United States
Department of
Agriculture

Forest
Service

**Southwestern
Region**

Environmental Assessment for Walnut Canyon Allotment

Mormon Lake Ranger District, Coconino National Forest, Coconino County, Arizona

Cover photo: Marshall Lake on the Walnut Canyon Allotment, Coconino National Forest (USDA 2005).

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Printed on recycled paper • May 2006

Contents

Chapter 1. Purpose and Need for Action **1**

Introduction 1
Project Background 1
Purpose and Need for Action 5
Proposed Action 5
Management Direction 8
Decision Framework 12
Public Involvement 13
Issues 13

Chapter 2. Proposed Action and Alternatives **15**

Alternatives Considered in Detail 15
Design Features 25
Mitigation Measures 28
Alternatives Considered but Eliminated from Detailed Study 29
Comparison of Alternatives 33

Chapter 3. Affected Environment and Environmental Consequences **35**

Introduction 35
Soils 36
Water Quality 47
Wetlands and Springs 51
Vegetation 67
Sensitive Plant Species 74
Wildlife 81
Threatened and Endangered Species 82
Sensitive Wildlife Species 89
Management Indicator Species 99
Migratory Bird Species 125
Important Bird Areas 133
Economy 136
Recreation, Scenery, and Social Environment 139
Cultural Resources 143
Air Quality 145
Other Required Disclosures 146
Environmental Justice 146
Unavoidable Adverse Effects 146
Short-term Uses and Long-term Productivity 148
Irreversible and Irretrievable Commitments of Resources 148

Chapter 4. Monitoring **151**

Chapter 5. Consultation and Coordination **155**

Glossary **159**

References **167**

Appendix A: Wetlands and Springs Within the Cumulative Effects Area **173**

Appendix B: Projects Considered in Cumulative Effects Analyses **181**

Appendix C: Example Grazing Schedules **192**

List of Tables

Table 1. Actual use, season of use, head months, and AUM from 1990 through 2005 ... 4
Table 2. Coconino Forest Plan emphasis on management areas within the Walnut Canyon Allotment ... 8
Table 3. Alternative 3 proposed improvements ... 24
Table 4. Existing structural improvements and maintenance schedule ... 33
Table 5. Proposed structural improvements by alternative ... 33
Table 6. Cattle grazing statistics by alternative ... 34
Table 7. Alternative comparison by purpose and need ... 34
Table 8. Summary of environmental effects ... 34
Table 9. Soil conditions on the Walnut Canyon Allotment, shown in TES Units ... 37
Table 10. Cattle grazing allotments within the San Francisco Wash and Walnut Creek watersheds ... 46
Table 11. Watershed acres for wetlands on Walnut Canyon Allotment ... 49
Table 12. Acres of wetland emergent vegetation and upland buffer within proposed exclosures and lanes 60
Table 13. Acres of wetland emergent veg. and upland buffer within existing exclosures/riparian pastures 62
Table 14. Grazing strategy by alternative for seasonal and semipermanent wetlands ... 62
Table 15. Acres of emergent vegetation within Walnut Canyon Allotment and the cumulative effects area65
Table 16. Sensitive plant species with potential habitat on the Walnut Canyon Allotment ... 75
Table 17. Average annual utilization in select Walnut Canyon pastures ... 86
Table 18. Sensitive wildlife species on the Walnut Canyon Allotment ... 90
Table 19. Management indicator species by management area ... 99
Table 20. Coconino National Forest MIS, habitat they represent, and monitoring requirement ... 101
Table 21. Pine habitat migratory bird species on the Walnut Canyon Allotment ... 126
Table 22. Pinyon-juniper habitat migratory bird species on the Walnut Canyon Allotment ... 128
Table 23. High elevation grassland habitat migratory bird species on the Walnut Canyon Allotment ... 131
Table 24. Economic effects for Coconino County by alternative ... 137
Table 25. Investment analysis by alternative ... 138
Table 26. Wetlands and springs within the cumulative effects area ... 173
Table 27. Past projects and/or natural events ... 181
Table 28. Current projects and ongoing activities ... 185
Table 29. Reasonably foreseeable future projects ... 190
Table 30. Adjacent allotments ... 191

List of Figures

Figure 1. Location of Walnut Canyon Allotment on the Coconino National Forest ... 2
Figure 2. Walnut Canyon Allotment pastures ... 3
Figure 3. Proposed fence with lane at Youngs Lake ... 17
Figure 4. Proposed fence with lane at Dry Tank ... 18
Figure 5. Proposed fence with lane at Lost Tank ... 19
Figure 6. Proposed fence at Fisher/Fry Lake ... 20
Figure 7. Proposed fence at Prime Lake ... 21
Figure 8. Proposed fence at Babbitt Spring ... 22
Figure 9. Terrestrial ecosystem survey units on the Walnut Canyon grazing allotment ... 38
Figure 10. Impaired soil units where cattle are contributing to conditions ... 39
Figure 11. San Francisco Wash and Walnut Creek 5th code watershed boundaries ... 45
Figure 12. Approximate number of elk by year for Game Management Units 5A, 5B, 6A ... 104
Figure 13. Forest-wide trend of mule deer population (GMUs 5A, 5B, 6A, 6B, 7 combined) ... 110
Figure 14. Mule deer and fawns in the project area (GMUs 5A/5B) ... 110
Figure 15. Mule deer and fawns in the project area (GMU 6A) ... 111
Figure 16. Forest-wide population trend of pronghorn antelope, Coconino National Forest ... 115
Figure 17. Location of pronghorn habitat on the Walnut Canyon allotment ... 117
Figure 18. Mormon Lake and Anderson Mesa IBAs in relationship to Walnut Canyon Allotment ... 134

Chapter 1. Purpose and Need for Action

Introduction

The Forest Service has prepared this draft environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from implementing the Proposed Action or alternatives. The document is organized into five chapters and includes a glossary, references, and appendix:

Chapter 1. Purpose and Need for Action - The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the Agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Chapter 2. Proposed Action and Alternatives - This chapter provides a more detailed description of the Agency's Proposed Action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on issues raised during scoping. This discussion also includes mitigation measures. Finally, this section provides a comparison of alternatives including environmental effects.

Chapter 3. Affected Environment and Environmental Consequences - This chapter describes the environmental effects of implementing the Proposed Action and other alternatives. This analysis is organized by resource area.

Chapter 4. Monitoring - This chapter describes the type of monitoring that would occur under all action alternatives during the life of the decision.

Chapter 5. Consultation and Coordination - This chapter provides a list of preparers and agencies consulted during development of the environmental assessment.

Additional documentation, including specialist reports, correspondence, and public comments and responses, may be found in the project record document [PRD] located at the Peaks Ranger District in Flagstaff, Arizona. These records are available for public review pursuant to the Freedom of Information Act (5 U.S.C. 552).

Project Background

The Walnut Canyon Allotment is located approximately 3 miles southeast of Flagstaff, Arizona (see Figure 1) and runs up onto the northwestern part of Anderson Mesa. The Anderson Mesa rim runs through the middle of the allotment from west to east. The allotment is located within all or portions of T21N, R8E Sections 34-36, T21N, R9E Sections 32 and 31, T20N R7E Sections 11 and 12, T20N, R8E Sections 7-12, 18-28, and 33-36, T19N R8E Sections 1-3, 9-12, 14-16, T20N R9E Sections 4-10, 15-21, 28-33, and T19N, R9E Section 5. The area within the allotment boundary is referred to as the *project area* in this EA.

The Walnut Canyon Allotment consists of approximately 31,607 acres, divided into nine pastures: Marshall Lake, Cherry, Youngs Lake, Observatory, Holding, Newman, South Newman, Walnut, and West Walnut (see Figure 2). The eastern half of the allotment is primarily pinyon and juniper with ponderosa pine stringers. The western half of the allotment is primarily ponderosa pine with pockets of pinyon and juniper. Grasslands exist within the central and eastern portion of the allotment. There are no wild and scenic rivers, research natural areas, designated wilderness areas, inventoried roadless areas, or designated parklands or prime farmlands within or near the Walnut Canyon Allotment.

