agency exercises due diligence by conducting a Phase I Environmental Site Assessment, it may claim the "innocent purchaser" defense under CERCLA. According to Title 42 United States Code (USC) 9601(35), the current owner/operator must show it undertook "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" before buying the property to use this defense.

Resource Conservation and Recovery Act (RCRA) of 1976
RCRA, an amendment to the Solid Waste Disposal Act, authorizes the EPA to provide for "cradle-to-grave" management of hazardous waste, and sets a framework for the management of non-hazardous municipal solid waste. Under RCRA, hazardous waste is controlled from generation to disposal through tracking and permitting systems, and restrictions and controls on the placement of waste on or into the land. Under RCRA, a waste is defined as hazardous if it is ignitable, corrosive, reactive, toxic or listed by the EPA as being hazardous. With the 1984 Hazardous and Solid Waste Amendments (HSWA), Congress targeted stricter standards for waste disposal and encouraged pollution prevention by prohibiting the land disposal of particular wastes. The HSWA amendments strengthen control of both hazardous and nonhazardous waste and emphasize the prevention of pollution of groundwater.

Safe Drinking Water Act (SDWA) of 1974
The SDWA establishes a Federal program to monitor and increase the safety of all commercially and publicly supplied drinking water. Congress amended the SDWA in 1986, mandating dramatic changes in nationwide safeguards for drinking water and establishing new Federal enforcement responsibility on the part of the EPA. The 1986 amendments to the SDWA require the EPA to establish Maximum Contaminant Levels (MCLs), Maximum Contaminant Level Goals (MCLGs) and Best Available Technology (BAT) treatment techniques for organic, inorganic, radioactive, and microbial contaminants, and turbidity. MCLGs are maximum concentrations below which no negative human health effects are known to exist. The 1996 amendments set current Federal MCLs, MCLGs, and BATs for organic, inorganic, microbiological, and radiological contaminants in public drinking water supplies.

Federal Land Policy and Management Act (FLPMA) of 1976
FLPMA and the regulations contained in 43 CFR Part 1600 govern the Bureau of Land Management planning process. Land Use Plans ensure that public lands are managed in accordance with the intent of Congress as stated in FLPMA, under the principles of multiple use and sustained yield. As required by FLPMA, the public lands must be managed in a manner that protects the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition, that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use by encouraging collaboration and public participation throughout the planning process. In addition, the public lands must be managed in a manner that recognizes the Nationís need for domestic sources of minerals, food, timber, and fiber from the public lands.

Taylor Grazing Act of 1934, as amended and supplemented.
The Taylor Grazing Act was the Federal governmentís first effort to regulate grazing on federal public lands. The act established grazing districts of vacant, unappropriated and unreserved land from any parts of the public domain, excluding Alaska, which are not national forests, parks, and monuments, Indian reservations, railroad grant lands, or revested Coos Bay Wagon Road grant lands, and which are valuable chiefly for grazing and raising forage crops. Residents and stock owners pay an annual fee to obtain a grazing permit which is used to manage livestock grazing in established districts. Grazing Administration Regulations (43 CFR 4100) provide for the development of state Standards for Rangeland Health and Guidelines for Grazing Management. The Standards and Guidelines are approved through Bureau of Land Management planning and NEPA processes.

Public Rangelands Improvement Act of 1978
The Public Rangelands Improvement Act was instituted to improve the conditions on public rangelands. Rangelands are defined as lands administered by the Secretary of the Interior through the Bureau of Land Management or the Secretary of Agriculture through the Forest Service in 16 contiguous western states, including Arizona, on which there is domestic livestock grazing or which the appropriate Secretary determines may be suitable for domestic livestock grazing. Rangeland quality is determined by soil quality, forage values, wildlife habitat, watershed and plant communities, the current state of vegetation in a site in relation to its potential, and the relative degree to which the kinds, proportions, and amounts of vegetation in a plant community resemble the desired plant community. The act requires a national rangelands inventory and consistent federal management policies. In addition, the act provides funding for range improvement projects.

Coastal Zone Management Act (CZMA) of 1972
The CZMA is concerned with the effective management, beneficial use, protection, and development of the Nation's coastal zone. The coastal zone refers to the coastal waters and the adjacent shorelines including islands, transitional and intertidal areas, salt marshes, wetlands, and beaches, and includes the Great Lakes. The CZMA declares a National policy to preserve, protect and develop, and where possible restore or enhance the resources of the Nation's coastal zone. The CZMA encourages states to exercise their full authority over the coastal zone, through the development of land and water use programs in cooperation with Federal and local governments. States may apply for grants to help develop and implement management programs to achieve wise use of the land and water resources of the coastal zone. Development projects affecting land or water use or natural resources of a coastal zone, must ensure the project is, to the maximum extent practicable, consistent with the state's coastal zone management program.

Toxic Substance Control Act (TSCA) of 1976
Title I of the Toxic Substance Control Act established requirements and authorities to identify and control toxic chemical hazards to human health and the environment. TSCA authorized the EPA to gather information on chemical risks, require companies to test chemicals for toxic effects, and regulate chemicals with unreasonable risk. TSCA also singled out polychlorinated bi-phenyls (PCBs) for regulation and as a result are being phased out. TSCA and its regulations govern the manufacture, processing, distribution, use, marking, storage, disposal, clean-up, and release reporting requirements for numerous chemicals like PCBs. PCBs are persistent when released into the environment and accumulate in the tissues of living organisms. They have been shown to cause adverse health effects on laboratory animals and may cause adverse health effects in humans. TSCA Title II provides statutory framework for "Asbestos Hazard Emergency Response," which applies only to schools. TSCA Title III, "Indoor Radon Abatement," states indoor air in buildings of the United States should be as free of radon as the outside ambient air. Federal agencies are required to conduct studies on the extent of radon contamination in buildings they own. TSCA Title IV, "Lead Exposure Reduction," directs Federal agencies to "conduct a comprehensive program to promote safe, effective, and affordable monitoring, detection, and abatement of lead-based paint and other lead exposure hazards." Further, any Federal agency having jurisdiction

over a property or facility must comply with all Federal, State, interstate, and local requirements concerning lead-based paint.

Wild and Scenic Rivers Act (WSRA) of 1968
By recognizing the remarkable values of specific rivers of the Nation, the WSRA provides for a wild and scenic river system. These selected rivers and their immediate environment are preserved in a free-flowing condition, without dams or other construction. The policy not only protects the water quality of the selected rivers but also provides for the enjoyment of present and future generations. Any river in a free-flowing condition is eligible for inclusion, and can be authorized as such by an Act of Congress, an act of State legislature, or by the Secretary of Interior upon the recommendation of the Governor of the State(s) through which the river flows.

EO 11988, "Floodplain Management," May 24, 1977
EO 11988 directs agencies to consider alternatives to avoid adverse effects and incompatible development in floodplains. An agency may locate a facility in a floodplain if the head of the agency finds there is no practicable alternative. If it is found there is no practicable alternative, the agency must minimize potential harm to the floodplain, and circulate a notice explaining why the action is to be located in the floodplain prior to taking action. Finally, new construction in a floodplain must apply accepted floodproofing and flood protection to include elevating structures above the base flood level rather than filling in land.

EO 11990, "Protection of Wetlands," May 24, 1977
EO 11990 directs agencies to consider alternatives to avoid adverse effects and incompatible development in wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland, and the proposed construction incorporates all possible measures to limit harm to the wetland. Agencies should use economic and environmental data, agency mission statements, and any other pertinent information when deciding whether or not to build in wetlands. EO 11990 directs each agency to provide for early public review of plans for construction in wetlands.

Pollution Prevention Act (PPA) of 1990
The PPA encourages manufacturers to avoid the generation of pollution by modifying equipment and processes, redesigning products, substituting raw materials, and making improvements in management techniques, training, and inventory control. EO 12856, "Federal Compliance with Right-to Know Laws and Pollution Prevention Requirements," requires Federal agencies to comply with the provisions of the PPA, and also requires Federal agencies to ensure all necessary actions are taken to prevent pollution. In addition, in Federal Register Volume 58 Number 18 (January 29, 1993), the Council on Environmental Quality provides guidance to Federal agencies on how to "incorporate pollution prevention principles, techniques, and mechanisms into their planning and decision making processes and to evaluate and report those efforts, as appropriate, in documents pursuant to NEPA."

Biological Factors
Endangered Species Act (ESA) of 1973
The ESA establishes a Federal program to conserve, protect and restore threatened and endangered plants and animals and their habitats. The ESA specifically charges Federal agencies with the responsibility of using their authority to conserve threatened and endangered species. All Federal agencies must insure any action they authorize, fund or carry out is not likely to jeopardize the continued existence of an endangered or threatened species or result in the destruction of critical habitat for these species, unless the agency has been granted an exemption. The Secretary of the Interior, using the best available scientific data, determines which species are officially endangered or threatened, and the U.S. Fish and Wildlife Service (FWS) maintains the list. A list of Federal endangered species may be obtained from the Endangered Species Division, U.S. Fish and Wildlife Service (703-358-2171). States may also have their own lists of threatened and endangered species which may be obtained by calling the appropriate State

Fish and Wildlife office. Some species, such as the bald eagle, also have laws specifically for their protection (e.g., Bald Eagle Protection Act).

Migratory Bird Treaty Act of 1918, amended in 1936, 1960, 1968, 1969, 1974, 1978, 1986, and 1989
The Migratory Bird Treaty Act implements treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Unless otherwise permitted by regulations, the Act makes it unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. The Act also make it unlawful to ship, transport or carry from one state, territory or district to another, or through a foreign country, any bird, part, nest or egg that was captured, killed, taken, shipped, transported or carried contrary to the laws from where it was obtained; and import from Canada any bird, part, nest or egg obtained contrary to the laws of the province from which it was obtained. The U.S. Department of the Interior has authority to arrest, with or without a warrant, a person violating the Act.

EO 13186, ìConservation of Migratory Birdsî, January 10, 2001
EO 13186 creates a more comprehensive strategy for the conservation of migratory birds by the Federal government. The Order provides a specific framework for the Federal governmentís compliance with its treaty obligations to Canada, Mexico, Russia, and Japan. The Order provides broad guidelines on conservation responsibilities and requires the development of more detailed guidance in Memoranda of Understanding (MOU) within two years of its implementation. The Order will be coordinated and implemented by he Fish and Wildlife Service. The MOU will outline how Federal agencies will promote conservation of migratory birds. The Order will requires the support of various conservation planning efforts already in progress; incorporation of bird conservation considerations into agency planning, including NEPA analyses; and reporting annually on the level of take of migratory birds.

EO 11514, "Protection and Enhancement of Environmental Quality," March 5, 1970
EO 11514 states the President, with assistance from the CEQ, will lead a national effort to provide leadership in protecting and enhancing the environment for the purpose of sustaining and enriching human life. Federal agencies are directed to meet national environmental goals through their policies, programs, and plans. Agencies should also continually monitor and evaluate their activities to protect and enhance the quality of the environment. Consistent with NEPA, agencies are directed to share information about existing or potential environmental problems with all interested parties, including the public, in order to obtain their views.

Economic and Social Factors
Environmental Quality Improvement Act (EQIA) of 1970
The EQIA ensures each Federal agency conducting or supporting public works activities affecting the environment implements policies established under existing law. The EQIA also created the Office Environmental Quality to provide professional and administrative staff for the Council on Environmental Quality (CEQ). The Director of the Office of Environmental Quality assists and advises the President on Federal policies and programs affecting environmental quality. The Office of Environmental Quality reviews the adequacy of existing environmental monitoring and predicting systems, and assists Federal agencies in appraising the effectiveness of existing and proposed facilities which affect environmental quality.

National Historic Preservation Act (NHPA) of 1966
The NHPA sets forth national policy to identify and preserve properties of state, local, and national significance. The at establishes the Advisory Council on Historic Preservation (Council), State Historic Preservation Officers, and the National Register of Historic Places (NRHP). The Council advises the President, Congress and Federal agencies on historic preservation issues. Section 106 of the act directs Federal agencies to take into account effects of their undertakings (actions and authorizations) on

properties included in or eligible for NRHP. Section 110 sets inventory, nomination, protection and preservation responsibilities for federally owned cultural properties. Section 106 of the act is implemented by regulations of the Council, 36 CFR Part 800. The Bureau of Land Management in Arizona complies with Section 106 according to a national Programmatic Agreement dated March 26, 1997, supplemented by a Protocol between the BLM Arizona State Director and the Arizona State Historic Preservation Officer.

The agency should coordinate studies and documents prepared under Section 106 with NEPA where appropriate. However, NEPA and NHPA are separate statutes and compliance with one does not constitute compliance with the other. For example, actions which qualify for a categorical exclusion under NEPA, may still require Section 106 review under NHPA. It is the responsibility of the agency official to identify properties in the area of potential effects, and whether they are included or eligible for inclusion in the National Register of Historic Places. Section 110 of the NHPA requires Federal agencies to identify, evaluate, and nominate historic property under agency control to the National Register of Historic Places.

Archaeological Resource Protection Act (ARPA) of 1979
ARPA protects archaeological resources on public and Indian lands. It provides felony-level penalties for the unauthorized excavation, removal, damage, alteration or defacement of any archaeological resource, defined as material remains of past human life or activities which are at least 100 years old. Before archaeological resources are excavated or removed from public lands, the Federal land manager must issue a permit detailing the time, scope, location and specific purpose of the proposed work. ARPA also fosters the exchange of information about archaeological resources between governmental agencies, the professional archaeological community, and private individuals. ARPA is implemented by regulations found in 43 CFR Part 7.

American Indian Religious Freedom Act of 1978 and Amendments of 1994
The American Indian Religious Freedom Act of 1978 recognizes that freedom of religion for all people is an inherent right, and traditional American Indian religions are an indispensable and irreplaceable part of Indian life. It also recognized the lack of Federal policy on this issue and made it the policy of the United States to protect and preserve the inherent right of religious freedom for Native Americans. The 1994 Amendments provide clear legal protection for the religious use of peyote cactus as a religious sacrament. Federal agencies are responsible for evaluating their actions and policies to determine if changes should be made to protect and preserve the religious cultural rights and practices of Native Americans. These evaluations must be made in consultation with native traditional religious leaders.

Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
NAGPRA establishes rights of Indian tribes to claim ownership of certain ìcultural itemsî, defined as native American human remains, funerary objects, sacred objects and objects of cultural patrimony, held or controlled by Federal agencies. Cultural items discovered on Federal or tribal lands are, in order of primacy, the property of lineal descendants, if these can be determined, the tribe owning the land where the items were discovered, of the tribe with the closest cultural affiliation with the items. Discoveries of cultural items on Federal or tribal land must be reported to the appropriate Indian tribe and the Federal agency with jurisdiction over the land. If the discovery is made as a result of a land use, activity in the area must stop and the items must be protected pending the outcome of consultation with the affiliated tribe.

EO 11593, "Protection and Enhancement of the Cultural Environment," May 13, 1971
EO 11593 directs the Federal Government to provide leadership in the preservation, restoration, and maintenance of the historic and cultural environment. Federal agencies are required to locate and evaluate all Federal sites under their jurisdiction or control which may qualify for listing on the National Register of Historic Places. Agencies must allow the Advisory Council on Historic Preservation to comment on

the alteration, demolition, sale, or transfer of property which is likely to meet the criteria for listing as determined by the Secretary of the Interior in consultation with the State Historic Preservation Officer. Agencies must also initiate procedures to maintain Federally owned sites listed on the National Register.

EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," February 11, 1994

EO 12898 directs Federal agencies to make achieving environmental justice part of their mission. Agencies must identify and address adverse human health and/or environmental effects its activities have on minority and low-income populations, and develop agency-wide environmental justice strategies. The strategy must list "programs, policies, planning and public participation processes, enforcement, and/or rulemakings related to human health or the environment that should be revised to promote enforcement of all health and environmental statutes in areas with minority populations and low-income populations, ensure greater public participation, improve research and data collection relating to the health of and environment of minority populations and low-income populations, and identify differential patterns of consumption of natural resources among minority populations and low-income populations." A copy of the strategy and progress reports must be provided to the Federal Working Group on Environmental Justice. Responsibility for compliance with this EO lies with each Federal agency.

EO 13007, ìIndian Sacred Sitesî, May 24, 1996

EO 13007 provides that agencies managing Federal lands, to the extent practicable, permitted by law, and not inconsistent with agency functions, shall accommodate Indian religious practitionersí access to and ceremonial use of Indian sacred sites, shall avoid adversely affecting the physical integrity of such sites, and shall maintain the confidentiality of such sites. Federal agencies are responsible for informing tribes of proposed actions that could restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites.

EO 13287, ìPreserve Americaî, March 3, 2003

EO 13287 orders the Federal Government to take a leadership role in protection, enhancement, and contemporary use of historic properties owned by the Federal Government, and promote intergovernmental cooperation and partnerships for preservation and use of historic properties. The order established new accountability for agencies with regard to inventories and stewardship.

APPENDIX C ñ VEGETATION COMMUNITIES AND ASSOCIATED WILDLIFE SPECIES

Each vegetation community is fully described by Brown (1982a, 1994). The Brown classification for the American Southwest is based on biogeography delineators such as climate, vegetation physiognomy, and plant dominants.

Upland Sonoran Desert Scrub

The Upland Sonoran Desert Scrub vegetation is at times referred to as the Arizona Desert or Paloverde-Cacti Desert. This vegetation is mainly associated with the Lower Sonoran Desert Scrub. It occurs on BLM land in the western part of the state and is the largest vegetation community at 3,280,602 acres. Cacti plants are characteristic of this desert scrub and include buckhorn cholla, cane cholla, chain fruit cholla, teddy bear cholla, desert Christmas cactus, pencil cholla, Klein cholla, Devilís club ground cholla, fishhook pincushion, Thornber pincushion, fish-horn barrel cactus, compass barrel cactus, and saguaro. Non-cactus dominant woody plants are blue palo verde, foothill palo verde, ironwood, creosotebush, white bursage, whitethorn acacia, limber bush, ocotillo, jojoba, little-leaved ratany, crucifixion thorn, and bush buckwheat. Fire is not common in this vegetation community. **The Desired Future Conditions are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to non-hazardous levels.**

A great majority of this vegetation occurs on slopes and broken ground giving it the name of Upland Sonoran Desert Scrub. Elevations range between 984-3,280 ft. Average annual precipitation is unreliable and bi-seasonal which averages 12-16 inches with approximately 30ñ60% occurring during summer months. Temperatures are warm and characteristic of subtropical deserts with a winter temperature range of 9ñ19 ∫C and summer range of 22ñ27 ∫C. Soils are variable but predominately sand characteristically covered with desert pavement. Historic fire had a return interval of decades to hundreds of years and was probably not common in this vegetation community (Rogers and Steele 1980). However, today the risk of wildfire may increase after abnormally high annual precipitation which encourages abundant growth of red brome and buffelgrass (McAuliffe 1995).

Numerous mammals occupy this prevalent vegetation community, including mule deer (*Odocoileus* hemionus), desert bighorn sheep (*Ovis* Canadensis), javelina (*Tayassu* tajacu), mountain lion (*Felis* concolor), ringtail cat (*Bassariscus* astutes), bobcat (*Felis* rufus), California leaf-nosed bat (M*acrotus californicus*), California myotis (*Myotis californicus*), black-tailed jack-rabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), spotted skunk (*Spilogale gracilis*), striped skunk (*Mephitis* mephitis), Arizona pocket mouse (*Perognathus amplus*), Baileyís pocket mouse (*Chaetodipus baileyi*), cactus mouse (*Peromyscus eremicus*), white-throated wood rat (*Neotoma albigula*), gray fox (*Urocyon cinereoargenteus*), the endemic Harris antelope squirrel (*Ammospermophilus harrisii*), and mesquite mouse (*Peromuscus merriami*). This paloverde-cacti-mixed scrub series supports diverse bird communities, including many species associated with other vegetation communities that extend into suitable habitats in the Arizona Upland Sonoran Desert Scrub. These species include typical thornscrub species such as Harrisí hawk (*Parabuteo unicinctus*), white-winged dove (*Zenaida asiatica*), elf owl (*Micrathene whitneyi*), pyrrhuloxia (*Cardinalis sinuatus*), the ìcactusî woodpeckers (gila woodpecker (*Melanerpes uropygialis*), northern flicker (*Colaptes auratus*), and ladder-backed woodpecker (*Picoides scalaris*), curve-billed thrasher (*Toxostoma curvirostre*), cactus wren (*Campylorhynchus brunneicapilus*), black-throated sparrow (*Amphisipiza bilineata*), red-tailed hawk (*Buteo jamaicensis*), Gambelís quail (*Lophortyx gambelii*), gilded flicker (*Colaptes chrysoides*), ash-throated flycatcher (*Myiarchus cinerascens*), house finch (*Carpodaucus mexicanus*), and black-tailed gnatcher (*Polioptila melanura*).

Many Sonoran and other desert reptiles also add to the wildlife diversity of this vegetation community, including species with more limited ranges such as western whiptail (*Cnemidophorus tigris*), gila monster (*Heloderma suspectum*), Arizona Sonoran coral snake (*Micruroides euryxanthus*), tiger rattlesnake (*Crotalus tigris*), desert tortoise (*Gopherus agassizii*), Mojave green rattlesnake (*Crotalus scutulatus scutulatus*), western rattlesnake (*Crotalus viridis*), western diamondback rattlesnake (*Crolatus atrox*), regal horned lizard (*Phrynosoma solare*), desert horned lizard (*Phrynosoma platyrhinos*), and ornate tree lizard (*Urosaurus ornatus*) (Brown 1994).

Lower Sonoran Desert Scrub

The Lower Sonoran Desert Scrub vegetation on BLM land occurs mainly in western Arizona. It is the second most common vegetation type on BLM land as it occupies 2,727,540 acres. This vegetation type is relatively species rich in comparison with the Great Basin Desert Scrub as there is a mixture of different shrub species throughout this type. The Sonoran Desert Scrub vegetation is associated with Mohave Desert Scrub and Upland Sonoran Desert Scrub. Characteristic shrubs are creosotebush, whitebursage, octillo, brittlebrush, foothill palo verde, fourwing saltbush, and Ironwood. Saguaro is a characteristic cactus. Western honey mesquite, ironwood, catclaw acacia, blue palo verde, desert willow, and smoketree are usually associated with washes. Big galleta grass is an important grass species. Invasive weedy species include exotic species such as buffelgrass, red brome, filaree, prickley lettuce, Russian thistle, and London rocket. Fire is not common in this vegetation community. **The Desired Future Conditions are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and buffelgrass, and to limit woody vegetation to non-hazardous levels.**

As a result of high temperatures and low precipitation, plant growth is typically opened and simple reflecting intense competition for soil water among individuals. Annual precipitation varies between 2 and 9 inches. Winter temperatures are mild but summer months are hot, and desert pavement is common. Vegetation tends to occur along washes and small drainages. Sand dunes are common in some areas. Historic fire had a return interval of decades to hundreds of years and was probably not common in this vegetation community (Rogers and Steele 1980). However, today the risk of wildfire may increase after abnormally high annual precipitation which encourages abundant growth of red brome and buffelgrass (McAuliffe 1995).

Mammals typical to this arid region are generally small burrowing mammals, such as mule deer (*Odocoileus* hemionus), desert bighorn sheep (*Ovis* Canadensis), javelina (*Tayassu* tajacu), mountain lion (*Felis concolor*), ringrtail cat (*Bassariscus* astutes), bobcat (*Felis* rufu), grey fox (*Urocyon* cinereoargenteus), kit fox (*Vulpes velox*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), black-tailed jack rabbit (*Lepus* californicus), desert pocket mouse *(Chaetodipus penicillatus*), and desert and Merriam Kangaroo rats (*Dipodomys deserti and D. merriami*), as well as the ubiquitous coyote (*Canis latrans*). This vegetation community is the poorest of the Sonoran Desert for birds, because of its sparsely vegetated and structurally shorter habitats. Typical bird species include lesser numbers of arid-adapted species, such as the LeConteís thrasher (*Toxostoma lecontei*), white-winged dove (*Zenaida asiatica*), elf owl (*Micrathene whitneyi*), black-throated sparrow (*Amphisipiza bilineata*), loggerhead shrike (*Lanius ludovicianus*), cactus wren (*Campylorhynchus brunneicapilus*), red-tailed hawk (*Buteo jamaicensis*), ash-throated flycatcher (*Myiarchus cinerascens*), gilded flicker (*Colaptes chysoides*), mourning dove (*Zenaida macroura*), Gambelís quail (*Lophortyx gambelii*), and verdin (*Auriparus flaviceps*). Amphibians include Couchís spadefoot toad (*Scaphiopus* cochii), western green toad (*Bufo debilis* insidior), and Woodhouseís toad (*Bufo* woodhousii). This vegetation community supports a diverse and productive community of reptiles. The sandy plains and dunes of the Lower Colorado River Sonoran Desert Scrub support a number of unique sand-adapted lizards and snakes, such as fringe-toed lizards (*Uma inornata*), banded sand snake (*Chilomeniscus cinctus*), and sidewinder (*Crotalus cerastes*).

Rocky outcrops, bajadas, talus slopes, washes, and gravel plains each support varied and often different herpetofauna communities ñ chuckwalla (*Sauromalus ater*), desert spiny lizard (*Sceloporus magister*), western whiptail (*Cnemidophorus tigris*), desert glossy snake (*Arizona elegans eburnata*), western rattlesnake (*Crotalus viridis*), regal horned lizard (*Phrynosoma solare*), desert horned lizard (*Phrynosoma platyrhinos*), gopher snake (*Pituophis catenifer*), and desert tortoise (*Gopherus agassizii*) (Brown 1994).

Great Basin Pinyon-Juniper Woodland

Great Basin Pinyon-Juniper Woodland vegetation is wide spread throughout Arizona and grows on 1,533,012 acres of BLM land. It is associated with Upland Sonoran Desert Scrub and Great Basin Pinyon-Juniper Woodland vegetation. The Great Basin Conifer community is a cold-desert, evergreen woodland that is characterized by juniper and pinyon pine trees. Juniper trees tend to dominate at elevations below 6,560 ft, while pinyon pine dominates at the higher elevations. These trees are short-growing and rarely exceed 12 m in height. The canopy cover is mostly opened except on higher elevations or mesic sites where tree limbs may interlock. Understory shrubs, forbs, and grasses are usually sparse due to aridity and intense competition for soil water from the juniper and pinyon pine trees. Important juniper species are Rocky Mountain juniper and Great Basin juniper. The Rocky Mountain pinyon pine dominates in Arizona. Associated grasses may include blue gramma, galleta grass, Indian ricegrass, western wheatgrass, Junegrass, and several muhleys or dropseeds. Dominant shrubs are big sagebrush, snakeweed, rabbitbrush, winterfat, black sagebrush, blackbrush, cliffrose, Apache plume, Mormon-tea, fourwing saltbrush, antelope bitterbrush, and yucca. Forbs include several gilia, buckwheat, penstemon, lupine, and globemallow species. The mixtures of grasses, shrubs, and forbs depend on soil, precipitation, temperature, and disturbance. Cacti include several different species of hedgehog, prickleypear, and cholla.