Figure 1. Location of Walnut Canyon Allotment on the Coconino National Forest

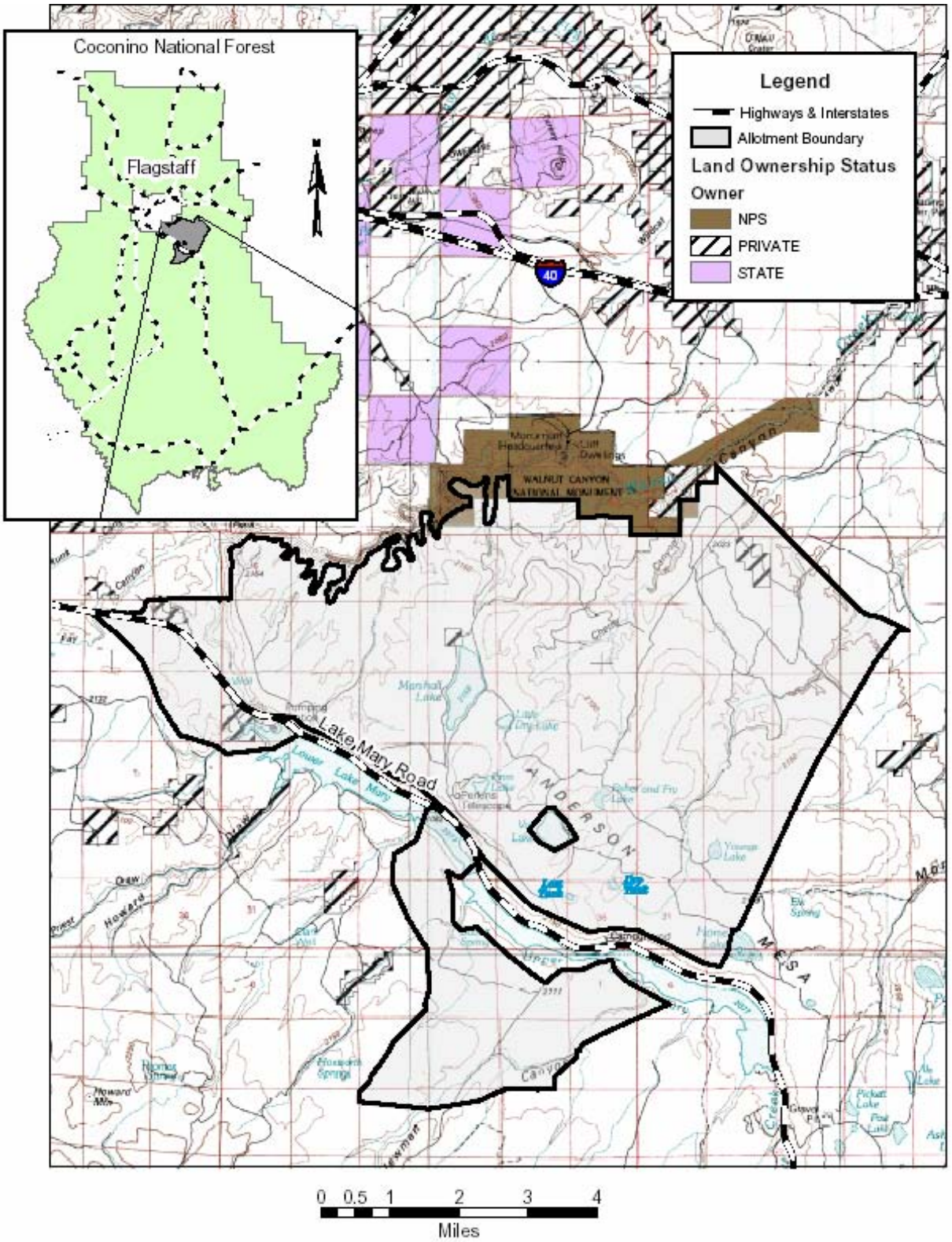
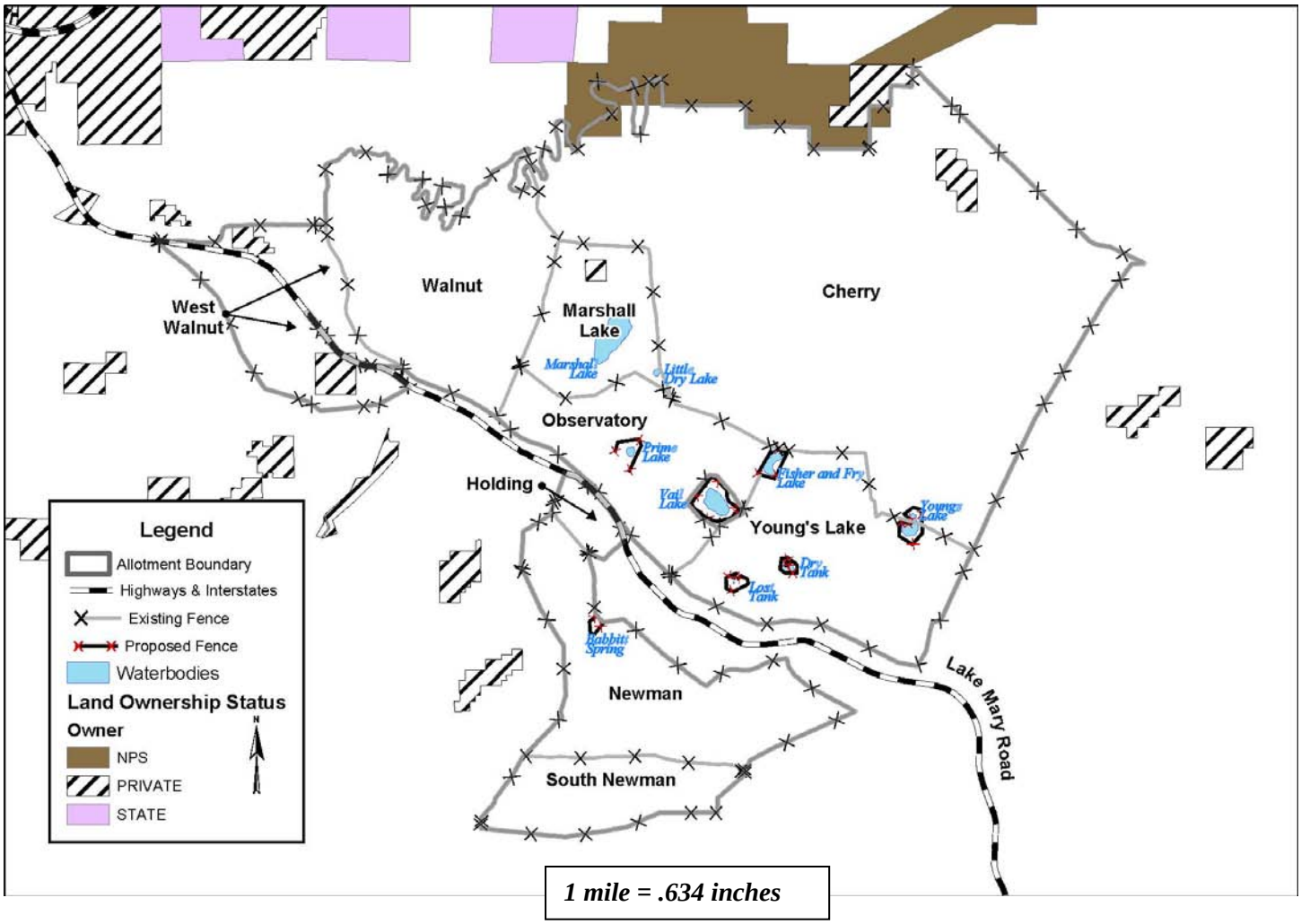


Figure 2. Walnut Canyon Allotment pastures



There are eight wetlands on the allotment: Marshall, Little Dry, Fisher/Fry, Vail, and Prime Lakes are semipermanent wetlands; Youngs Lake, Lost Tank and Dry Tank are seasonal wetlands. Marshall and Little Dry lakes are within a fenced riparian pasture and grazed by cattle for up to ten days in October. Vail Lake is currently excluded from cattle grazing. Horse Lake which is adjacent to the allotment to the south east is also excluded from cattle grazing.

Current permitted use for Walnut Canyon is 350 head of cow/calf pairs (1,761 head months), from June 1 through October 31. Grazing has occurred continuously in the area, starting with sheep in the 1870s. Since the Coconino National Forest was established in 1908, the Forest Service has reduced cattle numbers and managed cattle grazing periods more strictly. Cattle grazing management has improved over time with the construction of fences and waters by the Forest Service and grazing permittees.

Table 1 shows specific information for use over the last 16 years. Management on this allotment has changed little over this time. Use has varied primarily due to drought and adaptive management. The Southwest Region and the Coconino National Forest drought strategies are followed when making annual decisions regarding stocking on an allotment [PRD 60]. For example, in 2003 this allotment was not grazed, and in 2000, only 150 head of cattle grazed the allotment.

Table 1. Actual use, season of use, head months, and AUM from 1990 through 2005

Year Grazed	Number of Cattle	Dates	Head Months[1]	AUM[2]
1990	345	6/1-10/31	1735	2291
1991	345	5/21-10/17	1735	2291
1992	345	6/1-10/31	1735	2291
1993	345	6/1-10/31	1735	2291
1994	345	6/1-10/31	1735	2291
1995	345	6/1-10/31	1735	2291
1996	345	6/1-10/31	1735	2291
1997	262	6/1-10/31	1318	1740
1998	600	9/7-10/20	868	1146
1999	350	5/15-10/15	1772	2339
2000	150	7/1-10/22	562	742
2001	120	5/20-10/20	608	802
2002	150	6/1-6/30	148	195
	75	7/26-9/20	141	186
(Total 2002)			289	381
2003	0	0	0	0
2004	97	6/5-6/20	51	67
	240	7/12-11/20	1042	1375
(Total 2004)			1093	1442
2005	198	7/29-10/31	618	816

[1] The calculation for head months is derived by multiplying the number of cattle by the number of months the cattle are on the forest.

[2] Animal Unit Months (AUM) are calculated by multiplying head months by 1.32 (Forest Service units used for the class of cattle on this allotment). Head months are used for billing; AUM are used for capacity estimates.

Utilization from cattle and/or wildlife grazing has been within the 35 percent guideline on the Walnut Canyon Allotment during the last 10 years, except in 1999. There has been no trespass of cattle on this allotment or other incidents other than the utilization guideline being exceeded in 1999. The end-of-season inspections document this and are found in the range and watershed report [PRD 40]. In 1999, utilization was recorded at 50 percent in the Observatory and Young pastures. This occurred because the permittee at that time did not follow the grazing schedule. The permittee in 1999 had problems with other permit violations which along with this over utilization in 1999 resulted in termination of the permit and re-issuance of the permit to the present permittee.

Purpose and Need for Action

The Walnut Canyon Allotment is scheduled for an environmental analysis of grazing use on the Coconino National Forest, as required by the Burns Amendment (1995). This analysis is required in order to ensure cattle grazing is consistent with goals, objectives, and the standards and guidelines of the Coconino National Forest Plan (1987, as amended).

The purpose of this project is to analyze the effects of re-authorizing cattle grazing and to ensure the allotment is managed in a manner that maintains and/or moves the area toward Forest Plan objectives and desired conditions. Recent monitoring indicates rangeland conditions on the allotment are being maintained or improved with the current cattle grazing management in place. Future monitoring will help the Forest Service to evaluate the continued maintenance and improvement of rangeland conditions.

There is a need to maintain and/or improve rangeland conditions, and to maintain and protect seasonal and semipermanent wetlands which includes wetlands with emergent vegetation on the allotment. There is also a need to maintain the Forest Service's and permittee's access to current water claims within the allotment.

The purpose and need is consistent with applicable Forest Plan standards and guidelines, as detailed in the "Management Direction" section in this chapter.

Proposed Action

A Proposed Action has been developed to meet the project's purpose and need. The Proposed Action consists of seven components: authorization; proposed structural improvements to protect emergent vegetation and waterfowl habitat as well as reduce disturbance to nesting waterfowl; road closures; routing horse traffic on the Arizona Trail around Prime Lake; adaptive management; closing three pastures to livestock grazing; and monitoring.

Authorization

The Mormon Lake District of the Coconino National Forest specifically proposes to re-authorize grazing for up to 350 cattle (cow/calf) from June 1 through October 31 (1,761 head months). The authorization would be through a term grazing permit.

The proposed permitted use is based on condition and trend studies completed in 2002, actual use data for the allotment for the past 19 years and the effects of this use on resource conditions. It also reflects the estimated annual forage production available for cattle on the allotment considering climate, duration, timing, frequency, and intensity of grazing proposed as well as proper livestock management.

The proposed utilization guideline would allow up to 35 percent use by cattle and/or wildlife during the cattle grazing season of May through October. When pasture use approaches this level

by cattle and/or wildlife, cattle would be moved to another pasture on the allotment. Once this use standard is met across the allotment, cattle would be moved off the allotment. The definitions and procedures for utilization are further described in Chapter 2, “Design Features” and in Chapter 4, “Monitoring.”

Proposed Structural Improvements

The proposed improvements are based on the purpose and need of maintaining and protecting seasonal and semipermanent wetlands and Babbitt Spring, and maintaining access to the permittee’s and the Forest Service’s water claims. The following paragraphs describe the specific proposed improvements:

The emergent (wetland) vegetation and the surrounding upland buffer at Prime, Fisher/Fry, and Youngs Lakes along with Dry and Lost Tanks will be excluded from cattle grazing by fencing approximately 50 acres of emergent vegetation and approximately 142 acres of upland buffer. There will be a lane for cattle to access the stock tank water at Youngs Lake, Dry, and Lost Tanks. The current water lot at Fisher/Fry would remain as access for cattle to the stock tank. The lanes and waterlot would maintain the permittee’s and Forest Service current (livestock) water claims. The lanes and current waterlot would permit cattle grazing on approximately 6 acres of emergent vegetation and approximately 8 acres of upland buffer.

The riparian vegetation at Babbitt Spring would also be fenced to exclude cattle. The exclosure would exclude approximately 0.5 acres of emergent vegetation with approximately 15 acres in the exclosure. A quarter mile section of pipe would be constructed with a drinker for cattle and wildlife outside the exclosure. The Forest Service would spend approximately $3,500 on materials and $1,000 would be spent by the permittee on labor. These costs would likely be offset by outside grants and other funding sources.

In addition to maintaining current range structures (including existing fence, 50 stock tanks not in wetlands, and 13 cattle guards) approximately $39,235 would be spent on installing barbwire fence for the exclosure fences at Prime Lake, Fisher/Fry Lake, Youngs Lake, Dry Tank, and Lost Tank (approximately 6 miles). The Forest Service would spend approximately $15,635, primarily for materials, and the permittee would spend approximately $23,600 primarily for construction of these improvements. These costs would likely be offset by outside grants and other funding sources.

The proposed implementation schedule for these improvements are as follows: Prime and Fisher/Fry Lakes would likely be fenced within the first year and the fences at Youngs Lake, Lost Tank, Dry Tank, and Babbitt Spring would likely be built within the first five years. Cattle would not graze pastures these wetlands are in before July 15th until the fences are constructed.

Road Closures

Road closures will be necessary at Youngs Lake and Prime Lake to maintain the integrity of the wetland exclosures. The roads at Prime Lake that would be closed include: #9479K (1.3 miles); 9479J (0.25 miles); and 9479M (0.25 miles). Travel to Vail Lake would be routed around Prime Lake via road 129A. The roads at Youngs Lake proposed for closure include 9480Q (2.6 miles), 9480R (0.2 miles), and 9480S (0.75 miles). Alternative vehicle routes exist around these proposed closures. These road closures would be implemented when the fence is constructed at Prime Lake and Youngs Lake. These roads were identified as high risk and recommended for closure during the Anderson Mesa Landscape Scale Assessment.

Routing Horse Traffic on the Arizona Trail around Prime Lake

Walk-through access along the Arizona Trail for foot and mountain bike traffic would be built into the fence at Prime Lake. Horse traffic would be routed to the east around Prime Lake. The rerouting of horse traffic would be done so swing gates would not be needed in the fence. The route around Prime Lake would add a short distance to the length of the trail, approximately 0.5 miles.

Adaptive Management

The Proposed Action includes adaptive management, which provides more flexibility for managing cattle. Adaptive management allows the Forest Service to adjust: the timing and duration of grazing, movement of cattle within the allotment, and cattle numbers. If adjustments are needed, they are implemented through the Annual Operating Instructions which can adjust numbers so cattle use is consistent with current productivity. This allows plant, soil, and watershed conditions to be maintained or improved while range improvements are implemented over time. An example of a situation that could call for adaptive management adjustments is drought conditions.

The alternatives are designed to provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired conditions are not being achieved, management will be modified in cooperation with the permittee. Changes may include administrative decisions such as the specific number of livestock authorized annually, specific dates of grazing, class of animal or modifications in pasture rotations, but such change will not exceed the limits for timing, intensity, duration, and frequency defined for the alternatives.

Closing Three Pastures to Livestock Grazing

The South Newman, Walnut, and West Walnut pastures would be closed to grazing. The Walnut and West Walnut Pastures are currently not grazed because they are not fenced and do not have the necessary water to implement cattle management. The South Newman pasture is currently excluded from cattle grazing for resource protection. This pasture would be closed to grazing to continue the protection of Newman Canyon. Closing these three pastures would result in 7,387 acres being permanently withdrawn from permitted grazing.

Monitoring

The Proposed Action includes monitoring (see Chapter 4, “Monitoring”). The type and frequency for this monitoring would include:

- permittee compliance, allotment inspections, range readiness, forage production, rangeland utilization – annually;
- condition and trend - every five to ten years;
- soil and riparian condition including wetlands – as needed for trend
- archeological site condition - as needed; and
- frequency and canopy cover plots and a soil condition rating would be continued or established at long-term monitoring sites, in areas of concern or in areas where changes in trend are expected or needed throughout the allotment.

Additional details and maps of the Proposed Action are provided in Chapter 2 of this EA.

Management Direction

This action responds to the goals and objectives outlined in the 1987 Coconino National Forest Plan (Forest Plan) and all subsequent amendments. The Forest Plan provides direction for all resource management programs, practices, uses, and protection measures on the Coconino National Forest.

This project is consistent with direction listed in the forest-wide and Flagstaff/Lake Mary Ecosystem Analysis (FLEA) area-wide standards and guidelines and in the standards and guidelines for the following management areas (MA): MA 3 Ponderosa Pine and Mixed Conifer on slopes less than 40 percent; MA 4 Ponderosa Pine and Mixed Conifer on slopes greater than 40 percent; MA 6 Unproductive Timber Land; MA 7 Pinyon-Juniper Woodland on less than 40 percent slopes; MA 8 Pinyon-Juniper Woodland on greater than 40 percent slopes; MA 9 Mountain Grassland; MA 10 Grassland and Sparse Pinyon-Juniper above the rim; MA 12 Riparian; MA 35 Lake Mary Watershed; and MA 37 Walnut Canyon [PRD 17]. Table 2 lists the Forest Plan emphasis of each of these management areas. Consistency with the Forest Plan applies only to the specific activities described in the Proposed Action and alternatives.

Table 2. Coconino Forest Plan emphasis on management areas within the Walnut Canyon Allotment

Management Area (MA)	Forest Plan Emphasis
MA-3: Ponderosa pine and mixed conifer, less than 40 percent slopes	Sustained yield of timber and firewood production, wildlife habitat, livestock grazing, high quality water, and dispersed recreation.
MA-4: Ponderosa pine and mixed conifer, greater than 40 percent slopes	Wildlife habitat, watershed condition, and dispersed camping.
MA-6: Unproductive timber land	Wildlife habitat, watershed condition, livestock grazing.
MA-7: Pinyon-juniper woodland, less than 40 percent slopes	Firewood production, watershed condition, wildlife habitat, and livestock grazing.
MA-8: Pinyon-juniper woodland, greater than 40 percent slopes	Wildlife habitat, watershed condition, and dispersed camping.
MA-9: Mountain grassland	Livestock grazing, visual quality, and wildlife habitat.
MA-10: Grassland and sparse pinyon-juniper above the rim	Range management, watershed condition, and wildlife habitat.
MA-12: Riparian and open water	Wildlife habitat, visual quality, fish habitat, and watershed condition on the wetlands, riparian forest, and riparian scrub.
MA-35: Lake Mary watershed	Soil and watershed function, urban/rural influences,natural role of fire, lake shore species.
MA-37: Walnut Canyon	Recreation, Walnut Canyon National Monument values, scenic quality, urban/rural influences, wildlife habitat.

A portion of the Walnut Canyon Allotment is within the area analyzed in the Anderson Mesa Landscape Scale Assessment (USDA 2004). The assessment identifies existing conditions, desired conditions, and possible management strategies specific to the pinyon-juniper woodland vegetation type and wetlands. The Forest Service reviewed the final assessment report and determined that the Proposed Action was consistent with the following suggested management strategies from the Landscape Scale Assessment:

- fence and provide lanes to stock tanks;
- use structural and nonstructural improvements to improve distribution of cattle and control use of understory plants;
- manage cattle grazing and make adjustments in grazing schedules through annual operating instructions (AOI) when monitoring displays a need for change;
- cattle fencing when necessary; and
- monitor use in all wetland types, including vegetative ground cover.

This project is also consistent with the following:

- Congressional intent to allow grazing on suitable lands (Multiple Use-Sustained Yield Act of 1960, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976).
- Forest Service direction on rangeland management (FSM 2202.1, FSM 2203.1, FSH 2209.13).
- Federal regulation (36 CFR 222.2 (c)) which states that National Forest System lands would be allocated for cattle grazing and allotment management plans (AMP) would be prepared consistent with land management plans.
- Authorization of cattle grazing permits for a 10-year period is required by law (FLPMA Sec. 402 (a)&(b) (3) and 36 CFR 222.3), unless there is pending disposal, or it would be devoted to other uses prior to the end of 10 years, or it would be in best interest of sound land management to specify a shorter term.

Applicable Laws and Regulations

The planning and decision-making process for this project was conducted in accordance with applicable laws, regulations, policies, and plans. Listed below are Federal laws and executive orders pertaining to this project-specific planning and environmental analysis. This project is consistent with the following:

Clean Air Act of 1955: Cattle grazing is not anticipated to cause disproportionate adverse human health or environmental effects to air quality (see “Air Quality” analysis in Chapter 3).

Clean Water Act of 1948, as amended: This project complies with Arizona State laws regarding natural resource protection, including but not limited to water quality [PRD 40].

Multiple Use-Sustained Yield Act of 1960: This project is consistent with applicable Coconino National Forest Plan standards and guidelines [PRD 17].

National Historic Preservation Act (NHPA) of 1966, as amended: A cultural resources clearance report is being finalized for the proposed activities and the Forest Service will consult with the Arizona State Historic Preservation Office (SHPO) on this project. Native American tribes and communities were consulted.

National Environmental Policy Act (NEPA) of 1969, as amended: The effects of the Proposed Action and alternatives have been analyzed and are disclosed in this EA.

Endangered Species Act (ESA) of 1973, as amended: The Endangered Species Act (ESA, PL 93-205), Forest Service Manual (FSM) 2670.11, 2670.21 and 2670.31 direction, and the Coconino National Forest Plan standards and guidelines (replacement pages 23 and 64) all require that National Forest System lands are not only managed for endangered, threatened and

proposed (TEP) species, but also to recover TEP species. The ESA states that all Federal departments and agencies shall seek to conserve TEP species. FSM 2670 directs forests to manage National Forest System habitats to achieve recovery of TEP species and to avoid the need to implement special protection measures under the ESA.