The Great Basin Pinyon-Juniper Woodland is cold-temperate woodland characterized by cold winter temperatures with freezing temperatures occurring approximately 150 days per year. Summer temperatures are warm. Annual precipitation ranges between 10 and 22 inches, is distributed evenly throughout the year, and mainly occurs as snow in winter months. Soils are characteristically shallow and rocky. Juniper trees have invaded large areas of former grasslands and sagebrush dominated rangelands. Several factors, including fire suppression, climate change, and livestock grazing, may be responsible for the juniper invasion. Efforts to remove the invading trees have not been successful. Historic wildfire was not common. The sparse understory and openness of the pinyonñjuniper woodlands did not support the spread of fire expect on mesic areas where fuel was sufficient (Paysen et al. 2000). However, in modern times, many of these woodlands have sufficient fuel loads to support fire because of increased tree densities and the establishment of cheatgrass, red brome, buffelgrass and other annual weeds. **The Desired Future Conditions are that annual weeds such as cheatgrass are controlled, ladder fuels and downed woody debris are limited or not present, and juniper and piÒon pine tree densities and cover occur at their historic range of variation.**

Only a few vertebrate species are closely tied to or centered within this vegetation community, such as mountain lion (*Felis concolor*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), ringtrail cat (*Bassariscus astutus*), mule deer (*Odocoileus hemionus*), pinyon mouse (*Peromyscus truei*), bushy-tailed woodrat (*Neotoma cinerea*), Hualapai Mexican vole (*Microtus mexicanus hualpaiensis*), pinyon jay (*Gymnorhinus cyanocephalus*), gray flycatcher (*Empidonax wrightii*) Gray vireo (*Vireo vicinior*), black-throated gray warbler (*Dendroica nigrescens*), Scottís oriole (*Icterus parisorum*), wild turkey (*Meleagris gallopavo*), long-eared owl (*Asio otus*), Cassinís kingbird (*Tyrannus vociferans*), chipping sparrow (*Spizella passerina*), juniper titmouse (*Baeolophus ridgwayi*), ash-throated flycatcher (*Myiarchus cinerascens*), Bewickís wren (*Thryomanes bewickii*), bushtit (*Psaltriparus minimus*), western scrub-jay (*Aphelocoma californica*), common raven (*Corvus corax*), gray vireo (*Vireo vicinior*), mountain bluebird (*Sialia currucoides*),Woodhouseís toad (*Bufo woodhousii*), Great Basin spadefoot toad (*Spea*

intermontana), and the Striped whiptail (*Cnemidophorus velox*). A somewhat larger number of the more adaptable, and therefore, more widely distributed species also may be found in these habitats year-round or seasonally (Brown 1994).

Mohave Desert Scrub

Mohave Desert Scrub vegetation is located on 1,165,687 acres. The Mohave Desert Scrub vegetation mixture is intermediate between Great Basin Desert Scrub and Sonoran Desert Scrub. The characteristic shrubs include creosotebush, Joshua tree, all-scale, brittlebush, desert holly, white burrobrush, shadscale, blackbrush, and many more shrubs. Cacti are well represented and include Engelmann hedgehog, silver cholla, Mohave pricklypear, beavertail cactus, many-headed barrel cactus. Ephemeral plants, many of which are endemic (approximately 90 out of 250 species), are characteristic of Mohave Desert Scrub. These short-lived plants that complete their life cycle in one growing season are divided into two major groups: winter and summer annuals. The winter and summer annuals respond to winter and summer precipitation, respectively.

The Mohave Desert Scrub is a warmñtemperate desert with scanty precipitation that occurs mainly during winter months. Elevation for the Mohave Desert Scrub is broad in Arizona and ranges from below 980 ft to 4,000 ft. Precipitation is low with annual values ranging between 2 and 8 inches and occurs with a predominately winter and summer bi-modal pattern. Temperatures are relatively low in the winter and high in the summer. Temperatures can range from approximately 0 ∫C in the winter months to 40 ∫C in summer months. Dry lakes are common. Historic wildfire was probably not common in this vegetation community. **The Desired Future Conditions are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to non-hazardous levels.**

Mule deer (*Odocoileus* hemionus), desert bighorn sheep (*Ovis* Canadensis), javelina (*Tayassu* tajacu), mountain lion (*Felis* concolor), ringtail cat (*Bassariscus* astutes), bobcat (*Felis* rufus), and coyote (*Canis latrans*) are large mammals occupying this vegetation community, while smaller, less wide-ranging mammals abound, including Merriamís kangaroo rat (*D. merriami*), little pocket mouse (*Perognathus longimembris*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), desert woodrat (*Neotoma lepida*), southern grasshopper mouse (*Onychomys torridus*), long-tailed pocket mouse (*Perognathus formosus*), cactus mouse (*Peromyscus eremicus*), Harrisí antelope squirrel (*Ammospermophilus harrisii*) and canyon mouse (*Peromyscus crinitus*). Many of the bird and reptile species typical of this vegetation community are subspecies or subpopulations of species found in other desert vegetation communities in Arizona (Brown 1994). Bird species include black-tailed gnatcatcher (*Polioptila melanura*), great horned owl (*Bubo virginianus*), Phainipepla (*Phainopepla* nitens), black-throated sparrow (*Amphisipiza bilineata*), cactus wren (*Campylorhynchus brunneicapilus*), common raven (*Corvus corax*), rock wren (*Salpinctes obsoletus*), ash-throated flycatcher (*Myiarchus cinerascens*), loggerhead shrike (*Lanius ludovicianus*), mourning dove (*Zenaida macroura*), red-tailed hawk (*Buteo jamaicensis*), house finch (*Carpodaucus mexicanus*), and Gambelís quail (*Lophortyx gambelii*). Reptiles include desert spiny lizard (*Sceloporus magister*), Mojave desert tortoise (*Gopherus agassizii*), zebra-tailed lizard (*Callisaurus draconoides*), side-blotched lizard (*Uta stansburiana stejnegeri*), long-nosed leopard lizard (*Gambelia wislizenii*), Mojave rattlesnake (*Crotalus scutulatus scutulatus*), and coachwhip (*Masticophis flagellum*), Mojave fringe-toed lizard (*Uma scoparia*).

Great Basin Desert Scrub

Great Basin Desert Scrub vegetation occurs on 1,058,401 acres of BLM land in the Arizona Strip, Phoenix, Kingman, and Safford Field Offices. The Painted Desert is predominately Great Basin Desert

Scrub vegetation. It is associated with Upland Sonoran Desert Scrub and Great Basin Pinyon-Juniper Woodland vegetation. Species diversity is low with dominant shrubs occupying vast tracts of land. Characteristic vegetation is lowñgrowing, widely space hemispherical, non-sprouting shrubs with widely spaced bunchgrasses. Dominant shrubs include big sagebrush, black sagebrush, Bigelow sagebrush, shadscale, fourwing saltbush, rabbitbrush, winterfat, hopsage, horsebrush, blackbrush, and greasewood. Associated grasses may include blue gramma, galleta grass, Indian ricegrass, western wheatgrass, Junegrass, and several muhleys or dropseeds. Forbs include several gilia, buckwheat, penstemon, lupine, and globemallow species. Cacti number and species in Great Basin Desertscub are relatively few in comparison to those found in warm deserts. Cactus plants are small in stature or prostrate and include several species of prickly pear, hedge hog, and cholla. The mixtures of the different plants depend on soil, precipitation, temperature, and disturbance. Introduced weeds such as cheatgrass, medusahead, red brome, Russian thistle, halogeton, filaree, tumble mustard occur on disturbed sites. The introduced woody plants, Russian olive and saltcedar are commonly found present in riparian corridors. Historic fire intervals range between 5- 100 years depending on the shrub community type and fuel build-up (Paysen et al. 2000). Annual weeds such as cheatgrass and red brome have caused an increase in fire re-occurrence and fuel flammability. **The Desired Future Conditions are for fire to naturally reduce annual weed densities and cover, limit or reduce the invasion of juniper, and for the densities of shrubs, such as big sagebrush, to be maintained within their historic range of variability.**

The Great Basin Desert Scrub is part of the Great Basin Desert which is a cold desert characterized by cold, harsh winters, hot summers, and low precipitation. Elevation ranges between 3,930 and 7,220 ft. Average annual precipitation is approximately less than 10 inches with the majority occurring during the winter months as snow. Maximum daily temperature values may remain below freezing during many days of December, January and Februaryó the three coldest months of the year. For much of the area, increasing spring and summer temperatures coincide with decreasing soil water supplies which limits plant growth.

A distinct fauna is centered in this vegetation community. Mule deer (*Odocoileus* hemionus), bighorn sheep (*Ovis canadensisi),* Townsendís ground squirrel (*Spermophilus townsendi*), badger (*Taxidea* taxus), long-tailed pocket mouse (*Perognathus* formosus), and northern grasshopper mouse (*Onychomys* leucogaster) are associated with sagebrush communities of the Great Basin Desert Scrub. Large ungulates are poorly represented here, however several birds such as the golden eagle (*Aquila* chrysaeos), burrowing owl (*Athene* cunicularia), Sage thrasher (*Oreoscoptes montanus*), Sage sparrow (*Amphispiza belli*, Vesper sparrow (*Pooecetes gramineus*), common raven (*Corvus corax*), rock wren (*Salpinctes obsoletus*), horned lark (*Erempphila alpestris*), Sayís phoebe (*Sayornis saya*), western meadowlark (*Sturnella neglecta*), and Brewerís sparrow (*Spizella breweri*) are characteristic of sagebrush communities. The Sagebrush lizard (*Sceloporus graciosus*) and Great Basin spadefoot toad (S*cophiopus intermontanus*) are common representative species. A number of reptilian subspecies such as Desert horned lizard (*Phrynosomo platyrhihnos platyrhinos*), and Great Basin and Plateau tiger whiptails (*Cnemidophorus tigris tigris and C. Tigris septentrionalis*) are indicative of Great Basin Desert Scrub and a history of evolutionary separation (Brown 1994).

Plains and Great Basin Grassland

The Plains and Great Basin Grassland vegetation occupies 747,509 acres of BLM lands and is located on scattered, small land parcels on BLM land mainly in eastern Arizona. This grassland vegetation is associated with Great Basin Pinyon-Juniper Woodland vegetation at higher elevations and with Semi-Desert Grasslands or Great Basin Desert Scrub at lower elevations. The plains grasses are representative of the tall, medium, and short prairies of the central plains region. The Great Basin grasses are the southern extension from the Great Basin. These grasslands are much altered now but once were a continuous cover dominated by various grass species and interspersed with shrubs and forbs. Grazing and other agricultural practices have greatly influenced the cover and composition of these grasslands. Fire

with moderate return intervals was important in the ecology of these grasslands (Paysen et al. 2000). However, grazing and fire suppression has altered the historic natural fire regime. **The Desired Future Conditions are for a predominance of perennial grass cover, reduced cover of annual grasses, and for fire to naturally inhibit the invasion of woody shrubs such as rabbitbrush, snakeweed, and big sagebrush.**

The Plains Grassland vegetation can be divided into tall, medium, and short grassland fractions depending on general grass height. Tall grasses occur on sandhills and are dominated by big bluestem and little bluestem, and Indiangrass, switchgrass, western wheatgrass, needle-and-thread grass, galleta, and sand dropseed. Shinnery oak and midget oak are common shrubs. The short grass areas are dominated by blue grama, Indian ricegrass, galleta grass, prairie Junegrass, plains lovegrass, and alkali sacaton. Associated shrubs in both the tall and short grass vegetation may include fourwing saltbush, big sagebrush, winterfat, soapweed, prairie sumac, rabbitbrush and snakeweed depending on the degree of past grazing and other disturbances. Associated forbs may include primrose, bahia, spiderflower, four-oíclock, gaura, mallow, coneflower, bricklebush, and aster. Associated cacti include plains prickleypear, hedgehogs, and pin cushion.

Plains and Great Basin grasslands are cold-temperate vegetation and vary in elevation between 4,920 and 7,545 ft. Precipitation within the plains grasslands occurs mainly during summer-month thunderstorms and averages between 12 and 18 inches. The Great Basin grasses occur on drier and colder sites than the Plains grasses. Average precipitation for the former ranges between 180ñ300 mm and occurs mainly during winter and spring months.

Grassland vegetation provides a beneficial food source for larger grazing mammals such as the Pronghorn (*Antilocapra Americana)* and Bison (*Bison bison*). Smaller burrowing mammals include Gunnisonís prairie dogs (*C. gunnisoni*), Plains pocket gopher (*Geomys bursarius*), striped skunk (*Mephitis mephitis*), and northern grasshopper mouse (*Onychomys leucogaster*). The open landscape of the grasslands provides suitable habitat for bird species such as western meadowlark (*Sturnella neglecta*) and eastern meadowlark (*Sturnella magna*) Prairie falcon (*Falco mexicanus*), Vesper sparrow *(Pooecetes gramineus*), western kingbird (*Tyrannus verticalis*), Swainsonís hawk (*Buteo swainsoni*), burrowing owl (*Athene cunicularia*), lark sparrow (*Chondestes grammacus*), common raven (*Corvs corax*), American kestrel (*Falco sparvericus*), horned lark (*Eremophila aepestris*), red-tailed hawk (*Buteo jamaicensis*), ash-throated flycatcher (*Myiarchus cinerascens*), rock wren (*Salpinctes obsoletus*), northern mockingbird (*Mimus polyglottos*), loggerhead shrike (*Lanius ludovicianus*), and black-throated sparrow (*Amphisipiza bilineata*). The burrows created by small mammals are often co-habited by reptiles such as the gophersnake (*Pituphis melanoleucus sayi*), coachwip (*Masticophis flagellum)*, Utah milksnake (*Lampropeltis triangulum taylori*), and western rattlesnake (*Crotalus viridis*) (Brown 1994).

Semidesert Grassland

The Semidesert Grassland is located on 757,668 acres of BLM land mainly in east-central and southeast Arizona. This vegetation type is associated with Plains and Great Basin grassland, Madrean Evergreen Woodland, and Chihuahuan Desert Scrub. Originally the grasses were perennial bunchgrasses but grazing has encouraged the increased growth of sod grasses on areas with deep soil and heavy to moderate rainfall. The bunchgrasses have been replaced by annual grasses in areas with low precipitation. In some areas with deep soils and well protected from erosion bunchgrasses still cover large areas in association with a few shrubs and cacti. However, there are areas where grass cover has been reduced as a result of woody plant and cacti colonization. Fire with moderate return intervals was important in the ecology of these grasslands (Paysen et al. 2000). However, grazing and fire suppression has altered the historic natural fire regime. **The Desired Future Conditions are for perennial grasses to**

cover its historic range of variability, annual grass cover is reduced, and fire naturally inhibits the invasion of woody plants such as juniper, tarbush, whitethorn, and creosotebush.

Tobosa grass and black grama are the most dominant species in the Semidesert Grassland. Tobosa grass is generally found growing on heavy soils that are subject to flooding. Black grama is usually found of gravelly, upland soils. The other grasses are numerous and include black grama, sideoats grama, black grama, slender grama, chino grama, bush muhly, threeawn species, Arizona cottontop, vine grass, plains bristlegrass, plains lovegrass, wolftail, and little bluestem. Lehmann lovegrass was introduced for its forage value but has expanded at the expense of more palatable grass species. The assorted shrubs that are intermixed among the grasses include mesquite, one-seed juniper, lotebush, all-thorn, Mormon tea, false mesquite, catclaw acacia, desert hackberry, barberry, and ocotillo. Tarbush, whitethorn, and creosotebush have invaded extensive areas. Cacti and other succulents are important in this vegetation type and they include several yucca species, sotols, beargrass, several agrave species, barrel cactus, Turkís head, cane cholla, desert Christmas cholla, rainbow cactus, and several prickleypear and hedgehog species. The important forbs include mallow, lupine, buckwheat, filaree, spiderling, white-mat, amaranth, and devils claw. Invasive grasses include red brome, bristlegrass, foxtail barley, and wild oats which are increasing as a result of past grazing practices.

The Semidesert grassland is a warm temperate grassland ranging in elevation from 2,300-4,920 ft. Most of this grassland receives an annual precipitation between 8-12 inches with the majority coming during the spring and summer. Winters are mild and freezing temperatures occur generally less than 100 days during the year. Summers are warm with several days over 38 ∫C.

The Pronghorn antelope (*Antilocapra americana*) and White-tailed deer (*Odocoileus virginianus*) are the primary large grazing mammals associated with the Semidesert Grassland. The Javelina (*Dicotyles tajacu*), also known as the Collared peccary, can be found in the Semidesert Grassland. Small burrowing mammals are primarily represented by the Black-tailed jackrabbit (*Lepus californicus*) and various burrowing rodents, including the Spotted ground sqirrel (*Spermophilus spilosoma*), Hispid pocket mouse (*Perognathus hispidus*), antelope jack rabbit (*Lepus alleni*), and northern grasshopper mouse (*Onychomys leucogaster*). Numerous bird species include Swainsonís hawk (*Buteo swainsoni*), Mourning dove (*Zenaido mocroura*), greater roadrunner (*Geococcyc californianus*), Sayís phoebe (*Sayornis saya*) Cactus wren (*Campylorhynchus brunneicapillus*), Gambelís quail (*Lophortyx gambelii*), Black-throated sparrow (*Amphispiza bilineata*), Cassinís sparrow (*Aimophila cassinii*), Botteriís sparrow (*Aimophila botterri*), brown-headed cowbird (*Molothrus ater*), Chihushuan raven (*Corvus cryptoleucus*), scaled quail (*Callipepla squamata*), and burrowing owl (*Athene cunicularia*). The amphibian Woodhouseís toad (*Bufo woodhousii*) is found within this vegetation community. Reptiles include the Desert box turtle (*Terrapene ornate luteola*), Mexican (western) hognose snake (*Heterodon nasicus kennerlyi*), the all-female Desert-grassland whiptail (*Cnemidophorus uniparens*), and common earless lizard (*Holbrookia texana scitula*) (Brown 1994).

Interior Chaparral

Interior Chaparral vegetation represents 425,287 acres of BLM land mainly in western Arizona. It is associated with Upland Sonoran Desert Scrub, Lower Sonoran Desert Scrub, Mohave Desert Scrub, and Great Basin Pinyon-Juniper Woodland vegetation. The vegetation is dominated by shrubs with small, thick, evergreen leaves and wide-spreading, deep root systems. Historic fire was an important component of the ecosystem (Pase and Brown 1982a). As such, the shrubs are well adapted to fire and reproduce readily from heat-scarified seed that is stored in soil for decades. Some species readily sprout from root crowns after fire. The dense compacted leafy growth of the shrubs are naturally flammable which leads to a high fire hazard. The dominant plant is shrub live oak. Other shrubs are birchleaf mountain mahogany, skunkbush sumac, silktassel, desert ceanothus, hollyleaf buckthorn, cliffrose, desert olive, sophora, and

Arizona rosewood. Shrub cover is approximately 60ñ70% which allows grasses such as sideoats grama, hairy grama, cane bluestem, plains lovegrass, wolftail, and threeawn to grow in the inter-shrub spaces. Forbs are not common except after fire and include penstemon species, Wrightís verbena, goldenrod, purple nightshade, hoarhound, and scarlet morning glory. Occasionally, one-seed juniper, emory oak, or pinyon pine may occur. Weedy species include filaree and red brome which are increasing because of disturbances such as grazing and fire. **The Desired Future Conditions are that fire naturally maintains shrub cover while reducing annual grass cover, the invasion of woody plants such as juniper and piÒon pine are controlled, and the average age of chaparral stands is reduced through controlled fire or mechanical treatment.**

Interior Chaparral vegetation is considered a warm-temperate scrubland with elevations mainly between 3,445-6,070 ft but higher sites occur on drier and warmer slopes. The climate is characterized by cool, moist winters and hot, dry summers. The majority of precipitation occurs during winter months when plants are dormant or nearly so.

Small mammals associated with the Interior Chaparral include the Cliff chipmunk (*Eutamias dorsalis*), White-footed mouse (*Peromyscus leucopus*), White-throated woodrat (*Neotoma albiguld*), and eastern cottontail (*Sylviligus floridanus*). Nesting birds include the Spotted towhee (*Pipilo maculatus*), Virginiaís warbler (*Vermivora virginiae*), western scrub jay (*Aphelocoma californica*), Crissal thrasher (*Toxostoma dorsale*), black-chinned sparrow (*Spizella atrogularis*), rufous-crowned sparrow (*Aimophila ruficeps*), bushtit (*Psaltriparus minimus*), blue-gray gnatcatcher (*Polioptila caerulea*), Scottís oriole (*Icterus parisorum*), rock wren (*Salpinctes obsoletus*), and canyon wren (*Catherpes mexicanus*). Amphibians common to this vegetation community include Woodhouseís toad (*Bufo* woodhousii) and Arizona toad (*Bufo microscaphus*). Reptiles common to the Interior Chaparral include the Western threadsnake (*Leptotyphlops humilis*), Glossy snake (*Arizona elegans*), Smithís black-headed snake (*Tantilla hobartsmithi*), Western rattlesnake (*Crotalus viridis*), Western fance lizard (*S. occidentialis*), Arizona alligator lizard (*Gerrhonorus kingi*), and Sonora mountain kingsnake (*Lampropeltis pyromelana*) (Brown 1994).

Chihuahuan Desert Scrub

Chihuahuan Desert Scrub is part of the vast Chihuahuan Desert and grows on 447,398 acres of BLM land. This vegetation is associated with Semidesert Grassland and Upland Sonoran Desert Scrub vegetation on BLM land in southeast Arizona. Annual precipitation ranges between 8-12 inches with the majority received during the summer. Temperatures are hot in the summer and commonly over 40 ∫C and freezing temperatures occurring during winter months. Elevation varies between 2,300-4,900 ft.. The Chihuahuan Desert Scrub is shrub dominated but herbaceous and succulent plants are also an important part of its structure. The dominant shrubs are creosotebush, tarbush, and whitehorn acacia cover large expanses of outwash plains, low hills, and valleys. Saltbushes occur on fine textured soils and open stands of mesquite grow on sandy, wind eroded hummocks. Secondary important plants are mariola, guayule, goldeneye, desert zinnias, dogweeds, Condalia species, lechuguilla, ocotillo, and ratany. On the upslopes, succulents such as several agrave and yucca species are present along with ocotillo, Coldenia species, catclaw, fourwing saltbush, cenizo, condalia, and many more species. Cacti are low growing, prostrate, clumped and they include several cholla, prickle pear, hedgehog, Turkís head, pin cushion, and fishhook species. Semidesert grasses occur within this desert scrub with importance increasing near their common boundary. Fire is not common in this vegetation community. **The Desired Future Conditions are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to non-hazardous levels.**

Southern grasshopper mouse (*Onychomys torridus*), white-throated woodrat (*Neotoma albigula*), silky pocket nouse (*Perognathus flavus*), chisel-tooth kangaroo rat (*Dipodomys microps*), antelope jack rabbit *Lepus alleni*), yellow-nosed cotton rat (*Sigmodon ochrognathus*), and Ordís and Merriamís kangaroo rats (*Dipodomys ordii* and *D. merriami*) dominate the mammal populations of the Chihuahuan Desert Scrub. Scaled quail (*Callipepla squamata*), Chihuahuan raven (*Corvus cryptoleucus*), pyrrhuloxia (*Cardinallis sinuatus*), Swainsonís hawk (*Buteo swainsoni*), scaled quail (*Callipepla squamata*), black-throated sparrow (*Amphisipiza bilineata*), common poorwill (*Phalaenoptilus nnuttallii*), red-tailed hawk (*Buteo jamaicensis*), Verdin (*Auripasus flaviceps*), cactus wren (*Campylorchynchus brunneicapilus*), lesser nighthawk (*Chordeiles acutipenisi),* loggerhead shrike (*Lanius ludovicianus*), ash-throuated flycatcher (*Myiarchus cinerascens*), rock wren (*Salpinctes obsoletus*), and Gambelís quail (*Lophortyx gambelii*) are considered to be the characteristic bird species of the Chihuahuan Desert Scrub. Amphibians include Woodhouseís toad (*Bufo* woodhousii) and Plains spadefoot toad (*Spea* bombifrons). Reptiles include the exas Banded gecko (*Coleonyx brevis*), Greater earless lizard (*Cophosaurus texanus*), and Little striped and Marbled whiptails (*Cnemidophorus inornatus, C. tigris marmoratus*) (Brown 1994).

Riparian

Riparian vegetation is found on 176,927 acres of BLM land in association with streams and rivers. The area occupied by riparian vegetation is relatively small in relationship with other vegetation types but their biological and ecological importance is larger than their limited geographic occurrence. Riparian vegetation is important to wildlife as forage, cover, breeding, and migration corridors. Riparian corridors have been greatly disturbed by a variety of activity such as grazing, mining, tree harvesting, and stream flow alteration. **The Desired Future Conditions are that annual weed cover and density is controlled and ladder fuels and downed woody debris are limited or not present. Disturbances such as livestock grazing, mining, and off road vehicle travel, that can potentially reduce natural vegetation cover and vigor, are managed to maintain adequate cover and mix of natural plant species.**

The nature and species composition of the riparian vegetation changes depending on elevation and associated upland vegetation community. For example, at high elevation stream gradients are steep with relatively high precipitation and cool temperatures, while at low elevations stream gradients are gentle, low precipitation, and warm temperatures. At the higher elevations Pacific willow, bigtooth maple, narrowleaf cottonwood, box elder, black cherry, sycamore, Arizona walnut, velvet ash and western soapberry and red willow are the woody plants. At lower elevations mesquite, Gooddings willow, netleaf hackberry, western soapberry, velvet ash, Wrightís Sycamore, and black cherry characterize riparian vegetation. Russian olive and saltcedar are two invasive woody plants that have colonized large expanses of low- to mid-elevation riparian corridors.

Large mammals characteristic of riparian woodlands include White-tailed deer and Black bear (*Ursus americanus*). Small rodents include Arizona gray squirrel (*Sciurus arizonesis*). The River otter (*Lutra canadensis*) is a rare species found in woodlands adjacent to streams. Small carinovres such as Ringtailed cat (*Bassaricus astutus*) and Skunk (*Mephitus spp, spilogale putorius*) are also found in woodlands containing streams. Red bats (*Lasiurus borealis*) are found in riparian woodlands. Riparian habitats typically host the greatest variety, and often numbers, of birds in Arizona, with many being riparian-obligate species. Examples of bird species inhabiting riparian woodlands include the Zone-tailed hawk (*buteo albonotatus*), Northern (Bullockís) oriole (*Icterus galbula*), Yellow-billed cuckoo (*Coccyzus americanus*), Black phoebe (*Sayornix nigricans*), the Federally endangered Southwestern willow flycatcher (*Empidonax traillii extimus*), brown-crested flycatcher (*Myiarchus tyrannulus*), yellow warbler (*Dendroica petechia*), Bellís vireo (*Vireo bellii*), Lucyís warbler (*Vermivora luciae*), black-chinned hummingbird (*Archilochus alexandri*), summer tanager (*Piranga rubrai), lesser goldfinch (*Carduelis psaltria*), yellow-breasted chat (*Icteria virensi), hooded oriole (*Icterus curullatus*), Abertís towhee (*Pipilo aberti*), western screech-owl (*Otus asio*), ash-throated flycatcher (*Myiarchus cinerascnes*), Gambelís

quail (*Lophortyx gambellii*), Costaís hummingbird (*Calypte costae*), and Pyrrhuloxia (*Cardinalis sinuatus*). Arizona treefrog (*H. Wringtorum*), canyon treefrog (*Hyla arenicolor*), Woodhouseís toad (*Bufo woodhousii*), tiger salamander (*Ambystoma tigrinumi),* and leopard frogs (*Rana* spp.) are found more in interior forest. Ringnecked snake (*Diadophis punctatus*), black-necked gartersanke (*Thamnophis cyrtopsis cyrtopsis*), Mexican gartersnake (*Thamnophis eques megalops*), Checkered gartersnake (*Thamnophis marcianus marcianus*), narrow-headed gartersnake (*Thamnophis rufipunctatus*), Arizona mud turtle (*Kinosternon*), yellow mud turtle (*Kinosternon*),and Sonora mud turtle (*Kinosternon sonoriensei*) are often found in riparian woodlands.