The analysis and disclosure of effects to endangered, threatened, and proposed species is complete (see "Wildlife-Threatened and Endangered Species" analysis in Chapter 3). Section 7(a)(2) of the Endangered Species Act requires that Federal agencies consult with the U.S. Fish and Wildlife Service (USFWS), as appropriate, to ensure that our actions do not jeopardize the continued existence of species listed as threatened or endangered under the ESA, or destroy or adversely modify designated critical habitat. After analyzing the effects of current management and the Proposed Action, there is a determination of "no effect" for bald eagle and "may affect, not likely to adversely affect" Mexican spotted owls. Informal consultation with USFWS for effects to Mexican spotted owl is underway.

Other Guidance: Where other guiding documents exist, they are cited for the resource where they specifically apply. An example includes the Mexican Spotted Owl Recovery Plan (USDI 1995).

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended: This project is consistent with applicable Coconino National Forest Plan standards and guidelines [PRD 17].

National Forest Management Act (NFMA) of 1976, as amended: This project complies with the Coconino National Forest Plan and associated amendments [PRD 17]. This project addresses all applicable Forest Plan forest-wide standards and guidelines and management area direction as they apply to the project area. This project is also in compliance with Forest Plan goals and objectives. All required interagency review and coordination has been accomplished.

American Indian Religious Freedom Act of 1978: This project would not deny American Indians access to land within the project area for traditional and cultural purposes nor would it infringe upon the rights of Native Americans to worship through ceremonies or traditional rights within the project area. The tribes have been consulted on this project.

Executive Order 13007 (Indian sacred sites): Access to and ceremonial use of sacred sites by Indian religious practitioners would be accommodated with this project, and activities associated with this project would avoid adversely affecting the physical integrity of such places.

Executive Order 12898 (environmental justice): Implementation of this project is not anticipated to cause disproportionate adverse human health or environmental effects to minority or low-income populations (see "Environmental Justice" analysis in Chapter 3).

Executive Order 11990 (wetland protection): Executive Order 11990 directs all Federal agencies to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance the natural benefits of wetlands when:

- acquiring, managing, and disposing of Federal lands and facilities;
- providing federally-undertaken, financed, or assisted construction and improvements; and
- conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

The basic requirements of E.O. 11990 is that a Federal agency avoid construction or management practices that would adversely affect wetlands unless that agency finds that (1) there is no practical alternative, and (2) the Proposed Action includes all practical measures to minimize harm to the wetlands. Executive Order 11990 does not apply to the issuance by Federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-Federal property. These actions are, however, covered by other Federal statutes and regulations. The requirements of this order are the same direction outlined in Forest Service Manual 2500, Watershed and Air Management (FSM 2520).

All alternatives within this analysis meet the standards set in Executive Order 11990.

The project area was inventoried for wetlands in 2002-2005 [PRD 22]. Managing these wetlands consistent with MA 12 standards and guidelines in the Forest Plan would help meet E.O. 11990.

Also in accordance with E.O. 11990, there is no proposed construction within wetlands (besides a minimum disturbance in fence construction), or disposition of wetlands to other ownership, nor easement through wetlands. No additional stock tanks are planned in any alternative, and there is no proposal to remove stock tanks in any alternative. Stock tanks within seasonal or semipermanent wetlands (Marshall, Little Dry, Fisher/Fry, Vail, Prime, and Youngs lakes and Lost and Dry tanks) would be not be maintained for the next 10 years.

Executive Order 13186 (migratory birds): On January 10, 2001, President Clinton signed Executive Order 13186 for the "Responsibilities of Federal Agencies to Protect Migratory Birds" which directed Federal agencies to develop a memorandum of understanding with the U.S. Fish and Wildlife Service to promote conservation of migratory birds. Agencies shall identify potential impacts to migratory birds and their habitats, avoid or minimize adverse impacts, restore and enhance habitats, and evaluate the effects of actions on migratory birds. Where they exist, other analyses should be used, such as the Arizona Partners in Flight Conservation Plan.

This project is consistent with the Migratory Bird Treaty Act of 1918, as well as Agency guidelines for conformance with the act [PRD 53]. Implementing standards and guidelines tied to MA 12 would provide opportunities to restore and enhance habitat for migratory bird species of concern in seasonal and semipermanent wetland areas.

Forest Service Sensitive Species: Forest Service Manual 2621.2 directs managers to display findings under the various management alternatives considered for individual projects. This assessment is based on the current geographic range of sensitive species on the Coconino National Forest and the area affected by the project. This assessment considers, as appropriate for the species and area, factors that may affect the current trend for the species' population.

Sensitive species are defined as "those plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (FSM 2670.5(19))."

It is the policy of the Forest Service regarding sensitive species to:

- assist states in achieving their goals for conservation of endemic species;
- as part of the National Environmental Policy Act process, review programs and activities through a biological evaluation to determine their potential effect on sensitive species;
- avoid or minimize impacts to species whose viability has been identified as a concern;

- if impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole (the line officer, with project approval authority, makes the decision to allow or disallow impacts, but the decision must not result in loss of species viability or create significant trends toward Federal listing); and
- establish management objectives in cooperation with the State when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions.

Effects to Forest Service sensitive species were considered and a biological assessment and biological evaluation have been completed for the 16 sensitive plant and wildlife species found within the Walnut Canyon Allotment [PRD 53].

Management Indicator Species: The Forest Service is required to address MIS in compliance with various regulations and Agency policy (36 CFR 219, Forest Service Manual (FSM) 2621 and 1920), which are, themselves, tiered to the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the NFMA. The Coconino National Forest Plan was prepared under planning regulations issued in 1982. Effects to MIS were considered for this project and are summarized in this EA [PRD 53].

The Forest planning regulations were amended on January 5, 2005 (70 Fed. Reg.1023). The Department of Agriculture issued a final rule to remove the 2000 planning regulations at 36 CFR 219 (a) in their entirety. Regulation 36 CFR 219.14(f) provides clarification and the forests' MIS obligations. For forests, like the Coconino, that developed their forest plan under the 1982 NFMA regulations, the responsible official may comply with any obligations relating to MIS by considering data and analysis relating to habitat unless the plan specifically requires population monitoring or population surveys. The appropriate scale for MIS monitoring is the area covered by the Forest Plan, 36 CFR 219.14(f). The new planning regulations provide flexibility for MIS monitoring, which would allow for monitoring of habitat conditions as a surrogate for population trend data.

Decision Framework

This EA documents the environmental analysis of the Proposed Action and alternatives. The Mormon Lake District Ranger is the responsible official for deciding whether or not lands within the Walnut Canyon Allotment currently authorized for grazing would be authorized in the future and in what manner. Items in this decision include: number of cattle, utilization level, season of use, grazing management system, road closures, structural improvements such as wetland/spring fencing, and permanently withdrawing pastures from grazing. The decision is based on a consideration of the area's existing resource conditions, desired conditions, environmental issues, and the environmental effects of implementing the various alternatives. The District Ranger may select any of the alternatives analyzed in detail, or may modify an alternative, as long as the resulting effects are within the range of effects displayed in this document.

This document is not a decision document. Rather, it discloses the environmental consequences which may occur if the Proposed Action or alternatives to that action are implemented. A decision notice (DN) and finding of no significant impact (FONSI), signed by the Mormon Lake District Ranger, will document the decisions made as a result of this analysis. Should the decision authorize cattle grazing, any and all grazing practices adopted and within the scope of this analysis would be further detailed in the terms and conditions of a new AMP and grazing permit.

Public Involvement

This project was first listed in the Coconino National Forest Schedule of Proposed Actions (SOPA) in April 2004. Thirteen Native American tribes have also been consulted with on this project since August 2004. The permittee has been involved early on in the development of this project [PRD 5]. On January 26, 2006, a description of the Proposed Action and a series of maps were mailed to individuals and organizations who have expressed interest in similar past projects or who were otherwise determined to be affected (adjacent landowners, interest groups, and agencies). Three comment letters were received during this public scoping period and no significant issues were identified [PRD 38].

Issues

The Council on Environmental Quality (CEQ) NEPA regulations direct agencies to "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review" (Sec. 1506.3). Significant issues are defined as those directly or indirectly caused by implementing the Proposed Action. Issues are considered "significant" because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflict. Some reasons for considering comments or issues as non-significant include: (1) outside the scope of the project's purpose and need; (2) already decided by law, Forest Plan, or other higher level decision; (3) irrelevant to the decision; (4) conjectural or not supported by scientific or factual evidence; or (5) a general comment, opinion, or position statement.

Public scoping comments on the Proposed Action were considered and analyzed during the development of this EA [PRD 38]. Based on the above criteria, there were no significant issues identified during public scoping.

This page intentionally left blank

Chapter 2. Proposed Action and Alternatives

This chapter describes and compares the alternatives considered for grazing management on the Walnut Canyon Allotment. It includes a description of each alternative considered in this analysis. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., fencing wetlands versus not fencing wetlands), and some of the information is based upon the environmental, social, and economic effects of implementing each alternative (i.e., authorizing or not authorizing cattle grazing).

Alternatives Considered in Detail

The Forest Service analyzed three alternatives, including the No Action and Proposed Action alternatives. A comparison of the design features and environmental effects for all alternatives are found in Tables 4 through 8 at the end of this chapter.

Alternative 1

Current Management

As per the Forest Service Grazing Permit Administration Handbook (FSH 2209.13), current management should be analyzed in detail as an alternative to the proposed action (Chapter 92.31).

Alternative 1 would re-authorize cattle grazing on the Walnut Canyon Allotment under the current grazing management system (see Table 6) for cattle numbers and season of use.

Alternative 1 would maintain the current 35 percent utilization guideline by cattle and/or wildlife. Alternative 1 also has a “moderate” seasonal utilization guideline which is measured before the end of the growing season and is used when determining moving cattle. Cattle would move from one pasture to another when seasonal utilization approaches a “moderate” level, approximately 21-50 percent. The definitions and procedures for utilization are further described in Chapter 2 “Design Features” and in Chapter 4, “Monitoring.”

Adjustments in the annual operating instructions (AOI) would need to be made if graze periods are adjusted more than one week. As the new allotment management plan is implemented, cattle numbers would be adjusted annually to meet any particular resource issues such as drought.

No new improvements are planned in this alternative. However, if the need arises in the future, a separate analysis would be completed prior to installation. Maintenance would continue, as needed, by the permittee on all existing structural improvements including existing fence, stock tanks, and cattle guards (see Table 4). The stock tanks within seasonal and semipermanent wetlands would not be maintained for the next 10 years. The bottom wire of new and reconstructed fences would be smooth and a minimum height of 18 inches to facilitate wildlife movement.

Semipermanent or seasonal wetlands would not be grazed by cattle from May 1 to July 15. This would be accomplished by not grazing on top of Anderson Mesa (Observatory, Youngs and Marshall Lake pastures) during this time frame.

Alternative 1 meets the purpose and need by maintaining rangeland conditions and maintaining and protecting seasonal and semipermanent wetlands with emergent vegetation through deferred rotation grazing.

Alternative 2

No Action/No Grazing

The Forest Service is required to analyze the “No Action” alternative under the provisions of NEPA (40 CFR 1502.14).

Alternative 2 would not authorize cattle grazing on the Walnut Canyon Allotment. This alternative does not preclude cattle grazing or cattle management on this allotment in the future if a decision is made through another comprehensive analysis to resume these actions. With no cattle use, season of use, utilization guidelines, or adjustments to AOIs do not apply.

Under this alternative, no new structural improvements would be built. Existing structural range improvements would require a separate analysis and coordination with other agencies to determine whether or not to maintain or remove these improvements.

Alternative 2 meets the purpose and need of maintaining rangeland conditions because it eliminates cattle grazing impacts on forage species. Alternative 2 also meets the need of maintaining and protecting wetlands with emergent vegetation because no cattle grazing within Prime Lake, Youngs Lake, Dry Tank, Lost Tank and Fisher/Fry Lake would occur.

Alternative 3

Proposed Action

Alternative 3 proposes several additional changes to current cattle grazing management.

The Forest Service would re-authorize grazing on the Walnut Canyon Allotment for up to 350 cattle (cow/calf) from June 1 through October 31. The authorization would be through a term grazing permit.

Alternative 3 would maintain the current 35 percent utilization guideline by cattle and/or wildlife. Alternative 3 also has a “moderate” seasonal utilization guideline which is measured before the end of the growing season and is used when determining cattle need to move. Cattle would move from one area to another when seasonal utilization approaches a “moderate” level, approximately 21-50 percent. The definitions and procedures for utilization are further described in Chapter 2 “Design Features” and in Chapter 4, “Monitoring.”

The emergent (wetland) vegetation and the surrounding upland buffer at Prime, Fisher/Fry, and Youngs Lakes along with Dry and Lost Tanks will be excluded from cattle grazing by fencing approximately 50 acres of emergent vegetation and approximately 142 acres of upland buffer. There will be a lane for cattle to access the stock tank water at Youngs Lake, Dry, and Lost Tanks (see Figures 3-7). The current water lot at Fisher/Fry would remain as access for cattle to the stock tank. The lanes and waterlot would maintain the permittee’s and Forest Service current (livestock) water claims. The lanes and current waterlot would permit cattle grazing on approximately 6 acres of emergent vegetation and approximately 8 acres of upland buffer.

The riparian vegetation at Babbitt Spring would also be fenced to exclude cattle. The exclosure would exclude approximately 0.5 acres of emergent vegetation with approximately 15 acres in the exclosure (see Figure 8). A one-quarter mile section of pipe would be constructed with a drinker for cattle and wildlife outside the exclosure. The Forest Service would spend approximately $3,500 on materials and $1,000 would be spent by the permittee on labor. These costs would likely be offset by outside grants and other funding sources.