Cotton rat (*Sigmodon hispidis*), White-footed mouse (*peromyscus leucopus*), Desert pocket mouse (*Perognathus penicillatus*), and Arizona shrew (*Sorix arizonae*) are commonly found in the Riparian Scrub, as well as in other communities. Phainopepla (*Phainopepla* nitens), Crissal thrasher (*Toxostoma dorsale*), Verdin (*Auriparus flaviceps*) and Black-tailed gnatcatcher (*Polioptila melanura*) are representative of nesting birds. Red-spotted toad (*Bufo punctatus*), though found in various communities, is quite common to the Riparian Scrub.

Madrean Evergreen Woodland

The Madrean Evergreen Woodland is a warmñtemperate forest located on 67,731 acres of BLM land in the southeast and westñcentral Arizona. This vegetation type is associated with Semidesert grassland and interior chaparral at low elevations and Montane Conifer Forests at high elevations. Elevations range from 3,940 to 7,220 ft. Annual precipitation usually exceeds 15 inches with over half received during the growing season. The climate of the Madrean Evergreen Woodland is favorable and thus has supported human habitation for hundreds of years. Trees at lower elevations include Emory oak, Arizona white oak, alligator bark juniper, one-seeded juniper, and Mexican Pinyon. At the higher elevations Apache pine, Arizona pine, pino triste, and Durango pine become prevalent along with the oaks. The important grasses are several muhly species, cane bluestem, little bluestem, plains lovegrass, blue grama, sideoats grama, hairy grama, tanglehead, and green sprangletop. Forbs include penstemon, lupine, bricklebushe, sage species and many other species. The shrubs are indigobushes, buckwheats, roseñmallows, and Louisiana sage. Cacti and succulents include many species that are found in the Semidesert Grassland. **The Desired Future Conditions are that annual weeds such as red brome and buffle grass are controlled, ladder fuels and downed woody debris are limited or not present, a high percent of large trees are maintained, and tree stand vigor is maintained through controlled fire and mechanical treatments.**

White-tailed deer (*Odocoileus virginianus*) is a common game species found in the Madrean Evergreen Woodland. Common small mammals include Southern pocket gopher (*Thomomys umbrinus*), Mexican fox squirrel (*Sciurus nayaritensis*), and Eastern cottontail (*Sylvilagus floridanus*). A number of bird species are characterisic of this community, including include Montezuma quail (*Cyrtonyx montezumae*), Acorn woodpecker (*Melanerpes formicivorus*), Mexican jay (*Aphelocoma ultramarina*), Bridled titmouse (*Parus wollweberi*), Bushtit (*Psaltriparus minimus*), Huttonís vireo (*Vireo huttoni*), Black-throated gray warbler (*Dendroica nigrescens*), black-headed grosbeak (*Pheucticus melanocephalus*), hepatic tanager (*Piranga flavai*), red-shafted flicker (*Colaptes cafer*), Stellarís jay (*Cyanocitta stelleri*), dusky-capped flycatcher (*Myiarchus tuberculifer*), Virginiaís warbler (*Vermivora virginiae*), and whiskered screech-owl (*Otus trichopsis*). The elegant trogon (*Trogon elegans*) is uncommon but typoicaly found in this habitat adjacent to sycamore drainages. The Madrean Evergreen Woodland also has a variety of reptilian species, including Rock rattlesnake (*Crotalus lepidus*), Ridgenose rattlesnake (*C. willardi*), Mountain skink (*Eumeces callicephalus*), Sonoran mountain kingsnake (*Lampropeltis pyromelana*), Clarkís spiny lizard (*Sceloporus clarki*), and Chihuahuan blackhead snake (*Tantilla wilcoxi wilcoxi*), black-tailed rattlesnake (*Crotalus molossus molossus*), and Yarrowís spiny lizard (*Sceloporus jarrovii jarrovii*) (Brown 1994).

Montane Conifer Forest

The Montane Conifer Forest is a cold-temperate forest occurring on 19,067 acres of BLM lands at an elevation range of 6,560-9,840 ft on mountain slopes and ridge tops. Mean annual precipitation ranges from 18 to 30 inches with more than 50% being received during the growing season. Snow is common during the winter. Ponderosa pine forest is located at the lower elevations and Douglas-fir, white pine, limber pine, and aspen grow at the higher elevations in canyons and north-facing slopes. At it lower limit, this vegetation is associated with Madrean Evergreen Woodland and Great Basin Pinyon-Juniper Woodland vegetation. Ponderosa pine is the most common forest-type on BLM land. Old-growth ponderosa pine forests are often park-like with scattered large, old trees and occasional clumps of younger trees. The understory is mostly grass, forbs, and a few shrubs. Frequent light fires probably kept the forests in this park-like structure as the older trees were relatively fire resistant. The fires would burn every three to five years and remove the herbaceous understory and younger trees (Pase and Brown 1982b). Crown cover of these forests was approximately 50ñ70%. With the absence of fire, many ponderosa pine stands are composed of multi-aged trees with the young trees growing in ìdog-hair thicketsî. **The Desired Future Conditions are that ìdog-hair thicketsî are controlled, ladder fuels and downed woody debris are limited or not present, a high percent of large trees are maintained, and tree stand vigor is maintained through controlled fire and mechanical treatments.**

Mule deer (*Odocoileus hemionus*), White-tailed deer (*O. virginianus*), and Rocky Mountain elk (*Cervus elaphus*) are the primary large mammals in the Montane Conifer Forest. Bats, such as Southwestern myotis (*Myotis auriculus*), Long-eared myotis (*M. evotus*), Big brown bat (*Eptesicus fuscus*), are common. Small mammals characteristic of this forest community include Merriam shrew (*Sorex merriami*), Nuttallís cottontail (*Sylvilagus nuttalli*), Abertís tassel-eared squirrel (*Sciurus aberti*), Porcupine (*Erethizon dorsatum*), and Deer mouse (*Peromyscus maniculatus*). The large number of bird species includes northern goshawk (*Accipiter gentiles*), Flammulated owl (*Otus flammeolus*), Broad-tailed hummingbird (*Selasphorus platycercus*), Cordilleran flycatcher (*Empidonax difficilis*), Stellerís jay (*Cyanocitta stelleri*), Brown creeper (*Certhis familiaris*), Western bluebird (*Sialia mexicana*), Plumbeous vireo (*Vireo solitarius*), Yellow-rumped warbler (*Dendroica coronata*), hermit thrush (*Catharus guttatus*), red-breasted nuthatch (*Sitta canadensisi*), brown creeper (*Certhia Americana*), broad-tailed hummingbird (*Selasphorus platycercus*), red-faced warbler (*Cardellina rubrifrons*), hairy woodpecker (*Piranga ludoviciana*), mountain chickadee (*Poecile gambeli*), red-shafted flicker (*Colaptes rafer*), American robin (*Turdus migratorius*), band-tailed pigeon (*Columba fasciata*), dark-eyed junco (*Junco hyemalis*), Mexican spotted owl (*Strix occidentalis lucida*), olive-sided flycatcher (*Contopus cooperi*), and Pine siskin (*Carduelis pinus*). Characteristic lizards include Arizona alligator lizard (*Gerrhonotus kingi*), Gopher snake (*Pituophis melanoleucus*), Western rattlesnake (*Crotalus viridis*), Great Plains skink (*Eumeces obsoletusi),* and Wandering gartersnake *(Thamnophis elegans vagrans*) (Brown 1994).

Game Species and Furbearers

Table C-1 lists Big game species and their habitats occurring on BLM-administered lands in Arizona, while Table C-2 lists small game, predator, and furbearing species and their habitats occurring on BLM-administered lands in Arizona.

Sportfish

Common sportfish in Arizona include Apache trout (*Oncorhynchus gilae apache),* cutthroat trout (*O. clark),* rainbow trout (*O. mykiss),* brook trout (*Salvelinus fontinalis),* brown trout (*Salmo trutta),* smallmouth bass (*Micropterus dolomieui),* largemouth bass (*M. salmoides),* striped bass (*Morone saxatilis),* white bass (*M. chrysops*), yellow bass (*M. mississippiensis),* arctic grayling (*Thymallus arcticus),* desert sucker (*Catostomus insignis),* bigmouth buffalo (*Ictiobus cyprinellus),* flathead catfish

(*Pylodictis olivaris),* channel catfish (*Ictalurus punctatus),* tilapia (*Tilapia nilotica),* black bullhead (*Ameiurus melas),* yellow bullhead (*A. natalis),* bluegill (*Lepomis macrochirus),* green sunfish (*L. cyanellus),* redear sunfish (*L. microlophus),* walleye (*Stizostedion vitreum),* black crappie (*Pomoxis nigromaculatus),* white crappie (*P. annularis),* northern pike (*Esox lucius),* roundtail chub (*Gila robusta*), and yellow perch (*Perca flavescens).*

Table C1 - Big Game species and their habitats occurring on BLM-administered lands in Arizona

Species	Vegetation Community	General Habitat Description	Arizona BLM Field Offices(s)
Mammals			
Bighorn Sheep	Sonoran Desert Scrub, Mohave Desert Scrub, Great Basin Desert Scrub (rarely)	Historically, desert bighorn occurred on all mountain ranges and plateau slopes in the southern, northern, and western sections of Arizona. Desert Bighornís occur from 90 to 4,500 feet elevation, found on desert mountain ledges and grassy basins of southern and western AZ. The breeding season extends from early June through October, but the peak rutting activity takes place in August. The gestation period is about six months, and most lambs are born in late winter or early spring. Native grasses are important in the bighornís diet, although the animals also feed heavily on jojoba and other woody plants. Pincushion, barrel, and saguaro cactuses provide moisture. Preferred plants vary with habitat quality, locality, and species availability.	
Desert Bighorn Sheep *Ovis canadensis mexicana*	Sonoran Desert Scrub	Found in southern portions of Arizona.	Phoenix Tucson Yuma Lake Havasu
Desert Bighorn Sheep *Ovis canadensis nelsoni*	Mohave Desert Scrub	Found in northeastern portions of Arizona	Arizona Strip Kingman Phoenix Lake Havasu
Rocky Mountain Bighorn Sheep *Ovis canadensis*	Great Basin Desert Scrub	Found predominantly on Forest Service lands in high elevation, eastern portions of Arizona. Future reintroductions are being considered (AGFD Strategic Plan) to expand the current range of Rocky Mountain Bighornís.	Safford
Collared Peccary *Pecari tajacu*	Sonoran Desert Scrub (AZ Upland subdivision), Semi-desert Grasslands	The collared peccary, or javelina, is of tropical origin, and is thought to have expanded northward as scrub and cactus have replaced Arizonaís native grasslands. Javelina are opportunistic feeders, eating flowers, fruits, nuts, and berries of a great variety of plants. Prickly pear cactus makes up the major portion of their diet however, along with agaves, yucca roots, and other desert succulents.	Arizona Strip Kingman Safford Tucson Phoenix Lake Havasu Yuma

Species	Vegetation Community	General Habitat Description	Arizona BLM Field Offices(s)
Rocky Mountain Elk *Cervus elaphus nelsoni*	Montane Conifer Forest; Great Basin Pinyon-Juniper Woodlands (winter)	Native elk, eliminated sometime prior to 1900, were reintroduced back into Arizona in the 1920ís. Mountain meadows, ponderosa pine woodlands, spruce-fir forests, and other high-elevation habitats between 7,000 and 10,500 feel elevation constitute the elkís principal summer range. Elk are rarely found more than one-half mile from water and tend to stay on the summer range as long as possible, arriving early in the year and remaining until forced down by deep snow. Their winter range, which is usually between 5,500 and 6,500 feel elevation, is more limited in extent and may only comprise about 10 percent of the animalís total habitat. Calves are born between late May and early June after an 8-month gestation period. Elk are grass feeding animals.	Arizona Strip Tucson Phoenix
Mule Deer *Odocoileus hemionus*	AZ Upland Sonoran Desert Scrub, Semi-desert Grassland, Interior Chaparral, Montane Conifer Forest, Mohave Desert Scrub edges, Great Basin Pinyon-Juniper Woodlands (winter)	Mule deer are the most abundant big-game animal in AZ. They can be found in most areas of the state, from sparsely vegetated deserts upward into high, forested mountains. Mule deer are primarily browsers, although they feed largely on forbs and new grass growth in the spring and summer. Other major diet items are twigs, bark, buds, and oak in northern AZ, with jojoba, buck brush, and mountain mahogany being favored in southern AZ.	Arizona Strip Kingman Safford Tucson Phoenix Lake Havasu Yuma
White-tailed Deer *Odocoileus virginianus*	Madrean Evergreen woodland, Montane conifer Forest, Riparian	White-tailed deer are most common in the stateís southeastern mountains, but range northward to the edge of the Mogollon Rim and up into the White Mountains. Whitetails require areas of predictable summer precipitation and are most common in oak woodlands and on chaparral covered hillsides with oaks and pines.	Safford Tucson Phoenix Lake Havasu Yuma
Pronghorn Antelope *Antilocapra americana*	Plains & Great Basin Grasslands, Lower Colorado River Valley subdivision of Sonoran Desert Scrub, Mohave Desert Scrub edges, Great Basin Desert Scrub ñ grassland edge	Pronghorn antelope are native to the prairies of North America. In Arizona, antelope persist primarily in the northern plains, inhabiting high elevation meadows between forested areas. Scattered herds are also found in the grasslands of central and southeastern Arizona. Antelope breed in August and September, and the young are born in May and June. Fawns remain hidden until they are about two to three weeks old and strong enough to travel with adults.	Arizona Strip Kingman Safford Phoenix Lake Havasu
Black Bear *Ursus Americanus*	Various (Riparian, Interior Chaparral, Madrean Evergreen Woodland, Montane Conifer Forest)	Black bears in AZ are found in a variety of habitats, including subalpine and montane conifer forests, riparian forests, evergreen woodlands, and chaparral. Cubs are born in winter dens during January. Most Arizona bears hibernate from November through March.	Arizona Strip Safford Tucson Phoenix

Species	Vegetation Community	General Habitat Description	Arizona BLM Field Offices(s)
Mountain Lion *Puma concolor*	Various (AZ Upland Sonoran Desert Scrub, Great Basin Pinyon-Juniper Woodlands, Interior chaparral, Madrean Evergreen Woodland, Montane Conifer forest)	In AZ, mountain lions are absent only from the extremely arid southwest and those areas heavily impacted by human development. In general, the distribution of mountain lions in the state corresponds with the distribution of the animalís major prey species ñ the mule and white-tailed deer.	Arizona Strip Safford Tucson Phoenix Lake Havasu Yuma
Birds			
Gouldís Turkey *Meleagris gallopavo mexicana*	Montane Conifer Forest, Riparian	Gouldís turkeys have been transplanted and occur currently in low numbers in the Galiuro Mountains, and from recent releases in the Chiricahua Mountains. Gouldís turkeys in the Huachuca Mountains are hunted on a very limited basis. They occasionally are found along the San Pedro River, as they are well adapted to mature cottonwood riparian habitats.	Tucson Safford
Merriamís Turkey *Meleagris gallopavo merriami*	Montane Conifer Forest, Riparian	The Merriamís race of wild turkey is found in ponderosa pine forests and in riparian deciduous forests and other vegetation types at elevations ranging from 3,500 to 10,000 feet. During the winter, turkeys congregate in the pinyon pine-oak habitats just below the interface with the ponderosa pine forest. During the summer months, hens and poults spend much of their time searching for bugs and seeds in small meadows and forest openings. As winter approaches, the turkeys feed increasingly on acorns, pinyon nuts, and other mast crops. Later, with the onset on winter, the birds follow pine stringers downslope to snow-free areas where they feed on the seeds of ponderosa pine juniper, pinyons, and other plants	Arizona Strip Safford Tucson Phoenix Lake Havasu Yuma

Table C2. Small game, predator, and furbearing species and their habitats occurring on BLM-administered lands in Arizona.

Species	General Habitat Description
Small Game Mammals	
Tree Squirrels	No fewer than four species and eight subspecies of tree squirrels can be found in Arizonaís forests. Throughout the summer, squirrels feed on the seeds of developing cones as well as on underground fungi or truffles that grow under mature pine trees. These foods are the most nutritious for the squirrel, and only when they are exhausted does the animal resort to feeding on the inner bark of pine twigs.
Abertís (Tassel-Eared) Squirrel *Sciurus aberti*	Most widespread. Exclusively inhabitants of ponderosa pine forests. Close relatives include the black-bellied and white-tailed Kaibab squirrels.
Kaibab Squirrel *Sciurus aberti kaibabensis*	Kaibab Squirrels are a subspecies of tassel-eared squirrels. Exclusively inhabits ponderosa pine forests of northwestern Arizona.
Abertís Chuska Squirrel *Sciurus aberti chuscensis*	Chuska squirrels are a subspecies of tassel-eared squirrels. Found in isolated populations in extreme northeastern Arizona on Navajo Reservation.
Arizona Gray Squirrel *Sciurus arizonensis*	Inhabits riparian deciduous forests and oak woodlands south of the Mogollon Rim.
Chiricahua Fox Squirrel *Sciurus nayaritensis chiricahuae*	Inhabits riparian deciduous forests and oak woodlands south of the Mogollon Rim.
Red (Chicaree) Squirrel *Tamiasciurus hudsonicus*	Restricted to the higher forests of spruce and fire above 8,500 feet elevation.
Cottontails	Although able to breed most of the year, most young are produced in spring when the new growth of plants is most available. At other times of the year, selected foods include twigs, newly emerging grasses, weeds, and even cacti.
Desert Cottontail *Sylvilagus audubonii*	Most abundant, the desert cottontail is found in every county in the state up to elevations exceeding 7,000 feet.
Eastern Cottontail *Sylvilagus floridanus*	Found in the mountains of southeastern and central Arizona where it occupies may of the same habitats as the white-tailed deer.
Mountain Cottontail *Sylvilagus nuttalli*	Largely restricted to elevations above 7,500 feet from the Mogollon Rim northward.
Small Game Birds	
Pigeons and Doves	
Band-Tailed Pigeon *Columba fasciata*	Bandtails are birds of the mountains and usually nest in mixed conifer forests, ponderosa pine forests, or in dense stands of evergreen oaks and pines between 4,500 and 9,100 feel elevation. As migratory birds, bandtails are usually only present in AZ from late March through mid-October. After feeding on acorns and other fall mast crops, most AZ bandtails migrate southward to the Sierra Madre Occidental in Mexico.

Species	General Habitat Description
Mourning Dove *Zenaida macroura*	This is the most common and widely occurring game bird in AZ. Mourning doves occur from the lowest elevations along the Colorado River upward through forests of ponderosa pines to 8,500 feet. Their staple foods throughout the year are primarily small seeds and cultivated grains. Although some doves can be found nesting on the ground in open prairies, the best nesting habitats are brushlands and woodlands within the Sonoran Desert.
White-winged Dove *Zenaida asiatica*	There are two types of white-winged dove populations in AZ, a thinly scattered population found throughout the Sonoran Desert and the surrounding countryside, and colonial populations that nest collectively along river bottoms adjacent to agricultural areas. Feeding sites are often composed of standing crops of barley, maize, and safflower.
Quail	
Scaled Quail *Callipepla squamata*	Occurs in semidesert grasslands and the Chihuahuan desert preferring open plains and foothills. Breeding occurs in spring after wet winters, but also during the summer months after the monsoons.
Gambelís Quail *Callipepla gambelii*	Found throughout the Sonoran and Mojave deserts upward in elevation through semidesert grassland and chaparral to the edges of pinyon-juniper woodland and pine forest ñ wherever mesquites and other brushy cover occur. Breed only in spring and early summer, breeding intensity and success are directly related to the amount of rainfall received during the previous October through March.
(Mearnís) Montezuma Quail *Cyrtonyx montezumae*	Prefers oak woodlands and oak savannas in the southeastern potions of the state where grass cover is abundant enough to conceal its presence. Nest only after the summer monsoon season, often postponing breeding until after the summer solstice when the days are getting shorter.
California Quail *Callipepla californicus*	Introduced into Arizona in the 1960ís. Range is small, generally found in higher elevations, in eastern portions of Arizona.
Other Upland Game Birds	
Chukar *Alectoris chukar*	Chukar were introduced into Arizona in the 1940ís and 1970ís, and originated from Turkish stock. Chukar are cheatgrass obligates, and currently only persist on game farms and on the Arizona Strip (although are occasionally found in other parts of the state). Recent fires on the Arizona Strip have expanded cheat grass, causing an upswing in chukar populations.
Sandhill Crane *Crus canadensis*	Portions of three distinct populations of sandhill cranes winter in AZ. Cranes from both the Rocky Mountain and Mid-Continent populations winter in the Sulphur Springs and Gila River valleys in southeastern Arizona. Other sandhills from the Lower Colorado River Valley population winter along the lower Colorado River, primarily on the Colorado River Indian Reservation, Cibola National Wildlife Refuge, and Below Gillespie Dam on the Gila River. Wintering areas feature shallow-water roosting sites with low or sparse vegetation including playa lakes and sandbars along shallow, braided river channels. Another requirement is the close proximity of harvested fields of grain. Migration to wintering areas begins in September, with cranes arriving on their wintering areas between late September and mid-October.

Species	General Habitat Description
Ring-Necked Pheasant *Phasianus colchicus*	Pheasant populations persisting in AZ are largely confined to agricultural areas having relatively high humidity (Yuma and Mesa areas) or high enough in elevation to escape the desiccating heat of Sonoran Desert Summers (Virgin River and Verde River valleys). Most hens nest by mid-May. Pheasants roost on the ground or the low branches of trees. Primary foods are cultivated greens and grains ñ alfalfa, barley sprouts, and kernels of maize, barley, and corn.
Blue Grouse *Dendragapus obscurus*	Blue grouse in AZ do not migrate downhill during the winter months as they do in the more northern states. Instead, they spend the winter roosting in Douglas fir trees, subsisting on needles until spring. The peak of mating activity usually takes place during the last part of May or the first week of June. In fall, hens and poults feed at the edge of mountain meadows and in old burns on forbs.
Waterfowl	Arizonaís waterfowl can be grouped into two general classes ñ ducks, geese, and coots that nest in the state; and those that merely winter here or migrate through. Arizonaís principal waterfowl nesting grounds are the natural and modified marshes found above the Mogollon Rim and in the White Mountains. Most of these marshlands depend on winter precipitation and snowmelt rather than groundwater, and are generally seasonal, and are mostly located 7,000 feet elevation. Farm ponds and other small wetlands in the southeastern part of the state are also inhabited by species of Mexican ducks. The principal duck species nesting in AZ are mallards (especially in the White Mountains), pintails, cinnamon teal, redheads, and ruddy ducks. Additionally, smaller numbers of gadwall, green-winged teal, blue-winged teal, and ring-necked ducks are also found in northern marshes. Less common are canvasbacks, shovelers, and American widgeons.
Predators	
Bobcat *Felis rufus*	Found throughout the state in broken and brushy country. Their principal prey is cottontail rabbits and jackrabbits, but they also take both smaller and larger mammals, as well as snakes and lizards. The bobcat is also classified as a furbearer.
Coyote *Canis latrans*	Coyotes are widespread opportunists, feeding mainly on small mammals, but also on carrion, bird eggs, insects, and vegetable matter such as manzanita and juniper berries.
FOXES	
Common Gray Fox *Urocyon cinereoargenteus*	Most common fox in AZ, occurring wherever there is wooded country and broken terrain. Favor brushy habitats, rock piles and desert washes, although they also will climb trees.
Red Fox *Vulpes vulpes*	Uncommon in AZ, occurring only in the northeast potions of the state.
Kit Fox *Vulpes macrotis*	Found in valleys and on sandy plains it the southwestern deserts, spending much of their day underground.
SKUNKS	All skunks are generally omnivores, feeding on grasshoppers, worms, mice, lizards, bulbs, carrion, and garbage.
Hog-Nosed Skunk *Conepatus leuconotus leuconotus*	Occurs primarily in southeastern AZ. Breeds in late winter and produces young in April or May.
Hooded Skunk *Mephitis macroura*	Generally confined to southeastern Arizona. Breeds in late winter and produces young in April or May.

Species	General Habitat Description
Striped Skunk *Mephitis mephitis*	Most common in AZ, with a widespread distribution, living everywhere but the most extreme deserts, and are often found near water. Breeds in late winter and produces young in April or May.
Western Spotted Skunk *Spilogale gracilis*	Mostly occurs in rocky, mountainous areas. Breeds in late September or early October.
Furbearers	
American Badger *Taxidea taxus*	Widely distributed, the badger occurs almost anywhere in AZ having ground suitable to dig and excavate cavities. Badgers feed primarily on burrowing rodents such as prairie dogs and ground squirrels, but also will take snakes, lizards, and insects on occasion. Breeding season is in summer, with young not being born until the following spring.
American Beaver *Castor canadensis*	Beavers, at one time found nearly everywhere in AZ, now occur only along some permanent streams, certain shallow lakes, and a few dirt-lined canals. Diet is almost exclusively plant material with the bark of cottonwoods, aspen, and willow trees being especially important. Other reported foods include tamarisk, mesquite, and the roots of aquatic plants such as cattail and bulrush.
Common Raccoon *Procyon lotor*	A relatively common animal along Arizonaís perennial streams, lakes, and reservoirs. Raccoons are omnivores, eating whatever food is available ñ aquatic insect larvae, beetle grubs, fish, frogs, crayfish, wild fruits, and carrion.
Long-Tailed Weasel *Mustela frenata*	There is only one species of weasel in Arizona, restricted to high elevation sites such as those on the Kaibab Plateau, Mogollon Rim, Chuska-Lukachukai Mountains, and southern Arizonaís sky islands. Predators, feeding on cottontails, rodents, birds, snakes, and lizards. Weasels breed in midsummer, with young not born until the following spring.
Muskrat *Ondatra Zibethica*	Muskrats can be found along most of Arizonaís perennial rivers and permanent marshes. Primarily a vegetarian, the muskrat feeds on aquatic grasses, pondweed, cattail roots, and the leaves of seep willows. Muskrats in AZ are reported to breed year round, but most of the young are born between March and October.
Ringtail *Bassariscus astutus*	Most common in the rocky regions of southern and western AZ with the Grand Canyon being especially favored. The only areas devoid of ringtails are flat, alluvial valleys, as the animal prefers boulder-strewn hillsides, canyons, rock-walled houses, and mine shafts. Diet consists of small mammals, birds, lizards, and insects, as plant fruits.
River Otter *Lontra canadensis*	Once found throughout the Salt, Verde, LCR, and probably also the Gila and Colorado River systems, this species is now confined to the Verde River and its major tributaries where it was reintroduced in the early 1980ís. Diet includes fish, water birds, turtles, eggs, and crayfish.

All habitat information for Tables D1 and D2 was summarized from:

Hunt Arizona 2002 Edition ñ Survey, Harvest and Hunt Data for Big and Small Game. Arizona Game and Fish Department.

Additional range information on Bighorn Sheep, Gouldís Turkey, Tassel-Eared Squirrels, Chukar, and California Quail was derived from pers.comms.:

Brian Wakeling, Big Game Specialist, Arizona Game and Fish Department

Mike Rabe, Small Game Specialist, Arizona Game and Fish Department

Appendix D ñ
Proposed Conservation Measures
for
Arizona BLM Statewide LUP Amendment and EA
for Fire, Fuels, and Air Quality Management

1.0 Conservation Measures for Fire Management Activities

1.1 Wildland Fire Suppression (FS)

The following Conservation Measures will be implemented during fire suppression operations unless firefighter or public safety, or the protection of property, improvements, or natural resources, render them infeasible during a particular operation. Each Conservation Measure has been given an alphanumerical designation for organizational purposes (*e.g.*, FS-1). Necessary modifications of the Conservation Measures or impacts to Federally protected species and habitat during fire suppression operations will be documented by the Resource Advisor, and coordinated with the USFWS.

FS-1 Protect known locations of habitat occupied by Federally listed species. Minimum Impact Suppression Tactics (M.I.S.T.) will be followed in all areas with known Federally protected species or habitat [Appendix U, *Interagency Standards for Fire and Aviation Operations 2003*, or updates].

FS-2 Resource Advisors will be designated to coordinate natural resource concerns, including Federally protected species. They will also serve as a field contact representative (FCR) responsible for coordination with the USFWS. Duties will include identifying protective measures endorsed by the Field Office Manager, and delivering these measures to the Incident Commander; surveying prospective campsites, aircraft landing and fueling sites; and performing other duties necessary to ensure adverse effects to Federally protected species and their habitats are minimized. On-the-ground monitors will be designated and used when fire suppression activities occur within identified occupied or suitable habitat for Federally protected species.

FS-3 All personnel on the fire (firefighters and support personnel) will be briefed and educated by Resource Advisors or designated supervisors about listed species and the importance of minimizing impacts to individuals and their habitats. All personnel will be informed of the conservation measures designed to minimize or eliminate take of the species present. This information is best identified in the incident objectives.

FS-4 Permanent road construction will not be permitted during fire suppression activities in habitat occupied by Federally protected species. Construction of temporary roads is approved only if necessary for safety or the protection of property or resources, including Federally protected species habitat. Temporary road construction should be coordinated with the USFWS, through the Resource Advisor.

FS-5 Crew camps, equipment staging areas, and aircraft landing and fueling areas should be located outside of listed species habitats, and preferably in locations that are disturbed. If camps must be located in listed species habitat, the Resource Advisor will be consulted to ensure habitat damage and other effects to listed species are minimized and documented. The Resource Advisor should also consider the potential for indirect effects to listed species or their habitat from the siting of camps and staging areas (*e.g.,* if an area is within the water flow pattern, there may be indirect effects to aquatic habitat or species located off-site).

FS-6 All fire management protocols to protect Federally protected species will be coordinated with local fire suppression agencies that conduct fire suppression on BLM-administered lands to ensure that the agency knows how to minimize impacts to Federally protected species in the area.

FS-7 The effectiveness of fire suppression activities and Conservation Measures for Federally protected species should be evaluated after a fire, when practical, and the results shared with the USFWS and AGFD. Revise future fire suppression plans and tactical applications as needed and as practical.

1.2 Fuels Treatments (prescribed burning and other fuels management) (FT)

The following Conservation Measures **are mandatory** when implementing wildland fire use, prescribed fires, and the proposed vegetation treatments (mechanical, chemical, biological):

FT-1 Biologists will be involved in the development of prescribed burn plans and vegetation treatment plans to minimize effects to Federally protected species and their habitats within, adjacent to, and downstream from proposed project sites. Biologists will consider the protection of seasonal and spatial needs of Federally protected species (*e.g.*, avoiding or protecting important use areas or structures and maintaining adequate patches of key habitat components) during project planning and implementation.

FT-2 M.I.S.T. will be followed in all areas with known Federally protected species or habitats.

FT-3 Pre-project surveys and clearances (biological evaluations/assessments) for Federally protected species will be required for each project site before implementation. All applicable Conservation Measures will be applied to areas with unsurveyed suitable habitat for Federally protected species, until a survey has been conducted by qualified personnel to clear the area for the treatment activity.

FT-4 Use of motorized vehicles during prescribed burns or other fuels treatment activities in suitable or occupied habitat will be restricted, to the extent feasible, to existing roads, trails, washes, and temporary fuelbreaks or site-access routes. If off-road travel is deemed necessary, any cross-country travel paths will be surveyed prior to use and will be closed and rehabilitated after the prescribed burn or fuels treatment project is completed.

FT-5 As part of the mandatory fire briefing held prior to prescribed burning, all personnel (firefighters and support personnel) will be briefed and educated by Resource Advisors or designated supervisors about listed species and the importance of minimizing impacts to individuals and their habitats. All personnel will be informed of the Conservation Measures designed to minimize or eliminate take of the species present.

1.3 Rehabilitation and Restoration (RR)

RR-1 When rehabilitating important areas for Federally listed species that have been damaged by fire or other fuels treatments, the biologist will give careful consideration to minimizing short-term and long-term impacts. Someone who is familiar with fire impacts and the needs of the affected species will contribute to rehabilitation plan development. Appropriate timing of rehabilitation and spatial needs of Federally listed species will be addressed in rehabilitation plans.

RR-2 Seed from regionally native or sterile non-native species of grasses and herbaceous vegetation will be used in areas where reseeding is necessary following ground disturbance to stabilize soils and prevent erosion by both wind and water.

RR-3 Sediment traps or other erosion control methods will be used to reduce or eliminate influx of ash and sediment into aquatic systems.

RR-4 Use of motorized vehicles during rehabilitation or restoration activities in suitable or occupied habitat will be restricted, to the extent feasible, to existing roads, trails, or washes, and to temporary access roads or fuelbreaks created to enable the fire suppression, prescribed burn, or

fuels treatment activities to occur. If off-road travel is deemed necessary, any cross-country travel paths will be surveyed prior to use and will be closed and rehabilitated after rehabilitation or restoration activities are completed.

RR-5 All temporary roads, vehicle tracks, skid trails, and off-road vehicle (ORV) trails resulting from fire suppression and the proposed fire management activities will be rehabilitated (water bars, etc.), and will be closed or made impassible for future use.

RR-6 Burned area emergency rehabilitation (BAER) activities and long-term restoration activities should be monitored, and the results provided to the USFWS and AGFD. Section 7 consultation for BAER activities will be conducted independently, if necessary.

RR-7 **(Recommended)** Develop public education plans that discourage or restrict fires and fire-prone recreation uses during high fire-risk periods. Develop brochures, signs, and other interpretive materials to educate recreationists about the ecological role of fires, and the potential dangers of accidental fires.

2.0 Conservation Measures For Fire Management Activities In Riparian and Aquatic Habitats (RA)

2.1 Wildland Fire Suppression and Rehabilitation

The following Conservation Measures will be implemented during fire suppression operations in riparian, wetland, or aquatic habitats, unless firefighter or public safety, or the protection of property, improvements, or natural resources, render them infeasible during a particular operation. Necessary modifications of the Conservation Measures or impacts to Federally protected species and habitat during fire suppression operations will be documented by the Resource Advisor, and coordinated with the USFWS. The BLMís 1987 policy statement on riparian area management defines a riparian area as ìan area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lakeshores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.î

RA-1 During wildfire suppression, apply M.I.S.T. within riparian areas. Fire suppression actions in riparian areas should be prioritized to minimize damage to stands of native vegetation from wildfire or suppression operations. To the extent possible, retain large, downed woody materials and snags that are not a hazard to firefighters.

RA-2 Fire suppression and rehabilitation in riparian corridors will be coordinated with the Resource Advisor or qualified biologist approved by BLM.

RA-3 Site-specific implementation plans that include project areas with Federally protected aquatic or riparian-obligate species will specify fire management objectives and wildland fire suppression guidance, taking into account the special concerns related to these species.

RA-4 In riparian areas, use natural barriers or openings in riparian vegetation where possible as the easiest, safest method to manage a riparian wildfire. Where possible and practical, use wet firebreaks in sandy overflow channels rather than constructing firelines by hand or with heavy equipment.

RA-5 Construction or development of a crossing for motorized vehicles across a perennial stream will not be permitted, unless an established road already exists or where dry, intermittent sections occur.

RA-6 Avoid the use of fire retardants or chemical foams in riparian habitats or within 300 feet of aquatic habitats, particularly sites occupied by Federally protected species. Apply operational guidelines as stated in the *Interagency Standards for Fire and Fire Aviation Operations 2003 (or*

updates), ìEnvironmental Guidelines for Delivery of Retardant or Foam Near Waterways,î Chapter 8 (pp. 8-13 through 8-15).

RA-7 Priority for placement of fire camps, fire staging areas, and aircraft landing or refueling sites will be outside riparian areas or river/stream corridors.

RA-8 When using water from sources supporting Federally protected species, care must be taken to ensure adverse impacts to these species are minimized or prevented. Unused water from fire abatement activities will not be dumped in sites occupied by Federally protected aquatic species to avoid introducing non-native species, diseases, or parasites.

RA-9 If water is drafted from a stock tank or other body of water for fire suppression, it will not be refilled with water from another tank, lakes, or other water sources that may support non-native fishes, bullfrogs, crayfish, or salamanders.

RA-10 Use of containment systems for portable pumps to avoid fuel spills in riparian or aquatic systems will be required.

RA-11 (Recommended) Develop and implement restoration plans for affected riparian or aquatic areas, including long-term monitoring, to document changes in conditions in the riparian zone and watershed that maintain flood regimes and reduce fire susceptibility. Monitor stream water quality and riparian ecosystem health to determine effects of wildfire and fire management activities. Coordinate efforts and results with the USFWS and AGFD.

2.2 Fuels Treatments (prescribed fire; mechanical, chemical, and biological treatments)

The following Conservation Measures **are mandatory** when implementing wildland fires use, prescribed fires, and the proposed vegetation treatments (mechanical, chemical, biological) within riparian, wetland, or aquatic habitats.

RA-12 All Conservation Measures for wildland fire suppression (**RA-1 to RA-11, Section 2.1**) also apply to fuels treatment activities (prescribed fire; mechanical, chemical, and biological treatments) in riparian, wetland, and aquatic habitats.

RA-13 Fire management treatments within or adjacent to riparian and aquatic habitats will be designed to provide long-term benefits to aquatic and riparian resources by reducing threats associated with dewatering and surface disturbance, or by improving the condition of the watershed and enhancing watershed function.

RA-14 For priority fire/fuels management areas (*e.g.*, WUIs) with Federally protected species or designated critical habitat downstream, BLM biologists and other resource specialists, as appropriate, in coordination with USFWS and AGFD, will determine:

A) The number of acres and the number of projects or phases of projects to occur within one watershed per year.

B) An appropriately-sized buffer adjacent to perennial streams in order to minimize soil and ash from entering the stream.

C) Where livestock grazing occurs in areas that have been burned, specialists will determine when grazing can be resumed. Such deferments from grazing will only occur when necessary to protect streams from increased ash or sediment flow into streams.[1]

---

[1] The Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook, Exhibit 4-2 ,BLM supplemental guidance, page 5 of 9 (http://fire.r9.fws.gov/ifcc/ESR/handbook/4PolicyGuidance.htm) establishes the following policy for livestock exclusion following burns:

> Exclusion of livestock is critical for the recovery of burned vegetation or establishment and maintenance of new seedings and use of these areas should not be permitted until the vegetation recovers or is established. Both re-vegetated and, burned but not re-vegetated

If agreement cannot be reached or treatment will not meet fuel reduction objectives, BLM will re-initiate consultation.

3.0 Species Specific Conservation Measures

In addition to the general Conservation Measures listed in **Sections 1.0** and **2.0**, the following species-specific Conservation Measures will be applied during wildfire suppression to the extent possible, and will be required during fuels treatment activities (wildland fire use, prescribed fire, vegetation treatments). Necessary modifications of the Conservation Measures or impacts to Federally protected species and habitat during fire suppression operations will be documented by the Resource Advisor, and coordinated with the USFWS.

3.1 Amphibians [Chiricahua leopard frog (FT); Relict leopard frog (FC)]

AM-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**).

AM-2 For fire management sites with habitat for the Chiricahua leopard frog, unsurveyed sites will be considered occupied unless surveyed prior to project implementation.

AM-3 Install sediment traps, as determined by a Resource Advisor or qualified biologist approved by BLM, upstream of tanks and ponds occupied by Chiricahua leopard frogs in order to minimize the amount of ash and sediment entering the water. Consultation with a qualified biologist during the planning phase will aid in determining sediment trap installation requirements (see Conservation Measures FT-1 and FT-3).

AM-4 All personnel performing fire management activities at any creek crossing will be informed of the potential presence of Chiricahua leopard frogs, their status, and the need to perform their duties to avoid impacts to the frog and its habitat.

AM-5 Except as needed in emergency situations to abate immediate fire threat or loss of life or property, no water will be drafted for fire suppression from bodies of water known to be occupied by the Chiricahua leopard frog.

---

areas, will be closed to livestock grazing for at least two growing seasons following the season in which the wildfire occurred to promote recovery of burned perennial plants and/or facilitate the establishment of seeded species. Livestock permittees must be informed of the closure early during the plan preparation process, and livestock closures will be made a condition or term on the grazing license or permit through the issuance of grazing decision (see 43 CFR 4160). Livestock closures for less than two growing seasons may be justified on a case-by-case basis based on sound resource data and experience. Livestock management following seedling establishment and/ or burned area recovery should maintain both non-native and/or native species to meet land use (including Standards for Rangeland Health and Guidelines for Grazing Management) or activity plan objectives.

Our authority to make these types of changes is in the regulations at 43 CFR 4110.3-3(b).

3.2 Birds

3.2.1 Cactus ferruginous pygmy-owl (FE, Proposed CH)

FP-1 Treatment of riparian habitat, Sonoran desert/desertscrub, or mesquite-invaded grasslands under 4,000 feet in elevation that may support nesting cactus ferruginous pygmy owls will only occur during the non-nesting season of August 1 to January 31, unless pre-project surveys indicate the area does not support pygmy-owls or mitigation plans approved by the USFWS have alleviated negative consequences.

FP-2 Develop mitigation plans in coordination with the USFWS for fuels treatment projects (prescribed fire; vegetation treatments) that may adversely affect cactus ferruginous pygmy-owls or their habitat. Mitigation plans for prescribed fire shall limit to the extent practicable the possibility that fire would spread to riparian habitats. Mitigation plans will be approved by the USFWS.

FP-3 **(Recommended)** To the extent possible, maintain habitat features necessary to support breeding populations of the pygmy-owl within their historic range and review ongoing fire management activities for effects on essential habitat features needed by cactus ferruginous pygmy-owls. Modify activities, where necessary, to sustain the overall suitability of the habitat for the owls. Priority will be given to activities in or near occupied or recently (w/in the last 10 years) occupied habitat.

3.2.2 California brown pelican (FE)

BP-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (Section 2.0).

3.2.3 California Condor (FE; 10(j) species)

The following Conservation Measures apply to BLM-administered lands within the designated 10(j) area for California condors:

CC-1 All helicopter dip tanks will be covered when not in use.

CC-2 Any presence of condors in the project area will be recorded and reported immediately to the Resource Advisor.

CC-3 If condors arrive at any area of human activity associated with fire suppression or fuels treatment projects (wildland fire use, prescribed fire, vegetation treatments), the birds will be avoided. The assigned Resource Advisor or a qualified wildlife biologist approved by BLM will be notified, and only permitted personnel will haze the birds from the area.

CC-4 All camp areas will be kept free from trash.

CC-5 Aircraft use along the Vermilion Cliffs or sites where condors are attempting to breed or roost will be minimized

CC-6 The Resource Advisor will contact the Peregrine Fund daily (at 520-606-5155 or 520-380-4667) to check on locations of condors during fire suppression or fuels treatment activities involving aviation. This information will be communicated to the Incident Commander and aviation personnel.

CC-7 If any fire retardant chemicals must be used in areas where condors are in the vicinity (see **CC-6**), the application area will be surveyed and any contaminated carcasses will be removed as soon as practical to prevent them from becoming condor food sources.

CC-8 Aircraft will remain 400 meters from condors in the air or on the ground unless safety concerns override this restriction. If airborne condors approach aircraft, aircraft will give up airspace to the extent possible, as long as this action does not jeopardize safety.

CC-9 Smoke from wildland fire use and prescribed fire projects will be managed to minimize negative effects to condor breeding. A potential wildland fire use event will not be initiated, or an existing event will be modified or terminated, to prevent or stop significant amounts of smoke, or smoke that will remain in place for an extended period of time, or chronic smoke events, from occurring in area(s) where condors are attempting to breed.

CC-10 BLM will adhere to the air quality standards set by the Arizona Department of Environmental Quality.

3.2.4 Northern aplomado falcon (FE)

AF-1 If aplomado falcons are reestablished or are discovered on public lands, and they nest in a fuels management project area, BLM will implement temporary closures to human access and project implementation (wildland fire use, prescribed burning, vegetation treatments) within Ω mile of nest sites during the breeding season. Wildland fire use and prescribed burning will be conducted in a manner to ensure nest sites are more than Ω mile from downwind smoke effects.

3.2.5 Southwestern willow flycatcher (FE)

WF-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**).

WF-2 Except where fires are active in occupied habitat, minimize unnecessary low-level helicopter flights during the breeding season (April 1 ñ September 30). Approach bucket dip sites at a 90-degree direction to rivers to minimize flight time over the river corridor and occupied riparian habitats. Locate landing sites for helicopters at least º mile from occupied sites to avoid impacts to willow flycatchers and their habitat.

WF-3 Minimize use of chainsaws or bulldozers to construct firelines through occupied or suitable habitat except where necessary to reduce the overall acreage of occupied habitat or other important habitat areas that would otherwise be burned.

WF-4 Implement activities to reduce hazardous fuels or improve riparian habitats (prescribed burning or vegetation treatments) within occupied or unsurveyed suitable habitat for southwestern willow flycatchers only during the non-breeding season (October 1 to March 31).

WF-5 Avoid developing access roads that would result in fragmentation or a reduction in habitat quality. Close and rehabilitate all roads that were necessary for project implementation (see **RR-5**).

WF-6 Prescribed burning will only be allowed within Ω mile of occupied or unsurveyed suitable habitat when weather conditions allow smoke to disperse away from the habitat when birds may be present (breeding season of April 1 ñ September 30).

WF-7 Vegetation treatment projects adjacent to occupied or unsurveyed suitable habitat will only be conducted when willow flycatchers are not present (October 1 ñ March 31).

3.2.6 Yuma clapper rail (FE)

CR-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**).

CR-2 Any prescribed fire or vegetation treatment project in occupied or suitable marsh habitat would only occur between September 1 and March 15 to avoid the Yuma clapper rail breeding and molting seasons.

CR-3 Mechanical removal of overstory habitat (*Tamarisk*) could occur as early as August 15, after the breeding season for Yuma clapper rails.

CR-4 Herbicide application would not occur in Yuma clapper rail habitat and drift-inhibiting agents would be used to assure that the herbicide does not enter adjacent marsh areas.

3.2.7 Bald eagle (FT)

BE-1 No human activity within Ω mile of known bald eagle nest sites between December 1 and June 30.

BE-2 No tree cutting within º mile of known nest trees.

BE-3 No human activity within º mile of known bald eagle winter roost areas between October 15 and April 15.

BE-4 No tree cutting within the area immediately around winter roost sites as determined by BLM biologists.

BE-5 No helicopter or aircraft activity or aerial retardant application within Ω mile of bald eagle nest sites between December 1 and June 30 or winter roost sites between October 15 and April 15.

BE-6 Conduct prescribed burn activities outside of nesting season in a manner to ensure nest and winter roost sites are more than Ω mile from downwind smoke effects.

BE-7 Provide reasonable protective measures so fire prescription or fuels treatment will not consume dominant, large trees as identified by the Resource Advisor or qualified biologist approved by BLM within Ω mile of known nests and roosts of bald eagles Pre-treatment efforets should provide reasonable protection of identified nesting and roosting trees (see Conservation Measure FT-4).

3.2.8 Mexican spotted owl (FT, CH)

SO-1 BLM wildlife biologists will be involved early in the decision-making process for fuels management treatments (appropriately managed wildfires, prescribed fires, vegetation treatments) that are planned within suitable habitat or designated critical habitat for Mexican spotted owls (MSO).

SO-2 Suitable habitat and designated critical habitat for MSO will be surveyed prior to implementing prescribed fire or vegetation treatment activities on BLM-administered lands to determine MSO presence and breeding status. These fire management activities will only be implemented within suitable or critical habitat if birds are not present. If a spotted owl is discovered during these surveys, BLM will notify the USFWS to reinitiate consultation and will determine any additional Conservation Measures necessary to minimize or eliminate impacts to the owl.

SO-3 If a MSO is discovered during fire suppression or fuels treatment activities (wildland fire use, prescribed fire, vegetation treatments), the Resource Advisor or a qualified wildlife biologist will document the find and assess potential harm to the owl and advise the Incident Commander or project crew boss of methods to prevent harm. The information will include for each owl the location, date, and time of observation and the general condition of the owl. The Resource Advisor or biologist will contact the appropriate USFWS office, and BLM will reinitiate consultation for the fire suppression or project activities.

SO-4 Within MSO critical habitat designated on BLM-administered lands:

- **A)** To minimize negative effects on the primary constituent elements of critical habitat, appropriately managed wildlfires, and prescribed fires will be managed primarily as low-intensity fires, with only scattered high-intensity patches. The BLMís objective will be to limit mortality of trees greater than 18 inches dbh to less than 5 percent, occasionally up to 10 percent, within critical habitat.
- **B)** If fireline construction is necessary during fire suppression, appropriately managed wildfires, or prescribed fires, BLM will minimize the cutting of trees and snags larger than 18 inches

dbh, and no trees or snags larger than 24 inches dbh will be cut unless absolutely necessary for safety reasons.

C) For mechanical vegetation treatments within critical habitat, BLM will minimize the cutting of trees and snags larger than 18 inches dbh, and no trees or snags larger than 24 inches dbh will be cut unless absolutely necessary for safety reasons.

D) Critical habitat disturbed during fire suppression or fuels treatment activities, such as fire lines, crew camps, and staging areas, will be rehabilitated to prevent their use by vehicles or hikers. Fire line rehabilitation will include pulling soil, duff, litter, woody debris, and rocks back onto the line to bring it up to grade and to make it blend in with the surrounding area. Such rehabilitation will be inspected one year after the event to ensure effectiveness.

SO-5 The following measures will be followed in suitable habitat (occupied or unoccupied) whenever consistent with objectives to reduce hazardous fuels:

A) Manage mixed-conifer and pine-oak forest types to provide continuous replacement nest habitat over space and time (Table III.B.1 of the Recovery Plan for Mexican Spotted Owl).

B) Incorporate natural variation, such as irregular tree spacing and various stand/patch sizes, into management prescriptions and attempt to mimic natural disturbance patterns.

C) Maintain all species of native vegetation in the landscape, including early seral species. To allow for variation in existing stand structures and provide species diversity, both uneven-aged and even-aged systems may be used as appropriate.

D) Allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure.

E) Within pine-oak types, fuels treatment activities should emphasize retaining existing large oaks and promoting the growth of additional large oaks.

F) Retain all trees >24 inches dbh.

G) Retain hardwoods, large down logs, large trees, and snags.

Emphasize a mix of size and age classes of trees. The mix should include large mature trees, vertical diversity, and other structural and floristic characteristics that typify natural forest conditions.

SO-6 The effects of fire suppression and fuels treatment activities on MSO and their habitat, and the effectiveness of these Conservation Measures, will be assessed after each fire event or fuels treatment project by the Resource Advisor or local biologist to allow evaluation of these guidelines and to allow the USFWS to track the species environmental baseline. Prescriptions for appropriately managed wildfires, prescribed fires, and vegetation treatments will be adjusted, if necessary.

3.2.9 Yellow-billed cuckoo (FC)

YC-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**).

3.3 Fish

The following Conservation Measure will be implemented for all Federally protected fish species that may be affected by the Proposed Action during fire suppression to the extent possible, and are mandatory for wildland fire use, prescribed fire, and vegetation treatment activities:

FI-1 BLM will cooperate with other agencies to develop emergency protocols to decrease the impacts of fire suppression and fuels treatment activities on Federally listed fish species. Emergency protocols will include appropriate agency contacts, a list of facilities that can hold fish, sources of

equipment needed (e.g., sampling gear, trucks) and how to address human health and safety issues.

In addition to implementing **FI-1**, the following species-specific Conservation Measures will also apply:

3.3.1 Bonytail chub (FE,CH)

BC-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**) to eliminate adverse effects from fire management activities to available spawning habitat along shorelines *(i.e*., occupied reaches and critical habitat).

3.3.2 Desert pupfish (FE,CH)

DP-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**) for occupied reaches and critical habitat.

DP-2 Conduct prescribed burns such that no more than one-half of the watershed of each desert pupfish site is burned in a two-year period (excluding buffers to the streams and/or spring habitats) and repeat treatments at greater than two-year intervals.

DP-3 Monitor, where practical, for fish kill immediately following the first runoff event after prescribed fires in watersheds containing desert pupfish.

DP-4 When considering which creek crossings to use for fire management activities, avoid crossings that are known to be occupied by desert pupfish.

3.3.3 Gila topminnow (FE)

GT-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**).

GT-2 Conduct prescribed burns such that no more than one-half of the watershed of each gila topminnow natural or reintroduction site is burned in a two-year period (excluding buffers to the streams and/or spring habitats) and repeat treatments at greater than two-year intervals.

GT-3 Monitor for fish kill, where practical, immediately following the first runoff event after prescribed fires in the watersheds containing gila topminnows.

GT-4 When considering which creek crossings to use for fire management activities, avoid crossings that are known to be occupied by Gila topminnow, when possible.

GT-5 Develop mitigation plans in coordination with the USFWS for each fuels management project (prescribed fire; vegetation treatments) that may adversely affect the gila topminnow. Mitigation plans for prescribed fire will limit to the extent practicable the possibility that fire would spread to riparian habitats. Mitigation plans will be approved by the USFWS.

GT-6 **(Recommended)** Cooperate with the USFWS and AGFD to identify site-specific measures, such as prescribed fires in grassland vegetation types to improve watershed conditions (*e.g.*, in the Cienega Creek watershed), to protect populations of gila topminnow from other resource program impacts.

3.3.4 Razorback sucker (FE, CH)

RS-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (Section 2.0) to minimize adverse effects from fire management activities to available spawning habitat along shorelines (*i.e.,* occupied sites and critical habitat).

RS-2 Project boundaries for fire management activities will avoid or protect sensitive habitats of the razorback sucker.

3.3.5 Virgin River chub (FE, CH)

VC-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**) for the stretch of the Virgin River within Arizona.

3.3.6 Woundfin (FE, CH; Future 10(j) populations)

WM-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**) for the stretch of the Virgin River within Arizona.

3.3.7 Little Colorado spinedace (FT, CH)

LS-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**) to minimize adverse effects from fire management activities on BLM-lands to occupied reaches and critical habitat on adjacent lands.

3.3.8 Loach minnow (FT, CH); Spikedace (FT, CH)

LM-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**) for occupied reaches and critical habitat.

LM-2 All reasonable efforts shall be made to minimize disturbance within the wetted areas of Aravaipa Creek or tributary channels.

LM-3 No heavy equipment will be used off-road during wildfire suppression and fuels treatment projects within the wetted areas of Aravaipa Creek.

LM-4 All reasonable efforts will be made to ensure that no pollutants, retardants, or chemicals associated with wildfire suppression and fuels treatment projects or activities enter surface waters of reaches occupied by these two fish species.

LM-5 Develop mitigation plans in coordination with the USFWS for each fuels management project (prescribed fire; vegetation treatments) that may adversely affect the loach minnow and spikedace. Mitigation plans for prescribed fire will limit to the extent practicable the possibility that fire would spread to riparian habitats. Mitigation plans will be approved by the USFWS.

LM-6 **(Recommended)** Cooperate with the USFWS and AGFD to identify site-specific measures, such as prescribed fires in grassland vegetation types to improve watershed conditions (*e.g.*, in the Aravaipa Creek watershed), to protect populations of loach minnow and spikedace from other resource program impacts.