Figure 3. Proposed fence with lane at Youngs Lake

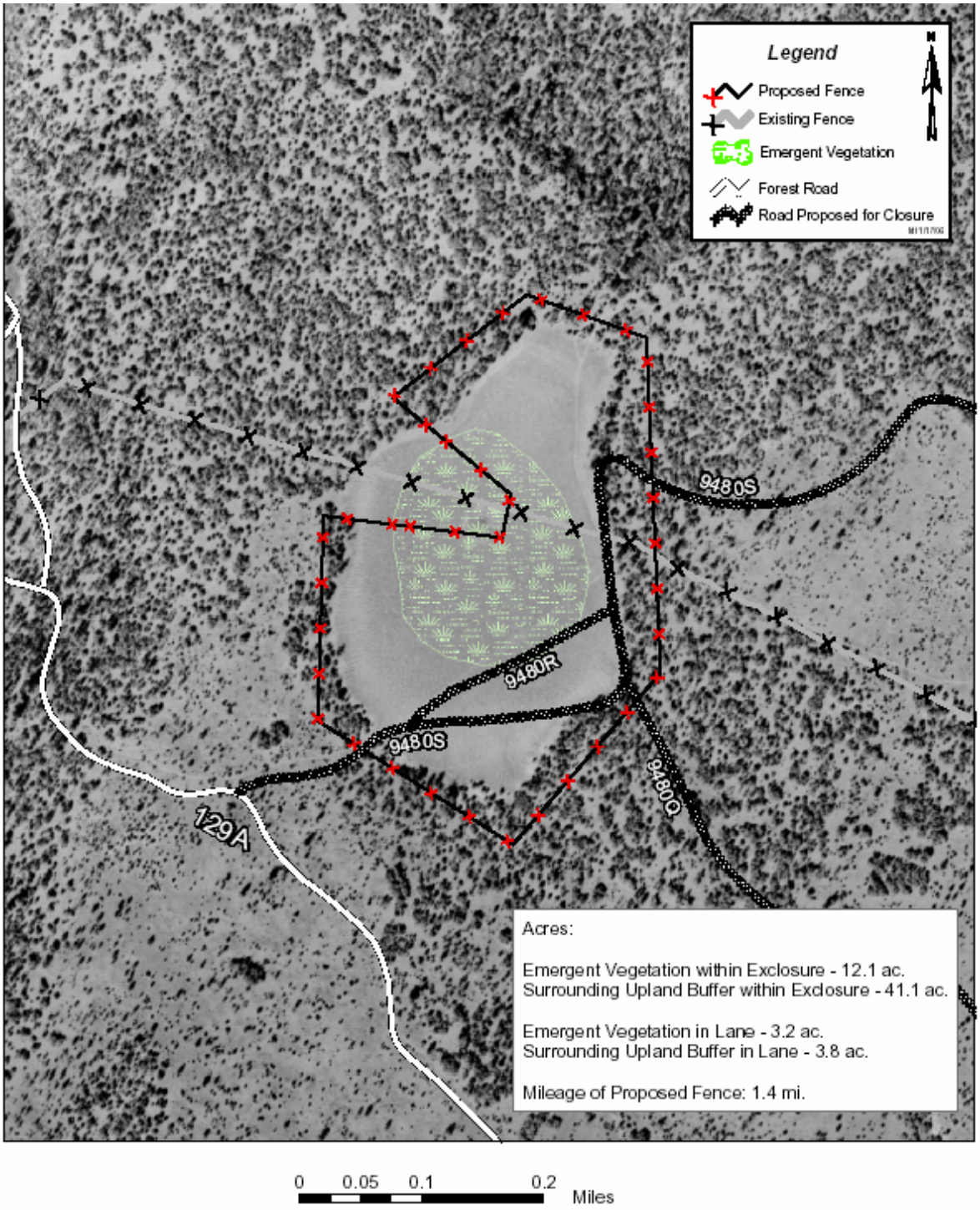


Figure 4. Proposed fence with lane at Dry Tank

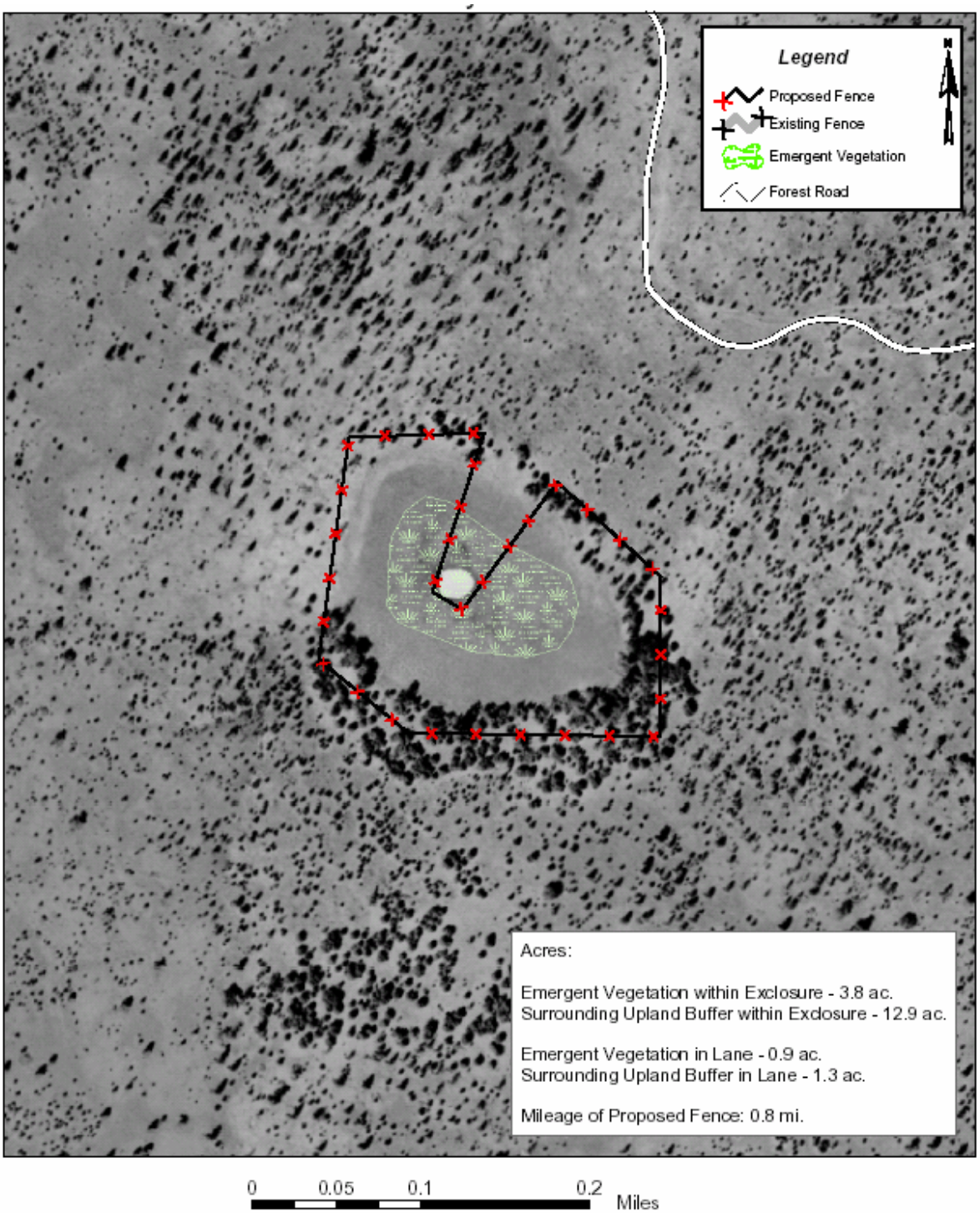


Figure 5. Proposed fence with lane at Lost Tank

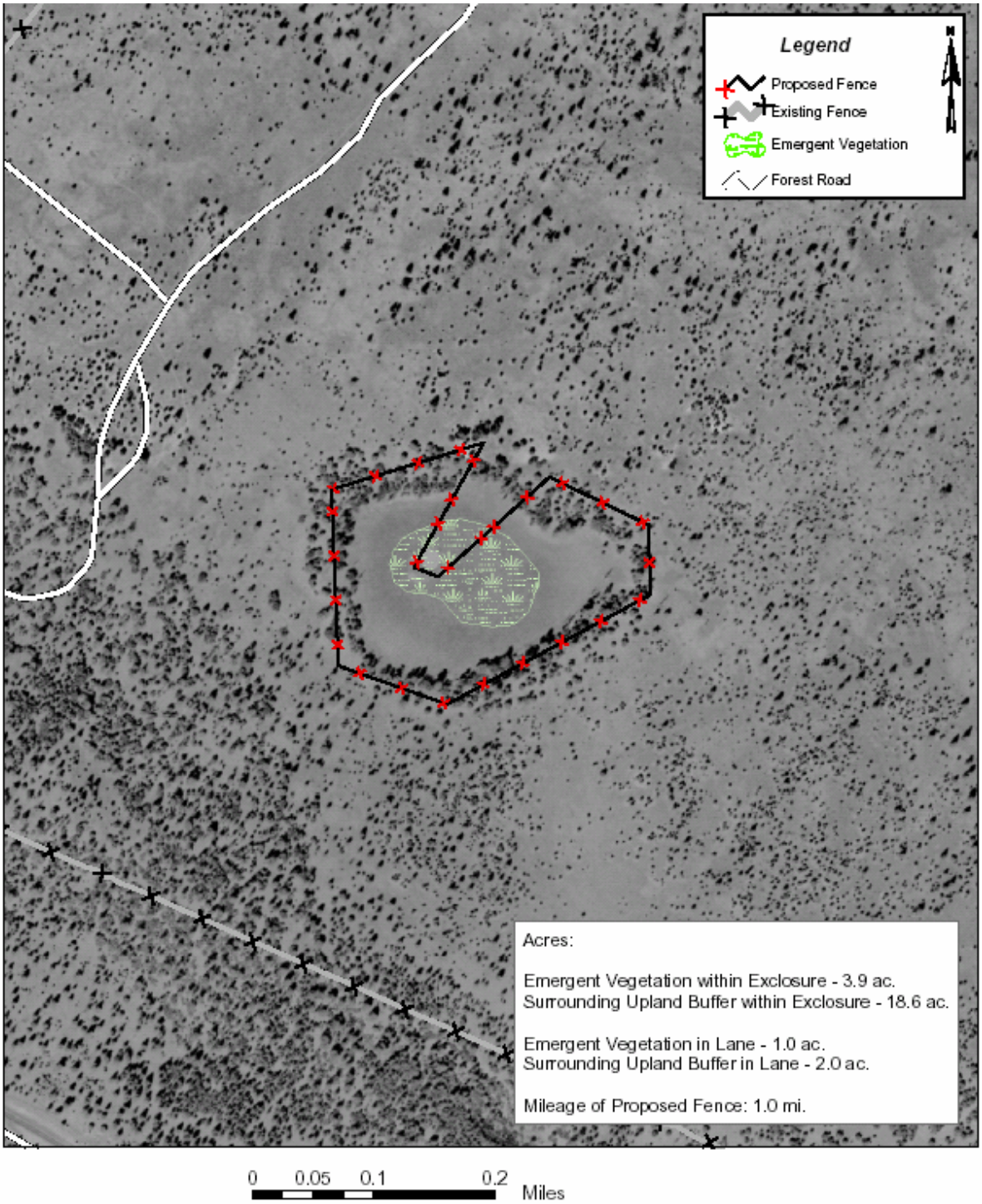


Figure 6. Proposed fence at Fisher/Fry Lake

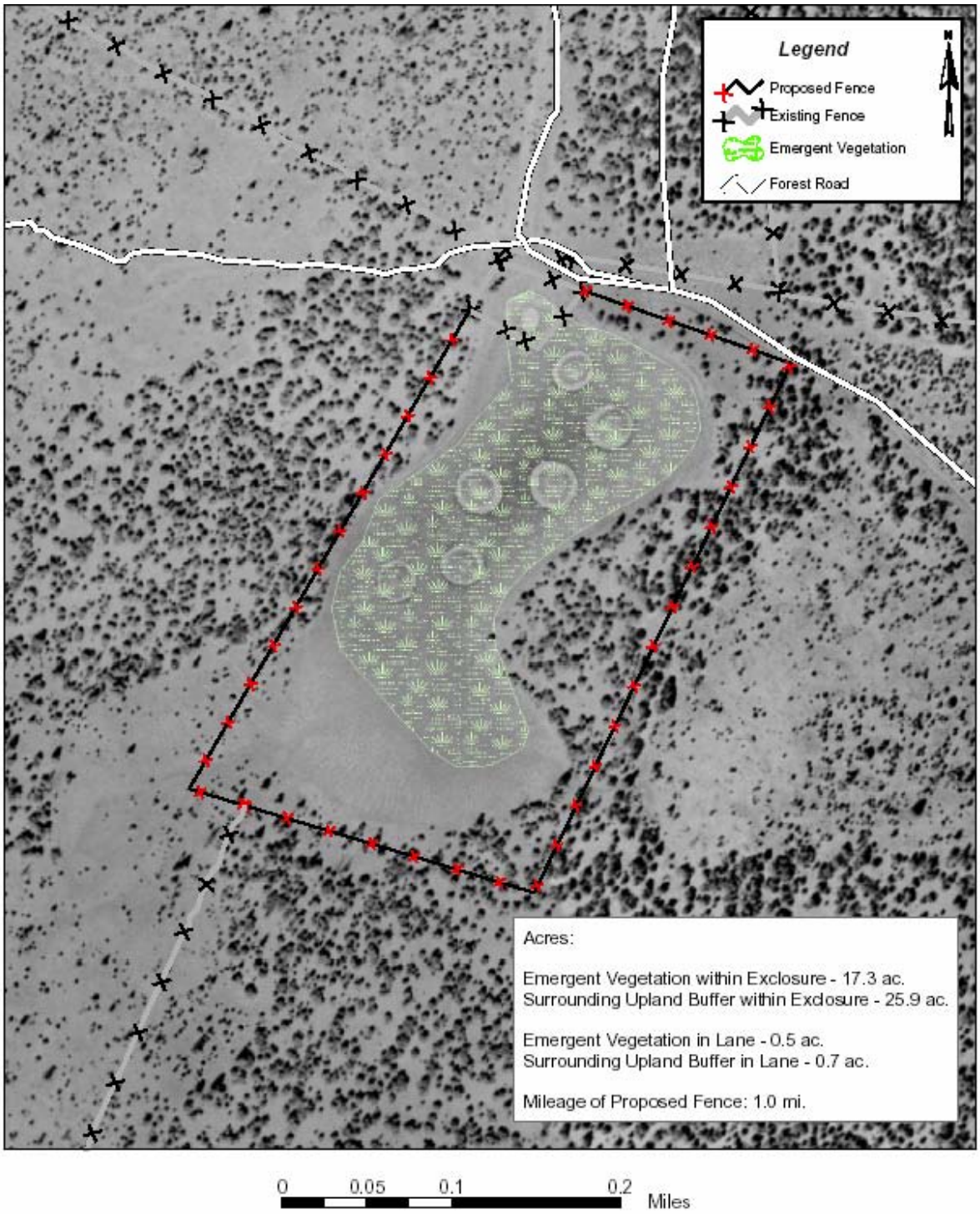


Figure 7. Proposed fence at Prime Lake

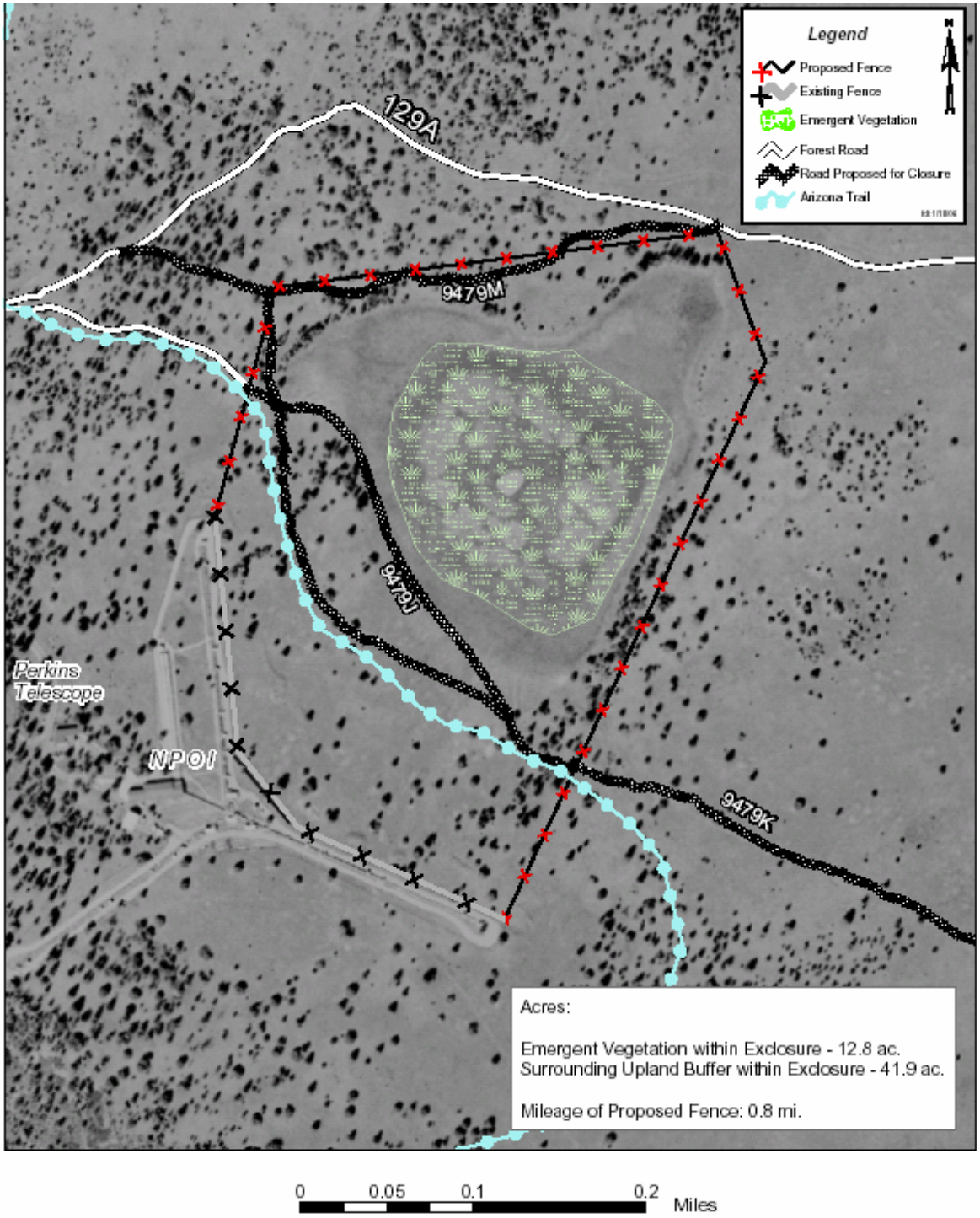
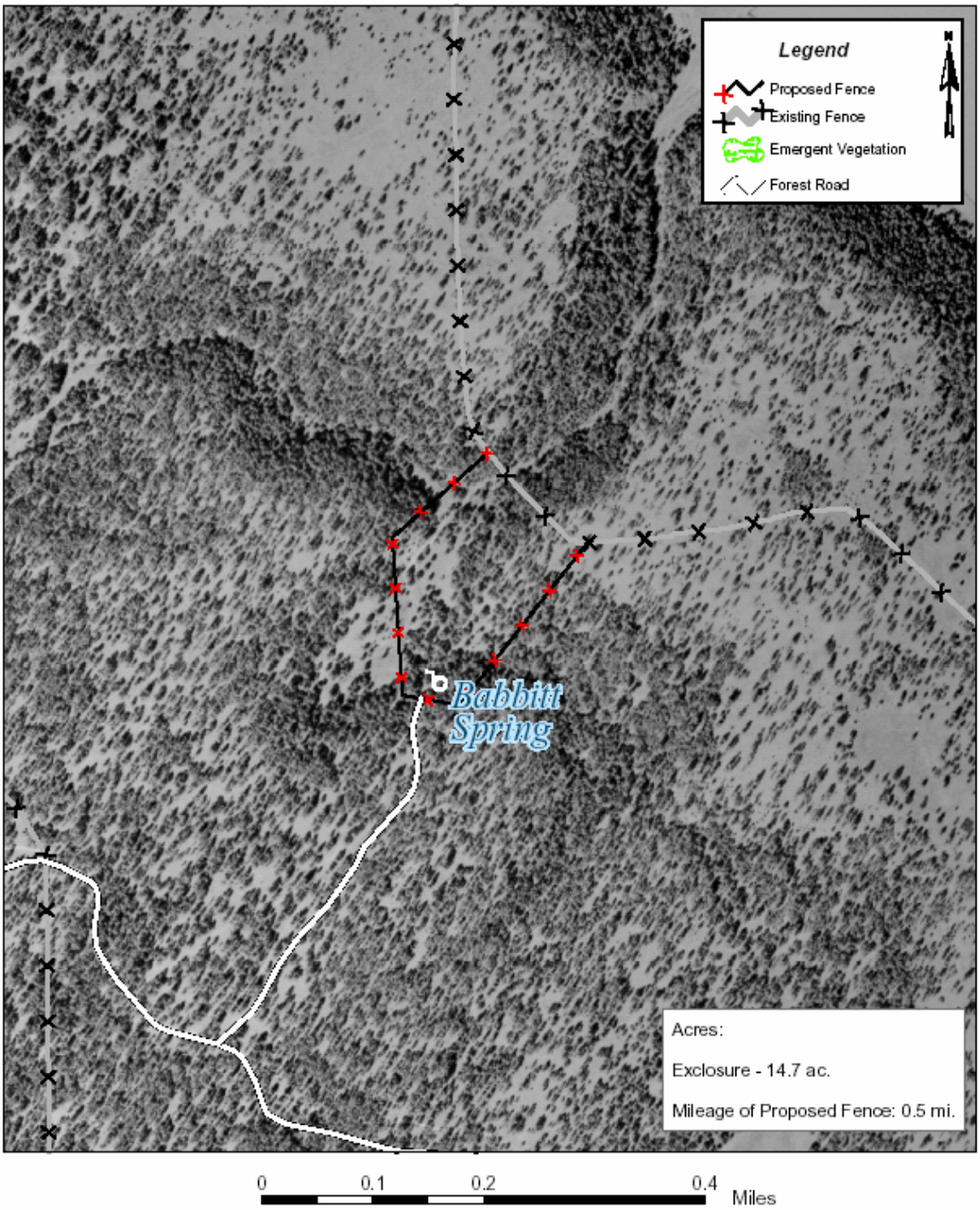


Figure 8. Proposed fence at Babbitt Spring



In addition to maintaining current range structures (including existing fence, 50 stock tanks not in wetlands, and 13 cattle guards) approximately $39,235 would be spent on installing barbwire fence for the exclosure fences at Prime Lake, Fisher/Fry Lake, Youngs Lake, Dry Tank, and Lost Tank (approximately 6 miles). The Forest Service would spend approximately $15,635, primarily for materials, and the permittee would spend approximately $23,600 primarily for construction of these improvements. These costs would likely be offset by outside grants and other funding sources.

Road closures will be necessary at Youngs Lake and Prime Lake to maintain the integrity of the wetland exclosures. The roads at Prime Lake that would be closed include: #9479K (1.3 miles); 9479J (0.25); and 9479M (0.25 miles). Travel to Vail Lake would be routed around Prime Lake via road 129A. The roads at Youngs Lake proposed for closure include 9480Q (2.6 miles), 9480R (0.2 miles), and 9480S (0.75 miles). Alternative vehicle routes exist around these proposed closures. These road closures would be implemented when the fence is constructed at Prime Lake and Youngs Lake. These roads were identified as high risk and recommended for closure during the Anderson Mesa Landscape Scale Assessment (USDA 2004).

Walk-through access along the Arizona Trail for foot and mountain bike traffic would be built into the fence at Prime Lake. Horse traffic would be routed to the east around Prime Lake. The rerouting of horse traffic would be done so swing gates would not be needed in the fence. The route around Prime Lake would add a short distance to the length of the trail, approximately 0.5 miles.

Alternative 3 includes adaptive management, which provides more flexibility for managing cattle. Adaptive management allows the Forest Service to adjust: the timing and duration of grazing, movement of cattle within the allotment, and cattle numbers. If adjustments are needed, they are implemented through the Annual Operating Instructions which would adjust numbers so cattle use is consistent with current productivity. This allows plant, soil, and watershed conditions to be maintained or improved while range improvements are implemented over time. An example of a situation that could call for adaptive management adjustments is drought conditions.

The alternatives are designed to provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired conditions are not being achieved, management will be modified in cooperation with the permittee. Changes may include administrative decisions such as the specific number of livestock authorized annually, specific dates of grazing, class of animal or modifications in pasture rotations, but such change will not exceed the limits for timing, intensity, duration, and frequency defined for the alternatives.

The South Newman, Walnut, and West Walnut pastures would be closed to grazing. The Walnut and West Walnut Pastures are currently not grazed because they are not fenced and do not have the necessary water to implement cattle management. The South Newman pasture is currently excluded from cattle grazing for resource protection. This pasture would be closed to grazing to continue the protection of Newman Canyon. Closing these three pastures would result in 7,387 acres being permanently withdrawn from permitted grazing.