3.3.9 Gila chub (PE, Proposed CH)

GC-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**) for occupied reaches and proposed critical habitat.

GC-2 When considering which creek crossings to use for fire management activities, avoid crossings that are known to be occupied by Gila chub, when possible.

GC-3 **(Recommended)** Cooperate with the USFWS and AGFD to identify site-specific measures, such as prescribed fires in grassland vegetation types to improve watershed conditions (*e.g.*, in the Cienega Creek watershed), to protect populations of gila chub from other resource program impacts.

3.4 Flowering Plants

The following Conservation Measures for known locations and unsurveyed habitat of all Federally protected plant species within the planning area will be implemented during fire suppression to the extent possible, and are mandatory for wildland fire use, prescribed fire and vegetation treatment activities:

PL-1 Known locations and potential habitat for plant populations will be mapped to facilitate planning for wildland fire use, prescribed fires, and vegetation treatments, and to ensure protection of these populations during fire suppression.

PL-2 BLM will coordinate with FWS to delineate buffer areas around plant populations prior to prescribed fire and vegetation treatment activities. BLM will coordinate with USFWS during any emergency response and wildland fire use activities to ensure protection of plant populations from fire and fire suppression activities.

PL-3 During fire suppression, wildland fire use, and prescribed fire in habitat occupied by Federally protected plant species, no staging of equipment or personnel will be permitted within 100 meters of identified individuals or populations, nor will off-road vehicles be allowed within the 100-meter buffer area, unless necessary for firefighter or public safety or the protection of property, improvements, or other resources (see **FS-7**). One of the primary threats to many of these plant species is trampling/crushing from personnel and vehicles.

PL-4 No prescribed burning will be implemented within 100 meters of identified locations or unsurveyed suitable habitat for Federally protected and sensitive plant populations unless specifically designed to maintain or improve the existing population.

There are no additional species-specific conservation measures for the following Federally protected plant species: **Arizona Cliffrose** (*Purshia subintegra*), **Brady pincushion cactus** (*Pediocactus bradyi*), **Holmgren Milk Vetch** (*Astragalus homgreniorum*), **Nichol Turkís Head Cactus** (*Echinocactus horizonthalonius* var. *nicholii*), **Peebles Navajo Cactus** (*Pediocactus peeblesianus* var. *peeblesianus*), **Pima Pineapple Cactus** (*Coryphantha scheeri* var. *robustispina*), **Jones Cycladenia** (*Cycladenia humilis* var. *jonesii*), **Siler Pincushion Cactus** (*Pediocactus sileri*), **AcuÒa Cactus**(*Echinomastus erectocentrus* var. *acunensis*), **Fickeisen Plains Cactus** (*Pediocactus peeblesianus* var. *fickeiseniae*).

3.4.1 Huachuca Water Umbel (*Lilaeopsis schaffneriana* var. *recurva*) [FE, CH]

In addition to implementing **PL-1** through **PL-4**, the following species-specific Conservation Measures will also apply:

WU-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**).

WU-2 **(Recommended)** The BLM should fund additional surveys for the water umbel on BLM lands, and support research on the ecology of the species. Surveys may support the use of prescribed fire in areas not occupied by the Huachuca Water Umbel.

3.4.2 Kearneyís Blue Star (*Amsonia kearneyana*) [FE]

In addition to implementing **PL-1** through **PL-4**, the following species-specific Conservation Measures will also apply:

KB-1 No mechanical or chemical vegetation manipulation will be authorized by BLM, and no planting or seeding of nonnative plants will occur in the Brown Canyon watershed within the Baboquivari allotment.

KB-2 Planning and management for wildfire suppression in the watershed of Brown Canyon will be coordinated with the USFWS.

3.5 Mammals

3.5.1 Black-footed ferret (FE, 10(j) species)

If black-footed ferrets are discovered or re-established on public lands, then the following Conservation Measures will apply:

BF-1 No heavy equipment operation off of existing roads within º mile of prairie dog towns having documented occurrence of black-footed ferrets.

BF-2 No aerial retardant application within 300 feet of prairie dog towns having documented occurrence of black-footed ferrets.

BF-3 No surface disturbance of prairie dog towns having documented occurrence of black-footed ferrets.

BF-4 In Apache and Navajo counties, prairie dog complexes suitable for black-footed ferrets within º mile of proposed project sites will either be surveyed prior to project implementation or will be protected using measures **BF-1** through **BF-3**, as if ferrets were present.

3.5.2 Hualapai Mexican vole (FE)

HV-1 All treatment areas will be surveyed for Hualapai Mexican vole occupancy prior to fuels management treatments (prescribed fire, vegetation treatments) in order to determine project modifications and/or avoidance and protection of occupied areas. Until surveyed, all potential vole habitat is considered occupied. Areas not considered suitable (e.g., areas dominated by thick pine needles and duff) will also be surveyed prior to treatment to protect existing snag habitat for potential future use by Mexican spotted owls.

HV-2 Fuels management treatments (prescribed fire or vegetation treatments), construction of fire breaks, and/or staging areas for fire suppression or fuels management treatments will not be located within a vole use area. Occupied vole sites within proposed burn areas will be protected by firebreaks, precision ignition of fire around such sites, or total avoidance of the area. Fire plans will incorporate site-specific features (*e.g.,* rock outcroppings, game trails, etc.), fire behavior, and professional judgment to determine the most appropriate method to protect occupied vole habitat. Additionally, monitoring of fuel moisture and use of the appropriate minimum impact suppression tactics will be used to reach the desired objective at each site.

HV-3 To minimize impacts to Hualapai Mexican voles during the breeding season, prescribed burns and vegetation treatments in occupied or potential vole habitat will be implemented only between September 1 and March 15. Treatment in chaparral habitat will occur during the latter part of this time frame, in winter and/or early spring. These prescribed fires will follow the summer monsoon period to encourage additional herbaceous growth. Post-monsoon burns would help avoid the dry conditions that could result in extremely hot fires that reduce the recruitment of grasses and forbs. Areas not considered suitable for Hualapai Mexican voles (*e.g.,* dominated by thick pine needles and duff) may be burned prior to September 1, if surveyed prior to treatment.

HV-4 Provide a 75- to 100-foot, minimum, unburned vegetation buffer between fuels treatment sites and riparian and dry wash areas to decrease erosion into and sedimentation of the occupied or potentially occupied vole habitat. Within ponderosa pine treatment sites, use of dry washes as a

fire line may be appropriate and result in less disturbance than construction of a cup trench above the wash. Under such circumstances, BLM will prepare the wash as a fire line by raking duff and removing by hand dead branches and other debris.

HV-5 The terms and conditions from the Pine Lake Wildland/Urban Interface Biological Opinion (BLM Kingman Field Office; Consultation No. 2-21-01-F-241) continue to apply to the Pine Lake project.

3.5.3 Jaguar (FE)

JA-1 Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (Section 2.0) to eliminate adverse effects to jaguars that may occur in dense riparian habitats on BLM-administered lands.

JA-2 Maintain dense, low vegetation in major riparian or xero-riparian corridors on BLM-administered lands in identified locations south of Interstate 10 and Highway 86. Locations will be identified in site-specific fire management plans.

3.5.4 Lesser long-nosed bat (FE)

LB-1 Instruct all crew bosses (wildfire suppression, wildland fire use, prescribed fire, and vegetation treatments) in the identification of agave and columnar cacti and the importance of their protection.

LB-2 Prior to implementing any fuels treatment activities (prescribed fire, vegetation treatments), pre-project surveys will be conducted for paniculate agaves and saguaros that may be directly affected by fuels management activities.

LB-3 Protect long-nosed bat forage plants -- saguaros and high concentrations of agaves -- from wildfire and fire suppression activities, and from modification by fuels treatment activities (prescribed fire, vegetation treatments), to the greatest extent possible. ìAgave concentrationsî are contiguous stands or concentrations of more than 20 plants per acre. Avoid driving over plants, piling slash on top of plants, and burning on or near plants. Staging areas for fire crews or helicopters will be located in disturbed sites, if possible.

LB-4 No seeding/planting of nonnative plants will occur in any wildfire rehabilitation site or fuels treatment site with paniculate agaves or saguaros.

LB-5 A mitigation plan will be developed by the Bureau in coordination with the USFWS for prescribed fires or fuels management projects (mechanical, chemical, biological treatments) within 0.5 mi of bat roosts or in areas that support paniculate agaves or saguaros. The mitigation plan will ensure that effects to bat roosts and forage plants are minimized and will include monitoring of effects to forage plants. The plan will be approved by the USFWS.

LB-6 **(Recommended)** BLM personnel should examine concentrations of agaves (including shindagger ñ *A. schottii*) within each proposed fuels treatment area, and blackline or otherwise protect from treatments any significant concentrations of agaves that appear to be amidst fuel loads that could result in mortality greater than 20 percent (>50% for *A. schottii).* BLM personnel should use their best judgment, based on biological and fire expertise, to determine which significant agave stands are prone to mortality greater than 20 percent (>50% for *A. schottii*) (see Conservation Measures FT-1 and FT-3).

LB-7 **(Recommended)** BLM should continue to support and cooperate in the investigations of agave relationships to livestock grazing, and of the effects of prescribed fire on paniculate agaves.

3.5.5 Mexican gray wolf (FE; 10(j) species)

If Mexican gray wolves are re-established on public lands, then the following Conservation Measures will apply:

GW-1 No human disturbance associated with fire management activities will be within one mile of a den site from April1 to June 30.
GW-2 No human disturbance associated with fire management activities will be within one mile of known rendezvous sites from April 1 to June 30.

3.5.6 Ocelot (FE)

No species-specific Conservation Measures developed.

3.5.7 Sonoran pronghorn (FE)

No species-specific Conservation Measures developed.

3.5.8 Black-tailed prairie dog (FC)

If black-tailed prairie dogs are re-established on public lands, then the following Conservation Measures will apply:

PD-1 No heavy equipment operation off of existing roads within º mile of black -tailed prairie dog colonies
PD-2 No aerial retardant application within º mile of black -tailed prairie dog colonies.
PD-3 No surface disturbance of black-tailed prairie dog colonies.

3.6 Reptiles

3.6.1 Desert tortoise, Mojave population (FT)

DT-1 Take appropriate action to suppress all wildfires in desert tortoise habitat, based on preplanned analysis and consistent with land management objectives, including threats to life and property. Full suppression activities will be initiated within key desert tortoise habitat areas identified in site-specific Fire Management Plans.
DT-2 Suppress all wildfires in desert tortoise habitat with minimum surface disturbance, in accordance with the guidelines in Duck et al. (1995) and the 1995 programmatic biological opinion on fire suppression on the Arizona Strip (2-21-95-F-379).
DT-3 Pre-position suppression forces in critical areas during periods of high fire dangers.
DT-4 As soon as practical, all personnel involved in wildfire suppression (firefighters and support personnel) will be briefed and educated about desert tortoises and the importance of protecting habitat and minimizing take, particularly due to vehicle use. Fire crews will be briefed on the desert tortoise in accordance with Appendix II of Duck et al. (1995).
DT-5 If wildfire or suppression activities cannot avoid disturbing a tortoise, the Resource Advisor or monitor will relocate the tortoise, if safety permits. The tortoise will be moved into the closest suitable habitat within two miles of the collection site that will ensure the animal is reasonably safe from death, injury, or collection associated with the wildfire or suppression activities. The qualified biologist will be allowed some discretion to ensure that survival of each relocated

tortoise is likely. If the extent or direction of movement of a fire makes sites within two miles of the collection site unsuitable or hazardous to the tortoise or biologists attempting to access the area, the tortoise may be held until a suitable site can be found or habitat is safe to access and not in immediate danger of burning. The Resource Advisor will contact the USFWS Arizona Ecological Services Field Office (AESFO) as soon as possible concerning disposition of any animals held for future release. Desert tortoises will not be placed on lands outside the administration of the Federal government without the written permission of the landowner. Handling procedures for tortoises, including temporary holding facilities and procedures, will adhere to protocols outlined in Desert Tortoise Council (1994).

DT-6 Upon locating a dead, injured, or sick desert tortoise, initial notification must be made to the appropriate USFWS Law Enforcement Office within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. The notification will be sent to the Law Enforcement Office with a copy to the AESFO

DT-7 Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. If possible, the remains of intact desert tortoises will be placed with educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above will be obtained and the carcass left in place. Arrangements regarding proper disposition of potential museum specimens will be made with the institution prior to implementing the action. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should any treated desert tortoise survive, the USFWS should be contacted regarding final disposition of the animal.

DT-8 The Resource Advisor or monitor(s) will maintain a record of all desert tortoises encountered during fire suppression activities. This information will include for each desert tortoise: 1) locations and dates of observation; 2) general condition and health, including injuries and state of healing, and whether animals voided their bladders; 3) location moved from and to; and 4) diagnostic markings (i.e., identification numbers of marked lateral scutes). No notching of scutes or replacement of fluids with a syringe is authorized.

DT-9 Prior to moving a vehicle, personnel will inspect under the vehicle for tortoises. If a tortoise is found under the vehicle, the tortoise will be allowed to move away from the vehicle on its own accord, if possible. Otherwise an individual will move the tortoise to a safe locality in accordance with **FS-2** and **DT-5**.

DT-10 Off-road vehicle activity will be restricted to the minimum necessary to suppress wildfires. Vehicles will be parked as close to roads as possible, and vehicles will use wide spots in roads or disturbed areas to turn around. Whenever possible, a biologist or crewperson trained to recognize tortoises and their shelter sites will precede any vehicle traveling off-road to direct the driver around tortoises and tortoise burrows. Whenever possible, local fire-fighting units should provide direction and leadership during off-road travel because of their expertise and knowledge of area sensitivities.

DT-11 Fire-related vehicles will drive slow enough to ensure that tortoises on roads can be identified and avoided.

DT-12 Fire crews or rehabilitation crews will, to the extent possible, obliterate off-road vehicle tracks made during fire suppression in tortoise habitat, especially those of tracked vehicles, to reduce future use.

DT-13 To the maximum extent practical, campsites, aircraft landing/fueling sites, and equipment staging areas will be located outside of desert tortoise habitat or in previously disturbed areas. If such facilities are located in desert tortoise habitat, 100 percent of the site will be surveyed for desert tortoises by a qualified biologist approved by BLM, whenever feasible. Any tortoises found will be moved to a safe location in accordance with **FS-2** and **DT-5**. All personnel located at these facilities will avoid disturbing active tortoise shelter sites.

DT-14 Elevated predation by common ravens or other predators attributable to fire suppression activities will be reduced to the maximum extent possible. Work areas, including campsites, landing/fueling sites, staging areas, etc. will be maintained in a sanitary condition at all times. Waste materials at those sites will be contained in a manner that will avoid attracting predators of desert tortoises. Waste materials will be disposed of at an appropriate waste disposal site. ìWasteî means all discarded matter including, but not limited to, human waste, trash, garbage, refuse, oil drums, petroleum products, ashes, and equipment.

DT-15 Backfiring operations are permitted where necessary in desert tortoise habitat. Burning out patches of identified habitat within or adjacent to burned areas is not permitted as a standard fire suppression measure unless necessary for firefighter or public safety or to protect property, improvements, or natural resources.

DT-16 Use of foam or retardant is authorized within desert tortoise habitat.

DT-17 Rehabilitation of vegetation in tortoise habitat will be considered, including seeding, planting of perennial species, etc.

DT-18 Recovery of vegetation will be monitored, including establishing and monitoring paired plots, inside and outside burned areas in tortoise habitat. Recovery plans will be coordinated with the USFWS and AGFD.

DT-19 The effectiveness of wildfire suppression activities and desert tortoise Conservation Measures will be evaluated after a wildfire. Procedures will be revised as needed.

3.6.2 New Mexico ridgenose rattlesnake (FT)

RN-1 To the extent possible, minimize surface disturbing activities from fire suppression and fuels treatment activities within New Mexico ridgenose rattlesnake habitat on BLM-administered lands in the southern Peloncillo Mountains, particularly during active periods for snakes (July through October).

RN-2 Prior to using wildland fire for resource benefit, cool season (November ñ March) prescribed fire or other fuel treatments should be used to reduce unnatural fuel loads within suitable habitat to avoid catastrophic fires and loss of canopy cover.

RN-3 All fires that occur outside of prescriptions that will result in low intensity, low severity burns will be fully suppressed within or near suitable New Mexico ridge-nose rattlesnake habitat.

3.7 Conservation Agreement and Management Plan Species

3.7.1 Flat-tailed horned lizard

No species-specific Conservation Measures developed.

3.7.2 Paradine (Kaibab) plains cactus

Implement **PL-1** and **PL-2** to protect known locations during fire suppression to the extent possible and during the fuels treatment activities.

3.7.3 Virgin spinedace

Implement the Conservation Measures for Fire Management Activities in Riparian and Aquatic Habitats (**Section 2.0**) for the stretch of the Virgin River within Arizona.

3.7.4 Desert tortoise, Sonoran population

Implement the Conservations Measures for Desert Tortoise, Mojave population, as appropriate, for fire suppression and fuels treatment activities (prescribed fire, vegetation treatments), excluding requirements for notification to USFWS.

REFERENCE:

Duck, T.A., T.C. Esque, and T.J. Hughes. 1995. Fighting wildfire in desert tortoise habitat: considerations for land managers. Proc. Desert Tortoise Counc. Symp. 1994:58-67.

Appendix E - Wild Free-Roaming Horses and Burros Herd Management Areas

There are 4 Herd Areas (HA) and 7 Herd Management Areas (HMA) managed by BLM in Arizona. These areas are the Tassi-Gold Butte HMA (Arizona Strip FO); Big Sandy HMA, Black Mountain HMA, and Cerbat HA (Kingman FO); Harquahala HA, Lake Pleasant HMA and Painted Rock HA (Phoenix FO); Alamo HMA and Havasu HMA (Lake Havasu FO); and Cibola-Trigo HMAand Little Harquehala HA (Yuma FO). Five of the areas are described in the Affected Environment section of current Land Use Plans. Descriptions of the other six areas are presented below.

Alamo
The Alamo HMA lies in west central Arizona, on lands adjoining Alamo Lake and portions of the Bill Williams, Santa Maria and Big Sandy rivers. The Alamo contains 341,034 acres of land. The wild burros roam freely throughout the area, which is largely steep, rocky and rugged. The lower areas contain gentle slopes cut with broad sandy washes. Sonoran Desert vegetation, such as palo verde and ironwood trees, dominate the washes. Summers are hot, with occasional temperatures exceeding 120 degrees. Wild burros share this habitat with desert bighorn sheep, desert mule deer, coyotes, fox, jackrabbits and a variety of small mammals. Other animals that can be found in the area include reptiles such as the desert tortoise and several species of lizards and rattlesnakes. The area is also home to a variety of birds, including the bald eagle and southwestern willow flycatcher.

Harquahala
The Harquahala HA lies six miles south of Aguila, Arizona, on Eagle Eye Road, 25 miles west of Wickenburg, Arizona, on US Highway 60. The wild burros inhabit the Harquahala Mountains and surrounding foothills and valleys. The Harquahala HA consists of 126,000 acres and extends from the Harquahala Mountains on the north side to the Big Horn Mountains on the south. The Harquahala Mountains is a relatively low granite range, surrounded by broad desert basins. The average precipitation is about five inches a year with summer temperatures exceeding 125 degrees. The desert vegetation consists of typical upper Sonoran Desert which includes palo verde, ironwood, ocotillo, mesquite, creosote bush, triangle leaf bursage and the giant saguaro cactus. In addition, the Harquahala Mountains contain pockets of Interior Chaparral Subdivision of the Warm-Temperate scrublands typified by jojoba, shrub live oak, sugar sumac and mountain mahogany. Because of the high diversity of species, the area has been identified as a Special Botanical Area. The area contains numerous springs that provide water for the wild burros, livestock and other wildlife. Riparian vegetation such as cottonwood, willow, cattails and bullrush occur at many of the spring sites. Wild burros share their habitat with other wildlife such as desert bighorn sheep, desert mule deer, bobcat, mountain lion, coyotes, gray fox, Gambel's quail, dove, various bat species, desert tortoise and other non-game species.

Cibola-Trigo
Spreading across the border of Arizona and California, the Cibola-Trigo HMA extends from Imperial Dam, west of the Colorado River, to Walters Camp in California. Located primarily between US 95 and the Colorado River and Interstates 8 and 10, the HMA is about 20 miles north of Yuma, Arizona. The Cibola-Trigo HMA is comprised of nearly one million acres of the lower Sonoran Desert. During the summer months, the burros are concentrated along the Colorado River, or other permanent water source. In late fall or early winter, depending upon rainfall, they disperse throughout the HMA. They begin their movement back to the river about May or June as the temperatures rise and the Mesquite beans mature. The wild horses remain near a permanent water source year round. In Arizona, the Cibola-Trigo HMA supports both wild burros and horses. While in southwestern California, only the wild burro roams between the river and the Chocolate/Mules and Picacho Herd Management areas. The HMA in California is dominated by intricately dissected alluvial fans and bajadas adjacent to the Colorado River. The

uplands support sparse stands of creosote, ocotillo and palo verde. The many drainages emptying into the river support dense stands of desert trees including palo perde, ironwood, catclaw acacia and mesquite. Immediately adjacent to the river are thick stands of salt cedar, phragmites and arrow weed. Further from the river, the bajadas give way to rugged volcanic mountains. Winters in the HMA are typically mild, but summers can be brutal with temperatures exceeding 125 degrees. Wild burros share this habitat with desert bighorn sheep and desert mule deer. Other animals that can be found in the area include desert tortoise, several species of rattle snakes and a variety of birds and lizards.

Havasu

The Havasu Herd Management Area lies in west central Arizona along the Colorado and Bill Williams rivers. The HMA is split into two units by the Colorado River. The Havasu HMA is also adjacent to the Chemeheuvi Herd Management Area on the California side. The Havasu HMA consists of 450,790 acres of Lower Colorado Sonoran Desert. The Arizona side of the HMA is 372,568 acres, while the California side of the HMA encompasses 78,222. In this area, some burros possess the shoulder cross characteristic of the ancestral Nubian wild ass and many have leg barrings associated with the Somali wild ass. In the summer months, the burros concentrate in the critical area, which is generally within one and a half miles of all major water sources. During cooler months, the burros normally move into the mountains and scatter throughout the area. The burros roam freely throughout the area, which is characterized by arroyo-scarred alluvial fans to steep and rocky volcanic mountains. There are four major vegetation community types found within the HMA. These include open hills characterized by creosote bush, primary and secondary wash characterized by palo verde and burro bush, and secondary wash of predominately palo verde and creosote. Summer temperatures can exceed 125 degrees, with about 100 days per year of above 100 degrees. Burros share this habitat with desert bighorn sheep and desert mule deer. Other animals in the area include small mammals, desert tortoises, several species of rattle snakes, a variety of birds, including the southwestern willow flycatcher, lizards and amphibians.

Lake Pleasant

The Lake Pleasant HMA is located approximately 25 miles northwest of Phoenix, west of Interstate 17 and north of State Highway 74. The HMA lies northeast of Lake Pleasant, and consists of 103,000 acres of Sonoran Desert. The majority of the burros in the HMA congregate in or around Lake Pleasant Regional Park due to the abundance of forage and water. The area consists of rugged mountains, numerous small canyons and open rolling hills. The vegetation is typical of the upper Sonoran Desert consisting of palo verde and mixed cacti. Wildlife species include wild burros, desert mule deer, javelina and mountain lions. Other animals found in the area include small mammals, songbirds, amphibians and reptiles.

Little Harquahala

The Little Harquahala HA is located southeast of Salome, Arizona, between U.S. Highway 60 and Interstate 10. The HA includes the extreme western portion of the Harquahala Mountains and a majority of the Little Harquahala Mountains. The HA includes 66,0000 acres of upper Sonoran desert and consists of desert mountains, separated by the Centennial Wash. The area is in mountainous terrain, covered with palo verde, ironwood and catclaw acacia. In this HA, burros stay in the mountains on either side of Centennial Wash during mild winters. The area receives about five inches of rain a year, mostly during the winter months. In the summer, when temperatures exceed 100 degrees, the burros move down into the valley. Burros share this HA with desert bighorn sheep and desert mule deer. Other animals that can be found in the area include the desert tortoise, several species of rattle snakes and a variety of birds and other reptiles.

Appendix F ñ Special Status Plant and Wildlife Species

Special status species include Federally listed (endangered or threatened), proposed, and candidate species, and designated or proposed critical habitat; species of concern managed under Conservation Agreements or Management Plans; state-listed species; and BLM-sensitive species. Several special status species occurring within the management areas of the BLM Field Offices in Arizona are discussed in the LUPs referenced at the beginning of Section 3.0, and are incorporated here by reference. However, additional species and critical habitats have been added to or have changed Federal status under the Endangered Species Act since the time these plans were written. Brief descriptions of each of the Federally listed, proposed, and candidate species, as well as the Conservation Agreement and Management Plan species, are provided below. Information on these species was consolidated from a variety of sources, most notably, the U.S. Fish and Wildlife Service (USFWS), Arizona Ecological Services website (http://www.arizonaes.fws.gov), and the Arizona Game and Fish Departmentís (AGFD) Heritage Data Management System (HDMS). HDMS provided lists, shape files, and habitat and general location information for special status species generated by the HDMS Coordinator, as well as unpublished abstracts created by AGFD (http://www.gf.state.az.us/wildlife_conservation/edits/hdms_abstracts.html). Personal communications with the HDMS Coordinator and species experts from state and federal agencies provided additional species information.

AMPHIBIANS

Federally protected amphibian species in Arizona that may be affected by the proposed project include one threatened frog species and one candidate frog species. Threats to amphibians include predation by introduced bullfrogs and non-native fish, disease, habitat fragmentation or destruction, water manipulations, and water quality degradation. These species frequently have an increased probability of local extirpation because of their small, often isolated, populations.

Chiricahua leopard frog (*Rana chiricahuensis*)
This **threatened** species has two forms in Arizona: the Southern form, found in southeastern Arizona, portions of southwestern New Mexico, and a portion of Mexico; and the Rim form, a disjunct population occurring along the southern edge of the Colroado Plateau and headwater drainages in the White Mountains and along the Mogollon Rim in Arizona. The range of the Rim form extends from montane central Arizona east and south along the Mogollon Rim to montane parts of west-southwestern New Mexico, at elevations ranging from 3500-8040 ft amsl (Apache, Coconino, Gila, Graham, Greenlee, Navajo, and Yavapai Counties, AZ). The range of the southern form extends through the southeastern montane sector of Arizona and adjacent Sonora, Mexico, at elevations ranging from 1219-4023 ft amsl (Santa Cruz and Cochise Counties, AZ). Only the southern form of the species occurs on or downstream from BLM-administered lands. This species requires permanent water sources, including streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs. The primary habitat type of *R. chiricahuensis* is oak, mixed oak and pine woodlands, although its habitat ranges into areas of chaparral, grassland, and desert.

Relict leopard frog (*Rana onca*)
In Arizona, this **candidate** species is restricted to a spring-fed wetland adjacent to the Virgin River near Littlefield, AZ (Mohave County). At this time no relict leopard frogs occur on BLM-administered lands within the action area. The site occupied by the Virgin River population occurs on private land. The species typically inhabits permanent streams, springs, seeps, spring-fed wetlands, and edges of marshes and pools below 2000 ft amsl. Threats to the species include elimination or dramatic alteration of aquatic habitats from human activities or development, and the spread of predator and nonnative bullfrogs, crayfish, and predaceous fishes.

BIRDS

The Federally listed, proposed, and candidate birds in Arizona considered for the Statewide LUP Amendment totals 10 species. The list is dominated by five raptor species and four riparian-obligate species. These species have experienced a variety of threats, primarily habitat loss or fragmentation from urbanization, agricultural expansion, or damming of rivers (affecting native riparian habitats). Past use of pesticides and illegal hunting have also contributed to declines in many of the raptors.

Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*)
The range of this **endangered** species in Arizona is limited to the New River (north) to the Gila Box (east) to the Cabeza Prieta Mountains (west) in Maricopa, Pima, Pinal, Santa Cruz, and Yuma Counties. **Proposed critical habitat** for this species occurs in Pima and Pinal Counties. The species typically inhabits mature cottonwood/willow woodlands or mesquite bosques, usually with saguaros on nearby slopes, in the Arizona Upland Subdivision and Sonoran desert scrub, ranging in elevation from 1300-1400 ft amsl. Before 1950, this species was a fairly common resident of low elevation riparian mesquite woodlands in southern Arizona. This species has experienced drastic declines in both range and abundance and is absent in many places where it was formerly documented.

California brown pelican (*Pelecanus occidentalis californicus*)
This **endangered** sub-species is typically found on the Pacific Coast, but is an uncommon, non-breeding transient at many Arizona lakes and rivers. This fish-eating bird prefers large open water areas, such as near dams, marinas, or river sandbars.

California condor (*Gymnogyps californianus*)
This **endangered** species is designated as an **experimental, non-essential population** (10(j) species) under Section 10(j) of the Endangered Species Act. The last wild condor was reported in Arizona in 1924; however a recovery program has reintroduced condors to Northern Arizona beginning in 1996. The release site is on BLM-administered lands at the Vermillion Cliffs (Coconino County, AZ), with an **experimental, non-essential area** (10(j) area) designated in northern Arizona, extending north into Utah and Nevada. The Vermillion Cliffs are rugged sandstone cliffs located on the Paria Plateau, providing the necessary remoteness, ridges, ledges, and caves favored by condors. The Paria Plateau is typified by Great Basin Pinyon-Juniper Woodland, dominated by juniper and pinyon pine. Great Basin Desert Scrub occurs along the Vermillion Cliffs, dominated by sagebrush and rabbitbrush. Species diversity is low, with shrubs occurring more frequently than woodland or forest. Some released condors have occasionally flown to parts of Arizona outside the designated 10(j) area, however, they typically return after short periods.

Masked bobwhite quail (*Colinus virginianus ridgewayi*)
This **endangered** species is presently only known from reintroduced populations on Buenos Aires National Wildlife Refuge in Pima County, AZ, although it formerly occurred in Altar and Santa Cruz Valleys and Sonora, Mexico. The species inhabits desert grasslands with a diversity of dense native grasses, forbs, and brush, ranging in elevation from 300-4000 ft amsl.

Northern aplomado falcon (*Falco femoralis septentrionalis*)
This **endangered** species formerly nested in southeastern Arizona. There have been no recent confirmed reports of this falcon in Arizona, but it has been found nearby in western New Mexico and in Mexico. It is likely that with improved habitats, the species will return to Arizona within the next 10-20 years, potentially in Cochise, Santa Cruz, or Yuma Counties. This species inhabits grassland and savannah, particularly sites with low ground cover and mesquite or yucca for nesting platforms.

Southwestern willow flycatcher (*Empidonax traillii extimus*)
The distribution of this **endangered** subspecies is restricted to riparian corridors within its range, including all counties in Arizona except Navajo, at elevations less than 9200 ft amsl. The species is a riparian obligate, preferring dense canopy cover, a large volume of foliage, and surface water during midsummer. It typically inhabits cottonwood/willow thickets along rivers and streams, although with the significant loss of this native riparian vegetation, the species will also use tamarisk (*Tamarix* spp.) or Russian olive (*Eleagnus angustifolia*) thickets and riparian associates. Extreme population reductions have been noted

range-wide since the1800's, though quantitative data are lacking. Riparian habitat loss and fragmentation and brood-parasitism by brown-headed cowbirds are two major causes for the decline of this flycatcher.

Yuma clapper rail (*Rallus longirostris yumanensis*)
This **endangered** secretive shorebird is the only clapper rail to breed in freshwater marshes, although it also inhabits brackish water marshes and side waters. Within Arizona, the species is a locally common summer resident and breeder occupying several locations along the lower Colorado River from the Mexican border north to Littlefield, AZ on the Virgin River, including Lake Mead (Yuma, La Paz, and Mohave Counties). Clapper rails also occur along the Bill Williams River below Alamo Dam, the Gila River up to the confluence with the Salt River, protions of the Salt, Gila, and possibly lower Verde Rivers, and Picacho Reservoir (though that population may be gone)(La Paz, Maricopa, Mohave, Pinal, and Yuma Counties). The species requires wet substrate (mudflat, sandbar) with dense herbaceous (*e.g.*, cattails and bulrushes) or woody vegetation (e.g., *Tamarisk* spp.) for nesting and foraging. The interface between water, soil and vegetation seems more important than the plant species that cover the site. Most birds are found within the Lower Colorado Subdivision of the Sonoran Desert Scrub biome, ranging in elevation from 75-1700 ft amsl in Arizona. Channelization and marsh development are primary sources of habitat loss.

Bald Eagle (*Haliaeetus leucocephalus*)
In Arizona, some birds of this **threatened** species are nesting residents while an estimated 200-300 birds winter along rivers and reservoirs, covering all counties of Arizona except Greenlee. This species requires large trees or cliffs near water (reservoirs, rivers, and streams) with abundant prey. Illegal shooting, disturbance, and loss of habitat continue to affect this species. It has been proposed for delisting (64 CFR 36454), but still receives full protection under the Endangered Species Act.

Mexican spotted owl (*Strix occidentalis lucida*)
This **threatened** species is patchily distributed in forested mountains statewide. It occurs at elevations from 3000-9000 ft amsl in nearly all counties in Arizona, except La Paz and Yuma. For Arizona BLM, only the Arizona Strip and Kingman Field Offices contain suitable habitat that could potentially sustain the subspecies, although no owls have been detected on BLM-administered lands in Arizona since the early 1980ís. **Critical habitat** was designated for Apache, Cochise, Coconino, Graham, Mohave, and Pima Counties. Some critical habitat is designated on BLM-administered lands in the Arizona Strip management area, although the designated sites generally lack some of the primary constituent elements expected for the speciesí habitat. These owls nest primarily in dense older forests of mixed conifer or ponderosa pine/gambel oak type, located on steep slopes, and deep, shady ravines or canyons. Sites with cool microclimates and high canopy closure, high basal area, many snags, and many downed logs appear to be of importance. They use a variety of habitats for foraging, including multi-layered forests with many potential patches. Many of the potentially suitable forested habitats on BLM-administered lands in Arizona are not currently suitable for Mexican spotted owls because they lack or are altered from the old-growth characteristics or dense, multi-storied forest structure found in other parts of the speciesí range. Canyon habitats located on BLM-administered lands are typically considered too hot and dry to provide suitable habitat for the species.

Yellow-billed cuckoo (*Coccyzus americanus*)
This **candidate** species is found in all counties in Arizona except Navajo at elevations less than 6700 ft amsl. It requires large blocks of riparian woodlands (cottonwood-willow galleries or tamarisk thickets). The USFWS has found that the species warrants listing, but other, higher priority listing actions prevent the USFWS from addressing the listing of the cuckoo at this time.

FISH

Fish species that are Federally listed and proposed total 14 species, and many have designated or proposed critical habitat. Many of these species were formerly widespread in the river systems of Arizona, but are now restricted to isolated or reduced populations on a fraction of their former range. Threats to these species typically include man-made changes to the river systems, such as habitat fragmentation, damming, dewatering for agriculture, mining, and urbanization, and competition or predation by introduced non-native fish species.

Bonytail chub (*Gila elegans*)
This **endangered** species is endemic to the Colorado River Basin and is the rarest of the Colorado River fish. Population augmentation is on-going in Lake Mohave and Lake Havasu in Mohave and La Paz Counties, AZ. The species was historically found in the warm, swift, turbid mainstem rivers of the Colorado River basin, but, in Arizona, is now restricted to the two reservoirs in the lower basin. **Critical habitat** designated for this species includes the Colorado River from Hoover Dam to Parker Dam (including Lake Mohave and Lake Havasu) in Arizona.

Desert pupfish (*Cyprinodon macularius*)
This **endangered** species was historically found in Graham, La Paz, Maricopa, Pima, Pinal, Santa Cruz, and Yavapai Counties, AZ at elevations less than 5000 ft amsl. There are no natural populations of this species remaining in Arizona. Reintroduced populations continue to exist at only two sites, Cold Springs (Graham County) and Lousy Canyon (Yavapai County); both sites are on BLM-administered lands. Other reintroduction sites are considered failed or the fish are of questionable heritage. BLM is pursuing a series of introductions into parts of the Aravaipa system, a tributary of the San Pedro River. There are also 14 refugia populations of desert pupfish. **Critical habitat** includes Quitobaquito Springs (Pima County, Arizona), and portions of San Felipe Creek, Carrizo Wash, and Fish Creek Wash (Imperial County, California). These critical habitat segments are located upstream of BLM lands in Arizona and outside the proposed action area in California. Critical habitat designations are primarily pertinent to the Quitobaquito pupfish (*Cyprinodon eremus*), which was considered a subspecies of the desert pupfish at the time of listing. Desert pupfish typically occupy shallow waters of springs, small streams, and marshes, although it tolerates saline and warm water. Sites are often associated with areas of soft substrates and clear water.

Gila topminnow (*Poeciliopsis occidentalis occidentalis*)
This **endangered** species was once the most common fish in the Gila River basin. It historically occurred in most perennial springs, streams, and vegetated margins and backwaters in rivers of the Gila River drainage in Yavapai, Gila, Pinal, Maricopa, Graham, Greenlee, Cochise, Pima, Santa Cruz and Yuma Counties, AZ. Currently, disjunct populations exist in 14 natural locations and 17 re-introduced locations within the Gila River drainage and one location in the Bill Williams River drainage, outside the topminnowís natural range. Of these localities, 15 are springs and the rest are creeks and washes at elevations less than 5000 ft amsl. Many of these natural and reintroduced populations occur on or downstream from BLM-administered lands. In 1998, populations were proposed for reintroductions by BLM into three tributaries of the Agua Fria River (Yavapai County, AZ). This species prefers shallow warm water in a moderate current with dense aquatic vegetation and algae mats.

Razorback sucker (*Xyrauchen texanus*)
Historically, this **endangered** species was once common to many of the rivers of the Colorado River Basin, including the Colorado, Gila, Salt, Verde, and San Pedro Rivers in Arizona, at elevations less that 5000 ft amsl. Presently, as a result of impoundment of large rivers and other habitat alterations, natural adult populations exist only in Lake Mohave, Lake Mead, Lake Havasu, and Horseshoe Reservoir (Mohave, La Paz, and Maricopa Counties, AZ). **Critical habitat** for this species includes the 100-year floodplain and all reservoirs of the lower Colorado River from the confluence with Paria River, through the Grand Canyon, to Imperial Dam; the Gila River from the Arizona/New Mexico border to Coolidge Dam; Salt River from Hwy 60/SR77 Bridge to Roosevelt Dam; and Verde River from the USFS boundary to Horseshoe Reservoir. Razorback suckers use a variety of habitat types from mainstem channels to slow backwaters of medium and large streams and rivers, sometimes around cover. In impoundments, they prefer depths of $\geq$1 meter over sand, mud or gravel substrates. Due to lack of recruitment, the few isolated populations of this species remain small.

Virgin River chub (*Gila seminuda*)
This **endangered** species is restricted to the Virgin River in Utah, Nevada, and Arizona (Mohave County), at elevations between 1500-2500 ft amsl. It has been documented in the Moapa (Muddy) River and the mouth of Beaver Dam Wash. **Critical habitat** has been designated along the main channel of the Virgin River and its 100-year floodplain. These fish are most common in deeper areas where waters are swift, but not turbulent, and are most often associated with boulders or other types of cover. Water in the Virgin

River is generally somewhat warm, turbid, and saline. Populations of this species continue to decline due to habitat modifications, dewatering from agriculture, mining, and urbanization, and management of non-native species.

Woundfin (*Plagopterus argentissimus*)
This **endangered** species historically occupied the lower Colorado River basin including the Virgin, Moapa, Salt and Gila River systems. At present, the woundfin is restricted to approximately 50 miles of perennial reaches of the Virgin River in the states of Utah, Arizona, and Nevada. It is found sporadically throughout the Arizona portion of the Virgin River mainstem in Mohave County at 1500-2500 ft amsl. The Virgin River and its 100-year floodplain have been designated as **critical habitat** for this species. **Experimental populations** (ESA Section 10(j)) have been designated, but not yet introduced, in portions of the Verde, Gila, San Francisco, and Hassayampa Rivers and Tonto Creek. Woundfin prefer the main channel of seasonally swift, highly turbid, and extremely warm, silty streams, with sandy, constantly shifting bottoms. They seemingly avoid clear waters and are very seldom found in quieter pools. Young fish seek quiet backwaters with sandy substrates. Biotic communities along the Virgin River include the Great Basin and Mohave Desert Scrub; the riparian community consists primarily of *Tamarix* spp. Historical habitat has been lost by habitat fragmentation, introduction of nonnative species, and dewatering due to agriculture, mining and urbanization. Damming and drying have caused the disappearance of the woundfin throughout most of its historic range and continue to impact it in the Virgin River.

Yaqui chub (*Gila purpurea*)
This **endangered** species is currently restricted to the San Bernardino and Leslie Canyon National Wildlife Refuges (NWR) (3700-4600 ft amsl), in Cochise County, AZ. **Critical habitat** has been designated on all aquatic habitats of the main portion of the San Bernardino NWR. The San Bernardino NWR is down-slope from a small area (1 square mile) of BLM-administered lands located in the upper part of the drainage approximately 7 miles east of the refuge. Leslie Canyon NWR occurs downslope or adjacent to small parcels of BLM-administered lands. The species occupies deeper pools of small streams near undercut banks or debris, often in association with dense aquatic vegetation, such as low, emergent aquatic plants and hydrophytic tree species (*e.g.*, willows). It is also found in swifter areas with clean, gravel bottoms and abundant growths of algae. Historically, the Yaqui chub was found in springs, cienegas, creeks, and moderately-sized rivers, which typically had alternating riffles and pools.

Yaqui topminnow (*Poeciliopsis occidentalis sonoriensis*)
This **endangered** species is limited to the Rio Yaqui River Basin, and, in Arizona, is restricted to the San Bernardino and Leslie Canyon NWRs in Cochise County, AZ. The San Bernardino NWR is down-slope from a small area (1 square mile) of BLM-administered lands located in the upper part of the drainage approximately 7 miles east of the refuge. Leslie Canyon NWR occurs downslope or adjacent to small parcels of BLM-administered lands. These fish occur at elevations from 3700- 4600 ft amsl in Arizona, and occupy small to moderate-sized streams, springs, and cienegas, generally in shallows.

Beautiful (Yaqui) shiner (*Cyprinella formosa*)
This **threatened** species was extirpated in the United States by 1970, but as of 1991, it was still found in most of its historic range in Mexico. In 1990, this fish was reintroduced into four man-made ponds on the San Bernardino NWR in Cochise County, AZ. **Critical habitat** has been designated on all aquatic habitats of the main portion of the San Bernardino NWR. The San Bernardino NWR is down-slope from a small area (1 square mile) of BLM-administered lands located in the upper part of the drainage approximately 7 miles east of the refuge. The species prefers small- to medium-sized streams and ponds with sand, gravel, and rock bottoms, with associated riparian plant communities, at elevations less than 4000 ft amsl.

Little Colorado spinedace (*Lepidomeda vittata*)
This **threatened** species is endemic to the Little Colorado River and its north flowing tributaries, including the Coconino, Navajo, and Apache Counties, AZ. In Arizona, four populations exist on the mainstem of the Little Colorado River, Nutrioso Creek, Clear Creek, and Chevlon Creek. One population occurring near BLM-administered lands is in Chevlon Creek, which is at least 1 mile downstream or downslope from scattered parcels (1 square mile) of public lands. Other records exist for populations on the Little Colorado River upstream from Lyman Lake near a BLM parcel adjacent to the river. Records also exist for

spinedace occurring in Silver Creek, and habitat on BLM-administered lands along this creek down to and including the confluence with the Little Colorado River would also be considered occupied. **Critical habitat** has been designated on 18 miles of East Clear Creek, eight miles of Chevlon Creek, and five miles of Nutrioso Creek. These fish are most common in slow to moderate water currents, over fine gravel bottoms, at depths of around 2 feet. It prefers unshaded pools with rocks or undercut banks for cover. Associated riparian vegetation includes *Alnus* spp. (alder), *Salix* spp. (willow), *Quercus* spp. (oak), and mixed conifer species. Populations fluctuate dramatically from year to year, and probably reflect cyclic periods of drought and/or increased rainfall. However, populations are thought to be declining due to alteration of habitat through reduced stream flow and interaction with introduced non-native fishes.

Loach minnow (*Tiaroga cobitis*)
This **threatened** species currently persists in Arizona only in limited reaches of Aravaipa Creek, Blue River, Campbell Blue Creek, San Francisco River, Dry Blue River, and the mainstem of the upper Gila River in Apache, Graham, Greenlee, Gila, Pinal, and Navajo Counties. Known populations once present in other rivers and streams of the state have been eliminated. **Critical habitat** was designated in April 2000, and in addition to occupied habitat, it includes habitat in the Arizona counties of Cochise, Pima, and Yavapai, which presently contain no known populations of loach minnow. This benthic fish occupies turbulent, rocky riffles of mainstream rivers and tributaries at elevations from 2325-8200 ft amsl. They prefer moderate to swift current velocity and gravel or cobble substrates, with an open, low growing riparian community composed mostly of grasses and shrubs. This speciesí range has been dramatically reduced and fragmented because of habitat destruction, and competition and predation by introduced fish species.

Spikedace (*Meda fulgida*)
Historically, this **threatened** species was common and locally abundant throughout the Upper Gila River basin of Arizona and New Mexico. In Arizona, this included the Agua Fria, San Pedro, and San Francisco River systems, and the Gila, Salt and Verde Rivers and major tributaries upstream of present-day Phoenix. Presently, these fish are restricted to Aravaipa Creek (Graham and Pinal Counties), Eagle Creek (Greenlee County), and the upper Verde River (Yavapai County) in Arizona, and the upper Gila River system in New Mexico. **Critical habitat** was designated in April 2000, and in addition to occupied habitat, it includes habitat in the Arizona counties of Apache, Cochise, Gila, and Pima, which presently contain no known populations of spikedace. The spikedace occurs at elevations from 1600-4500 ft amsl, occupying midwater habitats of runs, pools, and swirling eddies of moderate to large perennial streams, with gravel cobble substrates and moderate to swift velocities over sand and gravel substrates.

Yaqui catfish (*Ictalurus pricei*)
This **threatened** species historically occurred in San Bernardino Creek as far up as San Bernardino Ranch, Arizona. In Arizona, the species is now restricted to a small population (~350 fish) re-introduced in November 1997 into the Rio Yaqui on the northern portion of the San Bernardino NWR (3730-3780 ft amsl), in Cochise County. **Critical habitat** was designated on all aquatic habitats of the main portion of this NWR. The San Bernardino NWR is down-slope from a small area (1 square mile) of BLM-administered lands located in the upper part of the drainage approximately 7 miles east of the refuge. Habitat for this species includes ponds or streams, and moderate to large rivers, with medium to slow current over sand and rock bottoms; it prefers quiet clear pools. When streams flow intermittently in the dry season, the catfish seeks refuge in permanent, often spring-fed pools.

Gila chub (*Gila intermedia*)
This species is **proposed** for listing by the USFWS. The largest remaining U.S. populations are in southeastern Arizona. Gila chub are found in pools, springs, cienegas and streams (2700-5400 ft amsl) on BLM-administered lands, as well as multiple private lands (*e.g.*, The Nature Conservancy, Audubon Society, and others), in the central and southeastern counties of Arizona. **Proposed critical habitat** for this fish occurs in Cochise, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz, and Yavapai Counties, AZ. This species is also found in Sonora, Mexico.

FLOWERING PLANTS

The Federally listed, proposed, and candidate plants for BLM-administered lands in Arizona totals 12 species. The list is dominated by seven cactus species (Cactaceae family). All of these plants are also protected from collection under the Arizona Native Plant Law as Highly Safeguarded species. Many of these species are desert species growing on very special substrates. From a distributional perspective, the group is focused in northern Arizona and along the deserts of the southwest part of the state.

Arizona Cliffrose (*Purshia subintegra*) Rosaceae
This **endangered** shrub species is endemic to Arizona. It is found in Graham, Maricopa, Mohave, and Yavapai Counties, AZ, at elevations ranging from 2120-4000 ft amsl. Its habitat is characteristically white soils derived from tertiary limestone lakebed deposits within Sonoran Desert Scrub communities. Threats to this species include a low number of populations, poor recruitment rates, herbivory from livestock and burros, and off-highway vehicle use.

Brady Pincushion Cactus (*Pediocactus bradyi*) Cactaceae
The Brady pincushion cactus is listed as **endangered** and occurs only in Coconino County, AZ. It occupies bench and terrace habitats in Great Basin Desert Scrub near Marble Gorge. Substrate is Kaibab limestone chips over Moenkopi shale and sandstone soil. Threats to viability include small and localized populations, illegal collecting, livestock grazing, highway maintenance, off-road vehicles, and other recreation.

Holmgren Milkvetch (*Astragalus holmgrenorium*) Fabaceae
The **endangered** Holmgren milkvetch is found only in Mohave County, Arizona on Arizona State Lands, at elevations ranging from 2700 ft to 2800 ft amsl. Just under limestone ridges and along draws in gravelly clay hills. Two additional populations are known near St. George, Utah. This species is also known as Paradox milkvetch.

Huachuca Water Umbel (*Lilaeopsis schaffneriana* ssp. *recurva*) Apiaceae
This parsley family species is listed as **endangered** and occurs in disjunct populations in Cochise, Pima, and Santa Cruz Counties, AZ. It also occurs in adjacent Sonora, Mexico, west of the continental divide. Populations are on Fort Huachuca Military Reservation. **Critical habitat** is designated in Cochise and Santa Cruz counties (64 FR 37441, July 12, 1999). It is typically found at elevations of 4000-6500 ft amsl, although it may be found as low as 2000 ft amsl. It occupies habitat in cienegas, perennial low gradient streams, and wetlands. Threats to this species include watershed degradation from livestock trampling, diversion of water, dewatering of its habitat, and flash floods.

Kearneyís Blue Star (*Amsonia kearneyana*) Apocynaceae
Kearneyís blue star is Federally **endangered**. It occurs in Pima County, AZ, at elevations of 3600-6400 ft amsl. Its habitat includes west-facing drainages in the Baboquivari Mountains. Plants grow in stable, partially shaded, coarse alluvium along a dry wash.

Nichol Turk's Head Cactus (*Echinocactus horizonthalonius* var. *nicholii*) Cactaceae
This cactus species is Federally **endangered**. It is an isolated subspecies in Arizona and probably Sonora, Mexico of the widespread Chihuahuan *E. horizonthalonius* Lemair. It is found at elevations of 2000-3600 ft amsl in Pima and Pinal Counties, AZ. It is a very slow-growing plant. Its habitat features unshaded microsites in Sonoran Desert Scrub, on dissected alluvial fans at the foot of limestone mountains, and on inclined terraces and saddles on limestone mountainsides.

Peebles Navajo Cactus *(Pediocactus peeblesianus* var. *peeblesianus*) Cactaceae
The Peebles Navajo cactus carries a listing of Federally **endangered**. It occurs only in Navajo County, AZ. Its elevation range is 5100-5650 ft amsl. The habitat for this cactus includes the gravelly soils of the Shinarump conglomerate of the Chinle Formation. Gravel quarrying has destroyed as much as one-fourth of the potential habitat in the area. There are only 1000 individuals left in the wild, and these are sought by collectors and threatened by off-road vehicles, urban development, and continued gravel pit operations.

Pima Pineapple Cactus (*Coryphantha scheeri* var. *robustispina*) Cactaceae
This Federally **endangered** cactus species occurs in Pima and Santa Cruz Counties, AZ, at elevations ranging from 2300-4000 ft amsl. Habitat for this species includes Sonoran Desert Scrub or Semi-desert Grassland communities. It cccurs in alluvial valleys or on hillsides in rocky to sandy or silty soils. Loss of habitat is based on urban development, off-road vehicle use, road construction, agriculture, and mining. Illegal collecting is also a threat to this species.

Jones cycladenia (*Cycladenia humilis var. jonesii*) Apocynaceae
The Jones cycladenia is Federally **threatened**. It occurs in Mohave County, AZ, at elevations from 4390 ft to 6000 ft amsl. Its habitat includes Mixed Desert Scrub, juniper, or wild buckwheat-mormon tea plant communities. It is found on gypsiferous, saline soils of the Cutler, Summerville, Moenkopi, and Chinle formations. It is also found in Emery, Garfield, and Grand Counties, Utah. Populations of this species are threatened by impacts from mineral and oil and gas exploration, and habitat damage from off-road vehicles. This species has very exacting soil requirements and low fruit set.

Siler Pincushion Cactus (*Pediocactus sileri*) Cactaceae
The Siler pincushion cactus has a Federal listing of **threatened**. It occurs in Coconino and Mohave Counties, AZ, at elevations ranging from 2800-5400 ft amsl. Its habitat includes Desert Scrub transitional areas. This cactus grows on gypsiferous clay and sandy soils of the Moenkopi formation.
Acuna cactus (*Echinomastus erectocentrus var. acunensis*) Cactaceae
This cactus is a **candidate** for Federal listing, known to occur in Pima and Pinal Counties, AZ, at elevations ranging from 1300-2600 ft amsl. It typically occurs on well-drained knolls and gravel ridges in Sonoran Desert Scrub communities. The Organ Pipe Cactus National Monument population is stable; however others are at risk from illegal collecting.

Fickeisen Plains Cactus (*Pediocactus peeblesianus var. fickeiseniae*) Cactaceae
This federal **candidate** cactus species is an Arizona endemic found in Coconino and Mohave Counties at elevations of 4000-5450 ft amsl. Its habitat includes exposed layers of Kaibab limestone on canyon margins, or hills of Great Basin Desert Scrub. Threats to this species variety include illegal collection, trampling by livestock, off-road vehicle use, insect and rodent predation, road construction and maintenance, and mining.

MAMMALS

Federally listed and candidate mammals in Arizona totals 8 species. Several of these species were extirpated from the state, and have recovery programs that are currently reintroducing populations or have plans to re-establish populations by natural migration or reintroductions in the future (10-20 years). Habitats on BLM-administered lands either currently or are expected to play an important role in these recovery programs.

Black-footed ferret (*Mustela nigripes*)
No wild populations of this **endangered** species currently exist in Arizona. One reintroduced population has been established in the Aubrey Valley on tribal lands in northwestern Arizona, designated as an **experiment/non-essential** site under the Endangered Species Act (Section 10(j)). Black-footed ferrets require established prairie dog towns for food and shelter, which often occur in Plains Grassland and Great Basin Grassland. In Arizona, the historical range probably coincided with that of the Gunnison's prairie dog (*Cynomys gunnisoni*) north of the Mogollon Rim but south of the Colorado River, and possibly that of the black-tailed prairie dog (*C. ludovicianus*) below the Rim in Graham and Cochise counties. A recent survey of Gunnisonís prairie dog towns in Arizona resulted in no new potential sites for black-footed ferret reintroductions. However, the Arizona Game and Fish Department continues to pursue ferret reintroductions, and BLM-administered lands may provide suitable sites within the next 15-20 years.

Hualapai Mexican vole (*Microtus mexicanus hualpaiensis*)
This **endangered** species is confirmed only in the Hualapai Mountain Range and possibly in the Prospect Valley and Music Mountains, in Mohave, Coconino, and Yavapai Counties, AZ, at elevations between 2000-7000 ft amsl. Ongoing research may verify the species in additional locations. These voles inhabit

grass/forb habitats in ponderosa pine, typically near water. They are also found in pinyon-juniper and pine-oak associations with a variety of shrubs and grasses.

Jaguar (*Panthera onca*)
No breeding populations of this **endangered** species are known to exist in the United States. Individuals occur in the Southwest as occasional wanderers from Mexico. The historical range of the jaguar included the mountainous regions of eastern Arizona (Cochise, Santa Cruz, and Pima Counties), southwestern New Mexico and northeastern Sonora, Mexico. The jaguar likely occurred as a resident species only in southeastern Arizona although historic records extend north to the Grand Canyon. In Arizona, jaguars have been sighted in a variety of ecological communities, from Sonoran desert scrub through subalpine conifer forest (1600->9800 ft amsl). Jaguars have shown an affinity towards areas with dense plant cover, an abundance of prey, and the presence of water. Most records are from Madrean evergreen-woodland, shrub-invaded semi-desert grassland, and along rivers, which were likely used as travel corridors. BLM-administered lands may play a role in the recovery of this species.

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)
This **endangered** species is migratory, present in southern Arizona (Cochise, Gila, Graham, Pima, Pinal, Maricopa, and Santa Cruz Counties) usually from April to September. These bats inhabit Desert or Semidesert Grassland and desert shrub (PaloVerde/Saguaro) up to Oak Woodland transition habitats (1200-7300 ft amsl). They forage mainly on agave and columnar cacti blooms in paloverde-mixed cacti vegetation. The bats typically day-roost in caves and abandoned tunnels. In April, pregnant females congregate at traditional maternity roost sites; males and perhaps nonpregnant females arrive in July. By late September or October, the bats migrate south to unknown locations in Mexico for the winter. Significant population declines are thought to be associated with reduced numbers and size of maternity colonies in Arizona and Sonora due to exclusion and disturbance.

Mexican gray wolf (*Canis lupus baileyi*)
This **endangered** species has been reintroduced as an **experimental/nonessential** population (Endangered Species Act, Section 10(j)) in the Blue Primitive Area of Greenlee, Apache, and Coconino Counties, Arizona. Unconfirmed sightings of individuals have been reported in the southern part of the state (Cochise, Pima, and Santa Cruz Counties). Its historic range included eastern and central Arizona, the Mogollon Plateau, southern New Mexico, western and central Texas and the Sierra Madre Occidental area of western Mexico. Habitat types are primarily chapparal, pine-oak woodlands, pinyon-juniper forests, riparian areas, and grasslands above 4000 ft amsl. Individuals may also cross desert areas.

Ocelot (*Leopardus* [=*Felis*] *pardalis*)
This **endangered** species is considered extirpated from Arizona, although unconfirmed reports of individuals in the southern part of the state (Cochise, Pima, Santa Cruz Counties) continue to be received. It occurs at elevations <8000 ft amsl, typically occupying humid tropical and subtropical forests, savannahs, and semi-arid thornscrub. It may persist in partly-cleared forests, second-growth woodland, and abandoned cultivation reverted to brush. A primary habitat component is the presence of dense cover. Recovery programs for the ocelot include evaluating potential habitat for reintroductions over the next 10-15 years in southern Arizona (*e.g.*, San Pedro area), which may include BLM-administered lands.

Sonoran pronghorn (*Antilocapra americana sonoriensis*)
Historically, this **endangered** desert subspecies of antelope inhabited southwest Arizona and the northern part of Sonora, Mexico, but its population has been reduced to two small groups (estimated 150 individuals in Arizona; 250 in Mexico). The Arizona population survives in the arid flatlands of the Barry M. Goldwater Range, Organ Pipe Cactus National Monument, and Cabeza Prieta National Wildlife Refuge, with occasional sightings on Bureau of Land Management lands (Pima, Maricopa, and Yuma Counties). Within the Sonoran desert, these antelope are found in broad, alluvial valleys, with creosote-bursage and paloverde-mixed cacti associations, separated by granite mountains and mesas, at elevations from 340-2000 ft amsl. Vegetation is scarce throughout most of its habitat due to little and sporadic rainfall.

Black-tailed prairie dog (*Cynomys ludovicianus*)
This **candidate** species is currently extirpated from Arizona. Historically, this species was found in Pima, Cochise, and Graham Counties, AZ, inhabiting burrows in plains and grassland habitats at elevations from 3000-5500 ft amsl. These prairie dogs occur 5 miles south of the Arizona border in Mexico and have been reintroduced in southwestern New Mexico. With the current conservation efforts for this species, black-tailed prairie dogs may re-establish in Arizona in the next 10-15 years, either naturally or through reintroductions. BLM-administered lands may play a role in the speciesí recovery.

REPTILES

Two reptile species in Arizona are Federally listed as threatened. The Mohave population of the desert tortoise, which occurs north and west of the Colorado River, is actively managed by the Arizona Strip, Lake Havasu, and Yuma Field Offices. BLM has also participated in studies on the effects of wildfire on tortoises and their habitat. The New Mexico ridgenose rattlesnake has only a few reported sites in eastern Arizona.

Desert tortoise, Mohave population (*Gopherus agassizii*)
The Mohave population of the desert tortoise is listed as **threatened**, and includes all tortoises north and west of the Colorado River. In Arizona, this includes Mohave County north of the river, west of the Beaver Dam Mountains, north of the Virgin Mountains, and in the Pakoon Basin (Arizona Strip Field Office). In California, this includes lands in the western-most portions of San Bernardino, Riverside, and Imperial Counties, within the management areas of the Lake Havasu and Yuma Field Offices. These tortoises are still found throughout their range, but populations are fragmented and declining. BLM has classified desert tortoise habitat into three categories based on habitat quality, tortoise population densities, and management potential for tortoises. Habitat for the Mohave population includes sandy loam to rocky soils in valleys, bajadas, and hills in Mohave desert scrub and the Lower Colorado River Valley subdivision of the Sonoran Desert, with elevations ranging from 500-5100 ft amsl. The Mohave population occurs in plant communities dominated by creosotebush and other sclerophyll shrubs with small cacti and, in some areas, abundant Joshua trees.

New Mexico ridgenose rattlesnake (*Crotalus willardi obscurus*)
This **threatened** snake species has been documented on USFS lands in the Peloncillo Mountains (Cochise County, AZ), with only three known records in Arizona. It primarily inhabits canyon bottoms in pine-oak communities at elevations of 5000-6600 ft amsl.

CONSERVATION AGREEMENT AND MANAGEMENT PLAN SPECIES

Four species were formerly considered Category 2 candidate species for listing by the USFWS, but a change in regulations removed their Federal status. They include two reptile (lizard, tortoise), one cactus, and one fish species. These are currently considered Federal species of concern, and BLM participates in Conservation Agreements (3 species) and Management Plans (1 species) to manage these priority species.

Flat-tailed horned lizard (*Phrynosoma mcallii*)
The Conservation Agreement for this species was finalized in May 1997. This species of concern is found in Yuma County, Arizona, and in central Riverside County and Imperial County, California, within the management area of the BLM Yuma Field Office. This species inhabits sandy flats, dune-fringe areas, or areas with deposits of fine, windblown sand, at elevations less than 540 ft amsl. The creosote-white bursage series of the Sonoran Desert dominates these sites.

Paradine (Kaibab) plains cactus (*Pediocactus paradinei*)
The Conservation Agreement for this species was signed in February 1998. This species of concern is found in Coconino County, Arizona, within the management area of the BLM Arizona Strip Field Office. This cactus species occupies sites in pinyon-juniper woodland and shrub/grassland at elevations of 5000-7200 ft amsl.

Virgin spinedace (*Lepidomeda mollispinis mollispinis*)
The Conservation Agreement for this species was finalized in 1995. This species of concern is limited to the tributaries and the mainstem of the Virgin River at the mouth of tributaries. In Arizona, it occurs in Mohave County, within the management area of the BLM St. George Field Office. This fish species occupies clear, cool, relatively swift streams with scattered pools at elevations of about 1800 ft amsl. It is also found in Washington County, Utah and Clarke County, Nevada.

Desert tortoise, Sonoran population (*Gopherus agassizii*)
All Arizona BLM Field Offices manage the Sonoran population of the desert tortoise on public lands under the *Management Plan for the Sonoran Desert Population of the Desert Tortoise in Arizona* (Arizona Interagency Tortoise Team), finalized in December 1996. The Sonoran population includes those tortoises south and east of the Colorado River, including Cochise, Gila, Graham, La Paz, Maricopa, Mohave, Pima, Pinal, Santa Cruz, and Yavapai Counties, Arizona. BLM has classified desert tortoise habitat into three categories based on habitat quality, tortoise population densities, and management potential for tortoises. The Sonoran population occurs primarily on rocky slopes and bajadas of Mohave and Sonoran desert scrub, at elevations ranging from 508-5250 ft amsl. Habitats include a variety of biotic communities within the Upland and Lower Colorado River Valley subdivisions of the Sonoran Desert, but are most often paloverde-mixed cacti associations, as well as ecotonal areas consisting of Sonoran desertscub with elements of Mohave desert scrub, desert grassland, interior chaparral, and juniper woodland. Caliche caves in incised, cut banks of washes (arroyos) are also used for shelter sites, especially in the Lower Colorado River Valley subdivision.

Appendix G ñ Cultural Resource Site Types in Arizona

Prehistoric Archeological Sites

Village (Rancheria)	Usually a permanent habitation area for several families over an extended period of time.
Temporary Camp	A temporary habitation area.
Farm Camp	Temporary camp occupied during planting or harvesting times; usually found along the Colorado River.
Trail Camp	Very temporary camp used for a night or two during migrations.
Hunting/Gathering Camp	Temporary camp used for a few weeks as a base camp for hunting and gathering activities.
Rock Shelter	A temporary camp found within a natural rock shelter.
Cleared Circle	Also known as ìSleeping Circles,î a cleared and/or smoothed depression area on desert pavement terraces, usually used for sleeping.
Rock Circles	Usually a cleared area with rocks around the edge, thought to have served as anchors for temporary brush huts.
Quarry/Lithic Source	A source area for raw lithic materials used for tool manufacture, or for minerals used for paints.
Roasting Pit	A concentration of thermally affected rocks usually with ash in the soil. These may occasionally be cremation sites.
Rock Cairn	A trail marker, monument, or ìshrineî resulting from stones placed in a pile or cluster.
Midden	A refuse area usually associated with permanent or semi-permanent annually occupied villages or camps.
Milling Station	A food preparation area where one or more grinding stones (metates, mortars, or pestles) are present.
Knapping Station	An area where cores or raw lithic materials were reduced to blanks, performs, or tools, evidenced by concentrations of large chunks or flakes of the same material.
Lithic Scatter	A location used to manufacture a lithic tools, as evidenced by a scatter of lithic flakes or cores.
Ceramic Scatter	A location with scattered broken pottery sherds, possibly the result of the breakage of a single vessel.
Hunting Blind	A semi-walled locality, usually on hilly or mountainous slopes, used to hunt primarily bighorn sheep and deer.
Kill Site	A location where large animals (such as bison or mammoth) have been killed and/or butchered.
Burial/Cremation	Evidence or human burial or cremation, the latter usually containing ash and pieces of human bone.

Trail	An aboriginal footpath used to travel from area to area. Trails are primarily identified by association with artifacts and/or features.
Aboriginal Art	Geometric, zoomorphic, or anthropomorphic design created by aboriginal peoples.
Petroglyphs	Designs pecked, rubbed, or scratched onto rock.
Pictographs	Designs painted on rock.
Intaglios	Large designs created on desert pavement by removal of surface gravel..
Rock Alignments	Large designs created by the alignment of rocks and gravel.
Isolated Artifacts	Artifacts, such as pottery sherds, lithic tools, etc., found without association to an identifiable site.

Historic Archeological Sites

Mine	Evidence of ore removal for mineral extraction, i.e., pits, holes, shafts, adits, tailings, etc.
Mill	Structures (or the remains of structures) associated with processing minerals.
Town	Aggregation of structures and other physical remains of a multifamily occupation in historic periods.
Home or Cabin	Single structure and associated physical remains of a single person or family occupancy.
Corrals and Fences	Open-air structures pertaining to containment of horses, cattle, or other livestock.
Historic Campsite	Evidence of temporary occupation by one or more families. Usually associated with temporary mining or river-related activities.
Road or Trail	Evidence of historic use as a wagon or pack train route.
Military	Site of a military camp or other activities. Primarily remnants of General Pattonís World War II maneuvers.
Trash Dump	Historic refuse associated with any of the above.
Grave	One or more historical burials.

Traditional Cultural/Religious Sites

Ceremonial Site	A prehistoric or historic area of sacred character. Physical evidence of ceremonial activities are usually present in the form of dance patterns, vision quest circles, intaglios, rock cairns, etc.
Sacred Area	A prehistoric or historic area of sacred character. Evidence of physical activities is not always present. Certain mountaintops, power places and vision quest locations are examples of sacred areas.
Traditional Use Area	An area of traditional use for hunting, gathering (of food or medicinal plants), fishing, or traveling.

Adapted from Lower Gila South RMP (Appendix 17) and Final Yuma District RMP (Table 3-1)

Appendix G ñ Arizona Chronology*

Paleoindian Period 11,500 BC ñ 5,000 BC	Earliest known human occupation of North America, Paleoindians were small (20-30 individuals), nomadic groups which, utilizing distinctive Clovis technology, hunted mammoth and other megafauna. Many of the large game animals became extinct before the later phases of the Paleoindian Period (Folsom, Plano), although exploitation of resources such as *Bison antiquis* continued.
Archaic Period 8,000 BC ñ 1 AD	In the Early Archaic, small family groups of hunter-gatherers ranging over large territories, often using caves and rockshelters for base camps. Greater reliance on plants for food. Increasingly marginal environmental conditions necessitated improvements in technology. Use of baskets, milling stones, and a variety of different types of points and ground stone tools. The introduction of ceramics and horticulture (beans, corn, and squash) from Mesoamerica towards the end of the Archaic contributed to the development of more permanent settlements along the river valleys. Use of storage pits and other techniques for food preservation.
Ancestral Puebloan Period 1000 BC ñ 1300 AD	Considered ancestral to modern Pueblo Indians, this culture occupied the Four Corners region, including northeastern Arizona. Agriculture became an important component of Ancestral Puebloan culture around 500 AD, and by 700 AD, pit houses were replaced by pueblo architecture. It is believed that climatic changes and/or social conflict beginning around 900 AD caused the abandonment of settlements by 1300 AD.
Hohokam Period 150 AD ñ 1450 AD	Predominant in south-central Arizona. Increased importance of agriculture and a settled lifestyle; advanced irrigation techniques. Settlement patterns became more sophisticated over time: early pithouse clusters gave way to rock and adobe construction in the Classic Period. Settlements also exhibited similarities to Mesoamerican sites, with courtyard spaces and ceremonial ball courts. The ruins of Casa Grande, a four-story structure build in the mid-1300s with apparent ceremonial/astronomical significance reflect the sophistication of the Hohokam Classic Period.
Mogollon/Mimbres Period 200 AD ñ 1450 AD	Centered in southern New Mexico and West Texas (Rio Grande Valley), the Mogollon culture also extended into southeastern Arizona, and was generally contemporary with the Hohokam. Transition from pithouse to pueblo-style villages of up to 100 dwellings surrounding central plazas. Characteristic black-on-white pottery during the Mimbres Classic period. The abandonment of the Mimbres region occurred after AD 1300, although cultural elements are found as far west as the Salado Region (Tonto Basin).
Salado Period 1150 AD ñ 1450 AD	The Salado Indians occupied the Tonto Basin area, generally in the region between the middle Salt River and Tonto Creek, and in the rugged upper Sonoran Desert near the edge of the Mollogon Rim. The Salado practiced simple irrigation of crops (corn and beans) and utilized native plants such as yucca and agave. Food was stored in large beehive shaped granaries made of baskets lined with adobe and placed on low rock pedestals. Polychrome pottery made from red clay is characteristic of the Salado. Structures were typically cobble and adobe (similar to Hohokam masonry) and were organized into protected compounds around a central plaza. Platform mounds (ex. Cline Terrace Mound) began to be constructed around 1280 AD. The Salado abandoned these villages for cliff dwellings during the late 1300s, ultimately abandoning the Tonto Basin by 1450 AD.
Numic (Southern Piaute) Period 1150 AD - Present	Located in northwestern Arizona and neighboring areas, the Southern Paiute belong to the Ute-Chemehuevi group of the Numic (Shoshonean) branch of the Uto-Aztecan stock. Primarily hunter-gatherers who later supplemented their subsistence by adopting Puebloan agricultural techniques.
Piman (Oíodham) Period 1500 AD - Present	Considered descendants of the Hohokam, the Piman occupy the Sonoran desert. They are agriculturalists, utilizing irrigation canals along the Gila and Salt Rivers and cultivating corn, beans and squash. Characteristic coiled basketry.
Navaho/Apache Period Mid 1500s - Present	The Navajo, of Athabascan stock, entered the Southwest as early as 1350 AD, and by the 17th century they centered in the areas between the San Juan and Little Colorado Rivers in northeastern Arizona. They raised sheep and also participated in raids, sometimes with the Apache, against neighboring Puebloans. Nomadic hunters and warriors, the Apache, a southern branch of the Athabascan linguistic stock, began moving into the southeastern portion of present-day Arizona in the mid-1500s as a result of pressures from Comanches in Texas and New Mexico.
Puebloan/Hopi Historic Period 1540 AD ñ Present	The Hopi language belongs to the Uto-Aztecan branch of the Aztec-Tanoan linguistic stock. The Hopi are considered decendants of the Ancestral Puebloans, and utilize advanced building and agricultural techniques, with elaborate social and ceremonial systems.
Spanish-Mexican Period 1540 AD ñ 1854 AD	In 1539 the Spanish explorer Fray Marcos de Niza traveled through Arizona, followed by a larger expedition under Coronado a year later. Settlement by the Spanish brought disease (smallpox in 1520 and measles in 1729) and general disruption and decline to the native populations. Establishment of numerous forts (presidios) and missions. Spanish rule was followed by incorporation of the area into the Mexican Republic after 1824. The loss of most of Northern Mexico (including present-day Arizona) to the United States during the Mexican-American War (1846-1848) and the subsequent Gadsden Purchase in 1854, encompassing southern Arizona and the southernmost portion of New Mexico, marked the end of Hispanic control.
Anglo-American Period 1854 ñ Present	After the Mexican-American War, present-day Arizona was included in the New Mexico territory. In August 1861 the Territory of Arizona was created and seceded from the Union; in 1863, the United States Government recognized the Territory of Arizona and established the present boundaries. Influx of Anglo-American settlers from 1865 to 1900. Arizona attained statehood in 1912.

*Dates are approximate.

Appendix G ñ Selected Cultural Resources Localities on BLM-Managed Lands

Field Office	Locality	Type	Description
AZ Strip	Paria Canyon and Paria Plateau	Prehistoric	Large variety of sites including pithouses, masonry features, habitation structures, granaries, storage cists, hearths, lithic scatters, campsites, rock art, rock shelters, and trails. The Paria Plateau Archeological District (constituting 70,000 acres and 416 sites) was determined eligible for the NRHP in 1976.
AZ Strip	Moonshine Ridge	Prehistoric	Pinyon-juniper woodland with water sources at mesa footlands. High potential for prehistoric sites.
AZ Strip	Lost Spring Mountain	Prehistoric	Rock shelters, masonry features, and rock art associated with this location.
AZ Strip	Johnson Spring ACEC	Prehistoric	Rock shelters and rock art.
AZ Strip	Little Black Mountain	Prehistoric	Over 500 rock art designs on cliffs and boulders at the base of the mesa.
AZ Strip	Mount Trumbull and the Uinkaret Plateau	Prehistoric	The Mount Trumbull Archeological District (18,250 acres and 72 sites) was determined eligible for the NRHP in 1976. The area was occupied by 2600 BC, based on split twig figurines found in canyon rock shelters, and by 1 AD, the fertile soils of the area were being exploited by the Ancestral Puebloans, who established habitation sites in the area. Evidence of Paiute occupation has been noted. Nampaweap, a significant rock art site, is a half-mile long site with thousands of rock art elements. Antelope Cave, an Archaic occupation with overlying Ancestral Puebloan occupation, located on the Uinkaret Plateau, was listed on the NRHP in 1975.
AZ Strip	Old Spanish Trail	Historic	Historic overland trade route from New Mexico to California, established ca. 1829 by Antonio Armijo, a New Mexico trader.
AZ Strip	Temple Trail	Historic	Extends from St. George, Utah to sawmill sites on Mt. Trumbull. The sawmills and trail were established in 1872 by members of the Church of Jesus Christ of Latter-Day Saints to transport lumber to their Temple in St. George.
AZ Strip	Honeymoon Trail (Old Arizona Road)	Historic	Originating at the St. George Temple and established in 1871, this trail diverges from the Temple Trail at the Hurricane Cliffs near Antelope Spring, and into southern Arizona and northern Mexico.
AZ Strip	Mount Trumbull	Historic	Livestock/farming center established in 1916. The Mount Trumbull Schoolhouse and the Mount Trumbull Sawmill Site are preserved as interpretive sites.
Kingman	Joshua Tree Forest	Prehistoric	Large roasting pits near Grand Wash Cliffs.
Kingman	Wright Creek	Prehistoric	Cohonina campsites and Prescott Pueblo sites.
Kingman	Black Mountains	Prehistoric	Bighorn Cave and other rock shelters; polychrome pictographs and petroglyphs.

Field Office	Locality	Type	Description
Kingman Lake Havasu	Lower Colorado River Area	Prehistoric	Extensive (36 sq. mi.) macro-flaking industry, trails, petroglyphs and rock rings.
Kingman	Cerbat Mountains	Prehistoric Historic	Extensive prehistoric and historic mining sites.
Kingman	Carrow-Stephens Historical Area (ACEC)	Historic	19th century ranch site along Big Sandy Creek.
Kingman	Beale-Mojave Road	Historic	Wagon road and old Indian trail. Stone cabins dating from the 1860ís, associated with prospecting Fort Mojave troops.
Lake Havasu	Burro Creek	Prehistoric	Prescott Culture pueblos and camp sites; obsidian sources.
Safford	San Pedro River Valley	Prehistoric	Paleoindian kill sites; Salado village sites.
Safford	Gila Mountains	Prehistoric	Ancestral Puebloan sites in Bonita Creek Canyon.
Safford	Turkey Creek	Prehistoric	Salado cliff dwelling established ca. 1300 A.D. in the northern foothills of the Galiuro Mountains.
Tucson	Lehner Mammoth Kill Site	Prehistoric	Kill site dating to 11,000 B.C, with significant Clovis component (9000 B.C.). A designated National Historic Landmark.
Tucson	Fairbank Historic Townsite	Historic	Ghost town established in 1881 as an important railroad depot. Located within the San Pedro Riparian National Conservation Area (NCA), along the San Pedro River. Many structures associated with the town have been preserved.
Yuma	Antelope Hill	Prehistoric	Prehistoric and historic petroglyphs on the volcanic basalt outcrop adjacent to the Gila River. This area was also used as a quarry for grinding stones.
Yuma	Sears Point	Prehistoric Historic	Prehistoric and historic petroglyphs adjacent to the Gila River. Abundant archeological features in this area, including sleeping circles, rock shelters, lithic and ceramic scatters, rock alignments, shrines/cairns, and geoglyphs.
Yuma	Fisherman Intaglio	Prehistoric	One human figure and other designs (fish, sun) near the Plomosa Mountains, northeast of Quartzite, Arizona.

APPENDIX H ñ Summary of the Biological Evaluation for the BLM Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management

In accordance with Section 7(a)2 of the Endangered Species Act of 1973, as amended, the Bureau of Land Management (BLM), Arizona State Office, requested formal consultation and conference for the BLM Arizona Statewide Land Use Plan Amendment and Environmental Assessment for Fire, Fuels, and Air Quality Management. A Biological Evaluation was written that provided detailed analyses of all federally listed (endangered or threatened), proposed, and candidate species, as well as designated or proposed critical habitat, that may be affected by the proposed action. Development of this BE was guided by the Regulations on Interagency Cooperation (Section 7 of the ESA) in 50 CFR Part 402 and BLM Manual 6840, and it followed the U.S. Fish and Wildlife Service (USFWS) Arizona Ecological Services Office (AESO) outline as found in Attachment B of the Consultation Agreement for this project. All anticipated environmental effects, conservation actions, mitigation, and monitoring are disclosed in the BE. This included analysis of all direct and indirect effects of the Proposed Action, including any interrelated and interdependent actions, on listed, proposed, or candidate species (as a group, considered as ìFederally protected speciesî), and designated or proposed critical habitat, from the analysis of the actions in the Statewide LUP Amendment and EA.

The planning area for the proposed Statewide LUP amendment includes all BLM-administered public lands within the state of Arizona and those portions of California administered by the Yuma and Lake Havasu Field Offices. Within the project area, 30 endangered species, 12 threatened species, one species proposed for listing, and five species that are candidates for listing inhabit either BLM-administered lands in Arizona or adjacent Federal, state, reservation, or private lands that could be affected by fire suppression or the proposed fire management activities (see **Table 3.6** of this EA). These 48 Federally protected species can be grouped as follows: two amphibians, 10 birds, 14 fish, 12 flowering plants, eight mammals, and two reptiles. Based on discussions and analyses during informal consultation, determinations were made that the proposed action would have no effect on 25 species within the action area of the project (see Appendix B of the BE).

The proposed action analyzed in the BE was the amending of BLMís seven existing Land Use Plans (LUPs) to comply with current fire policy and guidance and to fully integrate fire and fuels management and direction found in the latest Department of Interior (DOI) and BLM resource program guidance for lands administered by BLM. As described in the EA for the project, the LUP Amendment would establish **Desired Future Conditions, Land Use Allocations,** and **Management Actions, including Conservation Measures,** and would amend existing LUP decisions concerning fire, fuels, and air quality management. The BE analyzed the effects to Federally protected species from each of the proposed treatment methods for fire and fuels management, including wildland fire use, prescribed fire, and mechanical, chemical, and biological vegetation treatments.

In addition to the proposed fire management activities, the BE analyzed the effects to Federally protected species from fire suppression activities within the planning area. Currently, fire suppression operations that occur on BLM-administered lands in or near sites occupied by federally listed, proposed, or candidate species, or designated or proposed critical habitat, require emergency consultation or conference to comply with Section 7 of the Endangered Species Act, as amended. The proposed action would include continued

fire suppression operations in some locations that are not suitable for implementing the proposed treatment methods. In addition, fire suppression operations would occur during wildland fire use and prescribed fire activities. Under the proposed action, general and species-specific Conservation Measures would be implemented to the extent possible during fire suppression activities on BLM-administered lands. The implementation of these Conservation Measures and broad analysis of fire suppression activities would result in greater consistency statewide in minimizing potential direct, indirect, and cumulative effects to listed, proposed, and candidate species within the action area. This comprehensive analysis would also minimize or eliminate the future need for emergency consultation when fire suppression activities occur within the range of listed, proposed, or candidate species or their critical habitats.