Table 3 summarizes the proposed structural improvements. The proposed implementation schedule for these improvements are as follows: Prime and Fisher/Fry Lakes would likely be fenced within the first year and the fences at Youngs Lake, Lost Tank, Dry Tank, and Babbitt Spring would likely be built within the first five years.

Table 3. Alternative 3 proposed improvements

Wetland/ Spring (Type)	Proposed Fencing (Estimated)	Est. Acres of Emergent Vegetation and Upland Buffer in Exclosure (and lane)	Objective	Approx. cost ($)
Prime Lake (Semipermanent)	1 mile of fence without a lane	13 acres of emergent vegetation and 43.3 acres of upland buffer	Reduce disturbance to nesting waterfowl and protect waterfowl habitat	6,650
Fisher/Fry Lake (Semipermanent)	1 mile of fence; keeping the current waterlot	17 acres of emergent vegetation and 26 acres of upland buffer (waterlot) 0.5 acres of emergent vegetation and 1 acre of upland buffer in lane	Reduce disturbance to nesting waterfowl and protect waterfowl habitat	6,650
Youngs Lake (Seasonal)	1.4 miles of fence with a lane	12 acres of emergent vegetation and 41 acres of upland buffer (lane) 3 acres of emergent vegetation and 4 acres of upland buffer in lane	Reduce disturbance to nesting waterfowl, protect waterfowl habitat, and allow cattle access to water claim	9,310
Dry Tank (Seasonal)	1 mile fence with a lane	4 acres of emergent vegetation and 13 acres of upland buffer (lane) 1 acre of emergent vegetation and 1 acre of upland buffer in lane	Reduce disturbance to nesting waterfowl, protect waterfowl habitat, and allow cattle access to water claim	6,650
Lost Tank (Seasonal)	1 mile fence with a lane	4 acres of emergent vegetation and 19 acres of upland buffer (lane) 1 acre of emergent vegetation and 2 acres of upland buffer in lane	Reduce disturbance to nesting waterfowl, protect waterfowl habitat, and allow cattle access to water claim	6,650
Babbitt Spring (Spring)	0.5 mi. fence without a lane 0.25 mi. pipeline with drinker	0.5 acres of emergent vegetation; 14.7 acres total	Protect emergent vegetation	3,325 (fence) 4,500 (pipeline)
Totals	6 mi. of fence; ¼ mi. pipeline; 1 drinker	50 acres of emergent vegetation and 142 acres of upland buffer at wetlands; 6 acres of emergent vegetation and 8 acres of upland buffer in lanes		43,735

Maintenance would be completed by the permittee on all new and existing structural improvements including existing fence, stock tanks, and cattle guards (see Tables 4 and 5). The stock tanks within semipermanent and seasonal wetlands would not be maintained for the next 10 years. To meet Forest Plan standards, the bottom wire of new and reconstructed fences would be smooth and a minimum height of 18 inches high to facilitate wildlife passage.

Design Features

The following is a list of items that are common to both action alternatives. Some of these items are also applicable to the No Action/No Grazing Alternative (Alternative 2).

Annual Operating Instructions: Annual operating instructions (AOI) make adjustments to cattle numbers and time and duration of pasture use based on current climatic and range conditions. The AOIs are established at the beginning of each grazing season (spring) and published on the Coconino National Forest Web site (www.fs.fed.us/r3/coconino/publications). Annual operating instructions may be adjusted throughout the grazing season as conditions change.

The AOIs are the means by which adjustments of cattle numbers, change of season of use, and pasture rest periods are made in response to monitoring information such as frequency, canopy cover, Parker Three-Step plots and allotment inspections. Cattle numbers may go up or down annually but would not exceed the maximum number set in this decision. The annual minimum cattle number is zero.