Because of the planning-level of the analysis, no fieldwork was conducted to obtain site-level species information. Instead, the method used to develop the Conservation Measures and analyze the effects of the proposed action included 1) gathering information on species distribution, habitat and life history requirements, and response to wildfire, fire suppression, prescribed fire, and vegetation treatments from government and scientific references, internet sources, and species experts or resource managers in Federal, State, or non-governmental agencies; 2) generating GIS or other distribution maps for each species to assess the proximity of species locations and habitats to BLM-administered lands, and to determine the likelihood that fire suppression and the proposed fire management actions would affect those species; and 3) generating GIS maps depicting vegetation communities (GAP vegetation) and recent fire reports, land-ownership, historical/natural fire frequency regimes, and current condition of fire frequency regimes. The maps were then used in conjunction with the species and habitat information to consolidate and develop the Conservation Measures and to analyze the effects of the proposed action on the Federally listed, proposed, and candidate species within the action area.

The BE provides species-specific analyses for each of the 48 species that may be affected by fire suppression or the various treatment elements of the proposed action. Information for each species provided in the BE includes species life history, species status and distribution, affected habitat, and an analysis of the direct and indirect effects from fire suppression and each proposed fire management activity (wildland fire use, prescribed fire, and mechanical, biological, and chemical vegetation treatments). Potential effects to each Federally protected wildlife, fish, or plant species are similar to those listed in **Section 4.9.2** of this EA, which generally describes direct and indirect effects of the proposed action on special status species. The BE also provides an analysis of the cumulative effects of actions on state and private lands that may affect each species. Finally, for each species and designated or proposed critical habitat, a determination of ìmay affect, and is likely to adversely affectî (LAA) or ìmay affect, but is not likely to adversely affect î (NLAA) was then concluded from the species-specific analysis. **Table 4.7** of this EA provides a summary of the effects determination for each species and critical habitat analyzed in the BE.

In many cases, the determination of ìmay affect, and is likely to adversely affectî stems from potential effects to the species from fire suppression operations, and not the proposed fire management actions. Because of the low tolerance of either the species or its habitat to fire use activities (wildland or prescribed fire use) or vegetation treatments, or a lack of accumulated hazardous fuels, preliminary projections by BLM estimated that the proposed fire management activities would not be implemented in habitats occupied by 28 of the 48 Federally protected species or associated critical habitats analyzed in the BE. Thus, the proposed fire management actions would not directly or indirectly affect these species. At these locations, all wildfires would be fully suppressed, and thus any potential direct or indirect effects to the species would be from fire suppression operations. Conservation Measures (see **Appendix D** of this EA) would be implemented to the extent possible in sites occupied by Federally protected species to minimize or eliminate effects of suppression activities to the species, although effects of fire suppression operations would be balanced with the need to minimize effects of the wildfire itself and the need to protect firefighter and public safety. The

Incident Commander would have the final decision-making authority on implementation of Conservation Measures during fire suppression operations. For the remaining 20 species, one or more of the proposed fire management actions may be implemented in habitats supporting the species to reduce accumulated hazardous fuels or restore forest or rangeland habitat conditions. Mandatory Conservation Measures (see **Appendix D**), including pre-project surveys, seasonal or distance restrictions, and minimizing human or surface-disturbing activities in or near occupied sites, would be implemented to minimize or eliminate any potential direct or indirect effects to the species. Final determinations for which fuels treatments, if any, would be implemented in or adjacent to habitats occupied by Federally protected species would be determined during pre-project planning and environmental analyses in Fire Management Plans and site-specific project level plans.

Through the species-specific analyses in the Biological Evaluation, the BLM determined that the proposed project (including both fire suppression operations and the proposed fire management actions) may affect, and is likely to adversely affect, the following 29 Federally listed species: Chiricahua leopard frog, cactus ferruginous pygmy-owl, southwestern willow flycatcher, Yuma clapper rail, bald eagle, Mexican spotted owl, desert pupfish, Gila topminnow, razorback sucker, Virgin River chub, woundfin, Yaqui chub, Yaqui topminnow, Little Colorado spinedace, loach minnow, spikedace, Arizona cliffrose, Brady pincushion cactus, Holmgren milk-vetch, Huachuca water umbel, Kearneyís blue-star, Nichol turkís head cactus, Peebles Navajo cactus, Pima pineapple cactus, Jones cycladenia, Siler pincushion cactus, Hualapai Mexican vole, desert tortoise (Mojave population), and New Mexico ridge-nosed rattlesnake; as well as designated critical habitats for the Mexican spotted owl, razorback sucker, Virgin River chub, woundfin, Little Colorado River spinedace, loach minnow, spikedace, Huachuca water umbel, and desert tortoise (Mojave population). Through formal consultation under the Endangered Species Act, as amended, the BLM requested that the USFWS prepare a Biological Opinion for these 29 species and nine critical habitats.

Additionally, the BLM determined that the proposed project may affect, but is not likely to adversely affect, the following 11 Federally listed species: California brown pelican, masked bobwhite, northern aplomado falcon, bonytail chub, beautiful shiner, Yaqui catfish, black-footed ferret, jaguar, lesser long-nosed bat, ocelot, and Sonoran pronghorn; as well as designated critical habitats for the bonytail chub, Yaqui chub, beautiful shiner, and Yaqui catfish. The BLM requested that the USFWS provide written concurrence with the determinations for these 11 species and four designated critical habitats.

BLM policy in Manual Section 6840 requires BLM to confer on proposed species at the ìmay affectî level. The BLM determined that the proposed project may affect, and is likely to adversely affect, the proposed endangered Gila chub and the 10(j) population (equivalent to a ìproposedî status) of the Federally listed California condor, as well as proposed critical habitats for the Gila chub and cactus ferruginous pygmy-owl. Through formal conference under the Endangered Species Act, as amended, the BLM requested that the USFWS prepare a Conference Opinion for the these two species and two proposed critical habitats, such that the Conference Opinion could be converted to a Biological Opinion should the species be listed or should critical habitat be designated later. The BLM also requested written concurrence from the USFWS with a finding of ìmay affect, not likely to adversely affectî for the 10(j) population (equivalent to ìproposedî status) of the Federally listed Mexican gray wolf.

Finally, under the Memorandum of Agreement on Section 7 Programmatic Consultations (2000), the BLM requested recommendations from the USFWS based upon the effects analyses and determinations for the following five candidate species: relict leopard frog (NLAA), yellow-billed cuckoo (LAA), AcuÒa cactus (LAA), Fickeisen plains cactus (LAA), and black-tailed prairie dog (NLAA).

GLOSSARY

AIR QUALITY The composition of air with respect to quantities of pollution therein; used most frequently in connection with "standards" of maximum acceptable pollutant concentrations. Used instead of "air pollution" when referring to programs.

CANOPY The stratum containing the crowns of the tallest vegetation present, (living or dead) usually above 20 feet.

CATASTROPHIC (Severe wildland fire) Fire that burns more intensely than the natural or historical range of variability, thereby fundamentally changing the ecosystem, destroying communities and/or rare or threatened species/habitat, or causing unacceptable erosion.

CLEAN AIR ACT A federal law enacted to ensure that air quality standards are attained and maintained. Initially passed by Congress in 1963, it has been amended several times.

CONDITION CLASS Based on coarse scale national data, Fire Condition Classes measure general wildfire risk as follows:

> Condition Class 1. For the most part, fire regimes in this Fire Condition Class are within historical ranges. Vegetation composition and structures are intact. Thus, the risk of losing key ecosystem components from the occurrence of fire remains relatively low.
>
> Condition Class 2. Fire regimes on these lands have been moderately altered from their historical range by either increased or decreased fire frequency.
>
> Condition Class 3. Fire regimes on these lands have been significantly altered from their historical return interval. The risk of losing key ecosystem components from fire is high. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure and diversity have been significantly altered. Consequently, these lands verge on the greatest risk of ecological collapse. (*Cohesive Strategy, 2002, in draft)*

COVER The area on the ground covered by the combined aerial parts of plants expressed as a percent of the total area.

CRITICAL HABITAT (1) Specific areas within the habitat a species occupies at the time it is listed under the Endangered Species Act that have physical or biological features (a) that are essential to the conservation of the species and (b) that may require special management considerations or protection, and (2) specific areas outside the habitat a species occupies at the time it is listed that the Secretary of the Interior determines are essential for the species conservation.

CULTURAL RESOURCES Remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that were important in past human events. Cultural resources consist of (1) physical remains, (2) areas where significant human events occurred, even though evidence of the events no longer remains, and (3) the environment immediately surrounding the actual resource.

DEPENDENT An animal species, which requires a certain vegetative community (or habitat) type during part of its life cycle.

DESIRED PLANT COMMUNITY The kind, amount, and proportion of vegetation which best meets land use objectives for a particular site, and which must be within the siteís capability to produce through management or a combination of management and land treatment.

ECOSYSTEM An interacting system of organisms considered together with their environment.

ENDANGERED SPECIES Plant or animal species that are in danger of extinction throughout all or a significant part of their range.

ENDANGERED SPECIES ACT of 1973 (as amended) Federal law to ensure that no federal action will jeopardize federally listed or proposed threatened and endangered species of plants and animals.

ENVIRONMENTAL ASSESSMENT (EA) A systematic environmental analysis of a site-specific BLM activity used to determine whether the activity would have a significant effect on the quality of the environment and whether an environmental impact statement is required.

ENVIRONMENT The complex surroundings of an item or area of interest, such as air, water, natural resources, and their physical conditions (temperature, humidity).

FEDERAL LAND POLICY AND MANAGEMENT ACT (FLPMA) Federal Land Policy and Management Act of 1976 (Public Law 94-570, 90 Stat. 2743, 43 USC 1701).

FIRE BEHAVIOR The manner in which a fire reacts to the influences of fuel, weather, and topography.

FIRE MANAGEMENT Activities required for the protection of burnable wildland values from fire and the use of prescribed fire to meet land management objectives.

FIRE MANAGEMENT OBJECTIVE Planned, measurable result desired from fire protection and use based on land management goals and objectives.

FIRE MANAGEMENT PLAN Strategic plans that define a program to manage wildland fires based on an approved land management plan. The plan must address a full range of fire management activities that support ecosystem sustainability, values to be protected, protection of firefighter and public safety, public health, and environmental issues. The plan must be consistent with resource management objectives and the activities of the area.

FUEL All the dead and living material that will burn. This includes grasses, dead branches and pine needles on the ground, as well as standing live and dead trees. Also included are minerals near the surface, such as coal that will burn during a fire, and human-built structures.

FUELBREAK A wide strip with a low amount of fuel, usually grass, in a brush or wooded area to provide soil cover and serve as a line of fire defense.

FUEL TYPE An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.

HAZARDOUS FUELS REDUCTION Prioritize hazardous fuels reduction where the negative impacts of wildland fire are greatest.

IGNITION METHOD The means by which a fire is ignited, such as hand-held drip torch, helitorch, and backpack propane tanks.

INVASIVE SPECIES Species that have been introduced into an environment in which they did not evolve and thus usually have no natural enemies to limit their reproduction and spread.

LAND USE PLAN A plan that provides management direction on future land uses.

LONG-TERM Ten to twenty years.

MITIGATION MEASURES Means taken to avoid, compensate for, rectify, or reduce the potential adverse impacts of an action.

MONITORING The orderly collection, analysis, and interpretation or resource data to evaluate progress toward meeting management objectives.

MOSAIC The intermingling of plant communities and their successional stages in such a manner as to give the impression of an interwoven design.

NOXIOUS WEED A plant that causes disease or has other adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and public health. Noxious weeds are designated and regulated by various State and Federal laws. In most cases, noxious weeds are also nonnative species.

PRESCRIBED BURNING The planned application of fire to wildland fuels in their natural or modified state, under specific conditions of fuels, weather, and other variables, to allow the fire to remain in a predetermined area and to achieve site-specific fire and resource management objectives.

PRESCRIPTION Measurable criteria that define the conditions under which a prescribed fire will be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

REHABILITATION Short term actions taken following fire to stabilize soils and encourage rapid establishment of vegetative cover.

RESOURCE MANAGEMENT PLAN A multiple-use plan that provides management direction for all Federal resources. It is often supplemented by more detailed, site-specific management plans for a particular land use activity, such as livestock grazing.

RESTORATION A long-term landscape-based approach to changing the ecological health of the rangelands which requires implementation of a set of actions that promotes plant community diversity and structure to encourage communities to be more resilient to future disturbance and invasive species.

RIPARIAN The banks and adjacent areas of water bodies, watercourses, seeps, and springs. These waters provide soil moisture sufficiently in excess of the otherwise available locally to provide a moister habitat than that of contiguous flood plains and uplands.

SENSITIVE SPECIES A list of animal and plant species that were designated by the Nevada BLM State Director with the State of Nevada Department of Conservation and Natural

Resources. It is BLM policy to give these species the same protection as federal candidate species in BLM Manual 6840.06.

SHORT-TERM Five years or less.

SHRUB A woody perennial plant differing from a perennial herb by its persistent and woody stem; and from a tree by its low stature and habit of branching from the base.

SPECIES COMPOSITION A term relating the relative abundance of one plant species to another using a common measurement; the proportion (percentage) of various species in relation to the total on a given area.

SUPPRESSION All the work of extinguishing or confining a fire beginning with its discovery.

THREATENED SPECIES Plant or animal species that are not in danger of extinction but are likely to become so within the foreseeable future throughout all or a significant portion of their range.

TREATMENT A procedure whose effect is to be measured and compared with the effect of other procedures. Examples include a fall burned prescribed fire, an unburned "control", or an area burned with a specific ignition method or pattern.

UNDERBURN A fire that consumes surface fuels but not trees and shrubs.

VEGETATION COMMUNITY A kind of existing plant community with distinguishable characteristics described in terms of the present vegetation that dominates the aspect or physiognomy of the area.

VEGETATIVE REGENERATION Development of new aboveground plants from surviving plant parts, such as by sprouting from a root crown or rhizomes. Even if plants form their own root system, they are still genetically the same as the parent plant.

VISUAL RESOURCES The visible physical features on a landscape (e.g., land, water, vegetation, animals, structures and other features).

WILDERNESS An area established by the Federal Government and administered either by the Forest Service, USDA or National Park Service, Fish & Wildlife Service, or Bureau of Land Management, in order to conserve its primeval character and influence for public enjoyment, under primitive conditions, in perpetuity.

WILDERNESS INVENTORY An evaluation of the public lands in the form of a written description and map showing those lands that meet the wilderness criteria as established under section 603(a) of FLPMA and section 2(c) of the Wilderness Act, which will be referred to as wilderness study areas (WSAs).

WILDERNESS STUDY AREA (WSA) A roadless area or island that has been inventoried and found to have wilderness characteristics as described in section 603 of FLPMA and section 2(c) of the Wilderness Act of 1964 (78 Stat. 891).

WILDFIRE A fire occurring on wildland that is not meeting management objectives and thus requires a suppression response.

WILDLAND An area in which development is essentially non-existent, except for roads, railroads, powerlines, and similar transportation facilities. Structures, if any, are widely scattered.

WILDLAND FIRE Any fire occurring on the wildlands, regardless of ignition source, damages, or benefits.

WILDLAND FIRE USE Wildland fire used to protect, maintain, and enhance resources and, when possible, allowed to function in its natural ecological role. Use of fire will be based on approved Fire Management Plans and will follow specific prescriptions contained in operational plans.

REFERENCES

Arizona Game and Fish Departmentís (AGFD) Heritage Data Management System (HDMS) website. 2003. http://www.gf.state.az.us/wildlife_conservation/edits/hdms_abstracts.html.

Arizona Game and Fish Department Laws and Rules 2002-2003 Edition, Reprinted from Arizona Revised Statutes, 2002 Edition and Arizona Administrative Code, Supplement 02-3. Link is: http://www.azgfd.com/pdfs/inside_azgfd/all_azgfd_laws.pdf

Arizona Game and Fish Department. 2002. Hunt Arizona 2002 Edition ñ Survey, Harvest and Hunt Data for Big and Small Game.

Arizona Game and Fish Department. 2001. Wildlife 2006ñ The Arizona Game and Fish Departmentís Wildlife Management Program Strategic Plan for the years 2001-2006. Approved by the AGFD Commission January 19, 2001. 91 pp. Available at www.azgfd.com.

Arizona Interagency Desert Tortoise Team. 1996. Management Plan for the Sonoran Desert Population of the Desert Tortoise in Arizona. December 1996. 55 pp.

Arno, S.F. and R.H. Wakimoto. 1988. Fire Ecology of Vegetation Common to Wildland Homesites. Pp. 118ñ123 In: Fisher, W.C.; Arno, S.F. compilers, Protecting people and homes form wildfire in the Interior West: proceedings of the symposium and workshop, General Technical Report INT-251. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT.

Brooks, M.L. 2002. Peak fire temperatures and effects on annual plants in the Mojave Desert. Ecological Applications 12: 1088-1102.

Brooks, M.L. and D.A. Pyke 2001. Invasive plants and fire in the Deserts of North America. pages 1-14 in K.E.M. Galley and T.P. Wilson (eds). Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: The First National Congress on Fire Ecology, Prevention, and Management. Misc. Publications No. 11, Tall Timber Research Station, Tallahassee, FL.

Brown, D.E. 1982a. Biotic Communities of the American Southwestó United States and Mexico. Desert Plants 4: (1ñ4) 1ñ342.

Brown, D.E. 1982b. Semidesert Grassland. Pp. 123ñ131 In: Brown, D.E., ed., Biotic communities of the American Southwestó United State and Mexico. Desert Plant 4 (1ñ4): 1ñ342.

Brown, D.E. 1994. Biotic Communities, Southwestern United States and Northwestern Mexico.. Englewood Cliffs, NJ: Prentice Hall.

Brown, J.K. 2000. Chapter 9: Ecological Principles, Shifting Fire Regimes and Management Considerations. Pp. 185ñ203 In: Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen.Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Bureau of Land Management. 1982. Final Environmental Impact Statement, Proposed Grazing Management Program for the Lower Gila North EIS Area. U.S. Dept. of the Interior, Bureau of Land Management Yuma, Mohave, Yavapai, and Maricopa Counties, Phoenix District, Arizona.

Bureau of Land Management. 1983. Lower Gila North Management Framework Plan. U.S. Dept. of the Interior, Bureau of Land Management, Lower Gila North Resource Area, Arizona
Bureau of Land Management. 1985. Lower Gila South Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Phoenix District, Arizona.

Bureau of Land Management. 1985. Final Yuma District Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Yuma District, Arizona.

Bureau of Land Management. 1988. Proposed Phoenix Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Phoenix District, Arizona.

Bureau of Land Management. 1989. Final Lower Gila South Resource Management Plan (Goldwater Amendment). U.S. Dept. of the Interior, Bureau of Land Management, Lower Gila South Resource Area, Arizona.

Bureau of Land Management. 1990. Proposed Arizona Strip District Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Arizona Strip District, Arizona.

Bureau of Land Management. 1991. Safford District Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Safford District Office, Arizona.

Bureau of Land Management. 1993. Kingman Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Kingman Resource Area, Arizona.

Bureau of Land Management. 1994. Planning Update, Amendment and Environmental Assessment to the Lower Gila North and South Mangement Plans. U.S. Dept. of the Interior, Bureau of Land Management, Lower Gila Resource Area, Arizona.

Bureau of Land Management. 1994. Rangeland Reform '94, Final Environmental Impact Statement. U.S. Dept. of the Interior, Bureau of Land Management, Department of Agriculture, Forest Service.

Bureau of Land Management, Arizona State Office. 2003. About BLM Arizona. URLs: www.az.blm.gov/fr_info.htm.; www.az.blm.gov/wildarea.htm; www.az.blm.gov/fr_wwdo.htm.

Caldwell, T.G., D.W. Johnson, W.W. Miller, and R.G. Qualla. Forest floor carbon and nitrogen losses due to prescribed fire. Soil Sci. Soc. Am. J. 66:262-267.

Clark, B. 2001. Fire Effects Guide. National Wildfire Coordinating Group. U.S. Fish and Wildlife Service. http://fire.fws.gov/ifcc/monitor/EFGuide/soils.htm.

Cunningham, S.C., L.M. Monroe, L. Kirkendall, and C.L. Ticer. 2001. Effects of the catastrophic Lone Fire on low, medium, and high mobility wildlife species. Arizona Game and Fish Department Research Branch Technical Guidance Bulletin No. 5, Phoenix. 51 p.

Delmonte, John. 1985. *Origins of Materials and Processes*. Technomic Publishing Company, Inc. Lancaster, Pennsylvania.

Desert Tortoise Council. 1994. Guidelines for handling desert tortoises during construction projects. Desert Tortoise Council, San Bernardino, California.

Duck, T.A., T.C. Esque, and T.J. Hughes. 1995. Fighting wildfire in desert tortoise habitat: considerations for land managers. Proc. Desert Tortoise Counc. Symp. 1994:58-67.

Esque, T.C., C.R. Schwalbe, L.A. DeFalco, R.B. Duncan, and T.J. Hughes. 2003. Effects of desert wildfires on desert tortoise (*Gopherus agassizii*) and other small vertebrates. The Southwestern Naturalist 48(1):103-111.

Hendricks. D.M. 1985. Arizona Soils. (ed.) Haney, R.A. College of Agriculture, University of Arizona, Tucson, Arizona. http://digital.library.arizona.edu/southwest/azso/index.html.

Howey, L.D. and G.B. Ruyle. 2002. Noxious Weeds I: Noxious Weeds: A Disaster Looking for a Place to Happen in Arizona!! URL: http://rangelandswest.org/az/weeds/noxiousweeds1.html, viewed 25 April 2003.

Howey, L.D. and G.B. Ruyle. 2002. Noxious Weeds II: What Can You Do To Stop a Disaster in Arizona? URL: http://rangelandswest.org/az/weeds/noxiousweeds2.html, viewed 25 April 2003. Lyon, L.J., H.S. Crawford, E. Czuhai, R.L. Fredriksen, R.F. Harlow, L.J. Metz, and H.A. Pearson. 1978. Effects of fire on fauna: A state-of-knowledge review. Gen. Tech. Report WO-6. Washington, D.C.: U.S. Department of Agriculture, Forest Service. 22 p.

Macadam, A. 1989. Effects of prescribed fire on forest soils. B.C. Ministry of Forests, Smithers, B.C. Research report 89001-PR.

Marsh, D. 2002. The Status of Water Quality in Arizona ñ 2002: Volume 1. Arizonaís Integrated 305(b) Assessment and 303(d) Listing Report. Arizona Department of Environmental Quality, Phoenix, AZ.

McAuliffe, J.R. 1995. The Aftermath of Wildfire in the Sonoran Desert. The Sonoran Quarterly 49: 4ñ8.

McNabb, D.H., and Swanson, F.J. 1990. Chapter 14: Effects of fire on soil erosion. In: Natural and prescribed fire in Pacific Northwest forests. (eds.) Walstad, J.D., et.al. Corvallis, OR: Oregon State University Press.

Mullins, Gary W., et. al. 2001. *Communicatorís Guide: Wildland Fire*. Boise, ID: National Interagency Fire Center (USDA/USDI).

National Interagency Fire Center, 2003. URL: www.nifc.gov.

Pase, C.P. and D.E. Brown. 1982. Interior Chaparral. Pp. 95ñ99 In: Brown, D.E., ed., Biotic communities of the American Southwestó United State and Mexico. Desert Plant 4 (1ñ4): 1ñ342.

Paysen, T.E., R.J. Ansley, J.K. Brown, G.J. Gottffried, S.M. Haase, M.G. Harrington, M.G. Narog, S.S. Sackett, R.C.Wilson. 2000. Pp. 121ñ159 In: Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen.Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Peek, J.M. 1986. A Review of Wildlife Management. Englewood Cliffs, NJ: Prentice Hall.

Pellant, M., D.A. Pyke, P. Shaver, J.E. Herrick. 2000. Interpreting Indicators of Rangeland health. Technical Reference 1734-6, U.S. Dept. of Interior, Bureau of Land Management, National Science and Technology Center, Information and Communication Group, Denver, CO, 118 pp.

Pyne, S.J., P.L. Andrews, and R.D. Laven. 1996 *Introduction to Wildland Fire*. New York: Wiley.

Rogers, G.F. and J. Steele. 1981. Sonoran Desert Fire Ecology. Pp. 15ñ19 In: Stokes, M.A. and Dietereich, J.H., Tech. Coord., Proceedings of Fire History Workshop. US Forest Service General Technical Report RM-81.

Silberman, J. PhD. 2003. The Importance of Fishing and Hunting. Economic Data on Fishing and Hunting for the State of Arizona and for Each Arizona County. Prepared by Arizona State University School of Management for the Arizona Game and Fish Department.
For copy of report follow link:
http://www.azgfd.com/pdfs/wildlife_conservation/FISHING_HUNTING%20Report.pdf

Smith, Jim. June 2002. Protecting Archeological Sites with Prescribed Fire. In *The Effects of Fire and Heat on Obsidian*, edited by Janine M. Loyd, et al. Northwest Research Obsidian Studies Laboratory.

Smith, J.K., ed. 2000. Wildland fire in ecosystems: Effects of fire on fauna. Gen. Tech. Rep. RMRS-GTR-42-vol. 1. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 83 p.

Soil Science Society of America. 2003. Glossary of Soil Science Terms. Madison, Wisconsin. http://www.soils.org/sssagloss/search.html.

Soil Survey Staff. 1999. Soil Taxonomy. 2nd Edition. Natural Resources Conservation Service. Agriculture Handbook No. 436.

Solomon, Madeline. June 2002. Fire and Glass: Effects of Prescribed Burning on Obsidian Hydration Bands. In *The Effects of Fire and Heat on Obsidian*, edited by Janine M. Loyd, et al. Northwest Research Obsidian Studies Laboratory.

Swetnam, T.W. and C.H. Baisan. 1996. Historical Fire Regime Patterns in the Southwestern United States Since AD 1700. Pp. 11ñ32 In: Allen, C.D., ed., Fire effects in southewestern forests: Proceedings of the second La Mesa fire symposium. General Technical Report RB-GTR-286, USDA, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Turner, R.M. 1982. Great Basin Desertscrub. Pp. 145ñ155 In: Brown, D.E., ed., Biotic communities of the American Southwestó United State and Mexico. Desert Plant 4 (1ñ4): 1ñ342.

U.S. Census Bureau, Census 2000, Summary Files 1, 2, 3.

U.S. Forest Service. 2003. A strategic assessment of forest biomass and fuel reduction treatments in western states. http://www.fs.fed.us/research/infocenter.html.

U.S. Forest Service, Rocky Mountain Research Station. January 2000. Wildland Fire in Ecosystems, Effects of Fire on Fauna, General Technical Report RMRS-GTR-42-Volume 1.

U.S. Forest Service, Rocky Mountain Research Station. January 2000. Wildland Fire in Ecosystems, Effects of Fire on Flora, General Technical Report RMRS-GTR-42-Volume 2.

U.S. Fish and Wildlife Service (USFWS), Arizona Ecological Services website. 2003. http://www.arizonaes.fws.gov

Vallentine, J.F., 1980. Range Development And Improvements, Second Edition. Brigham Young University Press, Provo, Ut. 545 Pp.

Wohlegmuth, P.M., J.L. Beyers, and S.G. Conard. 1999. Postfire hillslope erosion in Southern California Chaparral: A case study of prescribed fire as a sediment management tool. In: Proceedings of the Symposium on Fire Economics, Planning, and Policy: Bottom Lines. USDA Forest Service General Technical Report PSW-GTR-173, 332, pp. 269-276. Albany, CA: Pacific Southwest Research Station, Forest Service, US Department of Agriculture.

☆ U.S. GOVERNMENT PRINTING OFFICE: 2004 — 573-085 / 43018 Region No. 8

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Arizona State Office
222 North Central Ave.
Phoenix, AZ 85004-2203

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

PRIORITY MAIL

POSTAGE AND FEES PAID
U.S. DEAPRTMENT OF
THE INTERIOR
PERMIT NO. G-76