The AOIs for Walnut Canyon Allotment may be changed to reflect new information based on studies, ongoing field experiences, and conclusions. If changes are suggested that fall outside the parameters of the decision resulting from this EA, they would be subject to NEPA analysis and decision. The Forest Service would make the determination whether or not to undertake a new NEPA analysis at the time the recommendation is brought forward.

Grazing Schedules: Each action alternative contains proposed grazing schedules for each pasture in the allotment and the example grazing schedules are detailed in Appendix C. These grazing schedules are given as a guide for future use; however, they may be adjusted as a result of monitoring, weather, or other conditions.

Cattle Guards: Common to all action alternatives is the need to keep cattle contained to pastures and prevent forest users from leaving pasture gates open. Where roads are open for public use, cattle guards would be maintained. There are currently 13 cattle guards in this category. Where roads are identified for closure, in past and future road decisions, no cattle guards are necessary. If gates are left open more often, new cattle guards may need to be installed.

Cattle guard maintenance is shared between the Forest Service and the permittee for level 3 roads (main surfaced roads). Cattle guard maintenance on level 2 roads (smaller, secondary roads) is the responsibility of the permittee.

Structural Improvements: Common to all action alternatives is the need for cultural, wildlife and recreation coordination when implementing construction of structural improvements for the grazing system. Structural improvements, such as the proposed water lot and wetland fencing would be used to implement the allotment management plan. During the life of the permit, there may be additional or fewer improvements needed based on adapting to changes and meeting the goals of the new system. If the No Action/No Grazing Alternative is selected, each resource area specialist would be consulted to determine if existing structural improvements would be kept and/or maintained or removed. Allotment boundary fences would be maintained regardless of the alternative selected.

Monitoring: The following would be monitored for all action alternatives: permittee and permit compliance; allotment inspections; range readiness; forage production; rangeland utilization; condition and trend; precipitation; noxious weeds; threatened and endangered species; residual wetland vegetation, and soil condition. See Chapter 4, “Monitoring” for more specific information.

For Alternative 2 (No Action/No Grazing), condition and trend monitoring would be the same as what is proposed in the action alternatives. Wildlife utilization monitoring, on forage, would also be completed on the Allotment. The amount of wildlife monitoring would depend on funding availability.

Utilization: Long-term condition and trend monitoring is the primary standard for monitoring of this cattle grazing management system. Utilization is used as a tool to understand and achieve the goals of long-term management. Utilization guidelines are intended to indicate a level of use or desired stocking rates to be achieved over a period of years.

The definition of *utilization* and *seasonal utilization* come from standard protocols established by the Society of Rangeland Management and the new guidelines established by Region 3 Regional Forester (Smith, et al. 2005). The following definitions and procedures for utilization were taken and adapted to fit this project.

Utilization is the proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). It is a comparison of the amount of herbage left compared with the amount of herbage produced during the year. Utilization is measured at the end of the growing season when the total annual production can be accounted for and the effects of grazing in the whole management unit can be assessed. Utilization guidelines are not intended as inflexible limits.

Utilization measurements would be taken in key areas which reflect grazing effects within an entire pasture. One key area would be established within each large pasture, at existing long-term monitoring sites if possible, to represent overall pasture utilization. Utilization measurements can indicate the need for management changes prior to this need being identified through long-term monitoring. Utilization data would not be used alone, but would be used along with climate and condition and trend data, to set stocking levels and pasture rotations for future years.

Cattle would move from one pasture to another when seasonal utilization in a pasture approaches a "moderate" level. For Alternatives 1 and 3 (35 percent utilization guideline), moderate seasonal utilization would be approximately 21-50 percent. Moderate seasonal utilization is an approximate value because it takes into account any additional growth which might occur later that year and considers season of use, wildlife use, weather conditions, availability of forage, and water in pastures. This moderate seasonal utilization level leaves residual cover for wildlife and soils and provides for long-term health of the grazed plants.

If monitoring shows utilization rates exceed the utilization guideline in a pasture in a given year, the grazing schedule and/or cattle numbers would be adjusted the following year so the utilization guidelines are not exceeded again. If utilization is exceeded after these adjustments are made, then the grazing management system would be changed to ensure this does not happen in the future.

Anderson Mesa Pronghorn Plan: The Anderson Mesa Pronghorn Plan was developed by the Arizona Game and Fish Department (2002) with participation from many interested agencies, including the Forest Service and groups. The Pronghorn Plan identifies the following needs: (1) support managing cattle with the intent of avoiding major negative impacts on pronghorn forage or fawning cover in the frequent years of below normal precipitation and (2) advocate managing cattle at the level where cattle impacts on pronghorn forage or fawning cover are not major through the fawning period.

Specific to this project, habitat suitable for pronghorn fawning occurs primarily on top of Anderson Mesa on the Walnut Canyon Allotment. Management objectives from the Pronghorn Plan, along with Forest Service monitoring and improvements, began in 2002. Pronghorn Plan

accomplishments specific to the Walnut Canyon Allotment include modifying or replacing approximately five miles of fences in the last 3 years, with the 18-inch smooth bottom wire standard. Additionally, the Forest Service has been meeting annually with interested members of the Anderson Mesa Pronghorn Mediation group to evaluate the results of the previous year's treatments and management.

The Forest Service will continue to participate in implementing the Pronghorn Plan management objectives and annual adaptive management meetings despite any alternative selected.

Water Claims: The permittee and Forest Service have water claims for livestock use within this allotment [PRD 36]. Filed water claims are part of the Lower Colorado River adjudication process and a decision on their status has not been made by the State of Arizona at this time. As part of working with the Walnut Canyon permittee, access to these water claims would be maintained. For the proposed exclosure fences around Youngs Lake, Fisher/Fry Lake, Lost Tank, Dry Tank, access to the water claims would be provided via lanes or a water lot and are designed by the Forest Service and the permittee.

Fencing: All new fencing would have a smooth bottom wire at an 18-inches of the ground and a top wire no higher than 42-inches to facilitate eisier wildlife passage. Where possible, fences would be located within tree lines to limit impacts to visual quality. Elk jumps and goat bars (PVC pipes placed on the bottom two strands and on the top strand at a crossing point) would be installed along new fences or along existing fences on game trails and known migration corridors as volunteers and funding are available. As fence inventories are completed, those fences that are complete barriers to wildlife would be modified to meet the fencing standards identified in the Forest Plan.

Stock Tanks: There are no new stock tanks or removal of existing stock tanks proposed in any alternative. New stock tanks have not been constructed in wetlands on the Walnut Canyon Allotment for more than 40 years. Their construction was completed prior to the Clean Water Act requirement of a 404 permit for ground disturbance. For all alternatives, stock tanks located within seasonal and semipermanent wetlands (Marshall, Little Dry, Fisher/Fry, Vail, Prime, and Youngs lakes and Lost and Dry tanks) would not be maintained for the next 10 years.

For all action alternatives, the stock tanks that are not within seasonal or semipermanent wetlands may be maintained as needed and would meet the following standards: maintenance would be limited to the original boundary of the stock tank; maintenance would be limited to removal of sediment that has accumulated in the stock tank and maintenance of the tank berm and spillway; equipment that would be used includes but is not limited to a dozer, backhoe, or front end loader; maintenance frequency would range from no maintenance to whenever needed, depending on the amount of sediment flowing into the stock tank; maintenance would be done when the stock tanks are either dry or the water level is low enough so that the equipment would not get stuck in the mud; and any requirements or timing restrictions related to water quality, wildlife, archaeology, or Forest Plan standards and guidelines would be followed.

Watershed Protection: The current and proposed cattle grazing system incorporates Best Management Practices (BMP) and constitutes compliance with Arizona State and Federal Water Quality Standards. The following BMP, applicable to this project, is designed to protect resource values, uses, and maintenance of soil productivity, stability and water quality.

- Monitor ground conditions before and during construction activities to avoid wet ground conditions that can negatively affect soil condition and water quality.

The following grazing practices were selected for the Walnut Canyon Allotment through the integrated resource management process and would also apply to all cattle grazing alternatives.

- *Grazing systems are alternately rested and grazed in a planned sequence.* Cattle rotate in a planned grazing system that alternates rest and graze periods throughout a given year and from year to year. A six pasture deferred-rotation grazing meets this practice.
- *Grazing at a level that would maintain enough cover to protect the soils and maintain or improve the quantity and quality of desired vegetation.* This practice would be applied through the utilization guidelines for the action alternatives.
- *Fencing to improve cattle management, control access, prevent soil loss, and improve water quality*. The proposed water lots will allow the permittee to control access to water for cattle at the five selected stock tanks. By closing or opening up these water lots, the permittee can improve management of when and where cattle graze in the main pasture. Proposed wetland fencing will prevent cattle access to emergent vegetation (except for the lane). Proposed fencing was not designed to specifically prevent soil loss or improve water quality, however these are indirect benefits to the actions.

Mitigation Measures

The Forest Service would apply the following mitigation measures to any action alternative to minimize and reduce potential impacts from proposed activities.

Noxious Weeds: A weeds assessment/inventory was completed for this analysis [PRD 40]. State-listed noxious weeds located in this allotment would be treated as necessary. The permittee and Forest Service would coordinate the weed inventory and treatment with responsibilities identified through the AOI. Noxious weed monitoring is carried out at the same time allotment inspections are conducted. As noxious weed populations are found they are mapped, monitored and, in some areas, manually removed. Other treatment methods will follow guidelines established in the "Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds" (USDA 2005b).

Microphytic soil crusts: Microphytic (cryptogamic) soil exist on the Walnut Canyon Allotment within TES map units 436 and 465 (both Elevated Plains) Cattle can trample microphytic crusts when they travel through the area. Typically, effects from cattle are greatest near sites with high use, such as waters and salting locations. To mitigate the potential negative affect to microphytic soils from cattle, salting will not be allowed in TES Unit 436 and 465.

Threatened and Endangered Species: Mitigation measures or implementation parameters described in the wildlife biological assessment and biological evaluation [PRD 53] are required to minimize the impacts on bald eagles and Mexican spotted owl species and habitat.

Bald Eagle

Livestock management activities such as salting, herding and construction actions associated with grazing operations within the project area would not occur within one-quarter mile of a bald eagle roost or nest site during any time of occupation by bald eagles.

Mexican Spotted Owl

Mexican spotted owl habitat occurs on the Walnut Canyon Allotment. The following mitigation measures would be implemented.

- No human disturbance or construction activities associated with cattle grazing operations would occur within PACs during the breeding season (March 1 through August 31).
- Continue to monitor grazing use by cattle and wildlife in the ponderosa pine/gambel oak type. The utilization guideline for cattle and/or wildlife is 35 percent in this key area within the PACs.
- Livestock distribution techniques, such as salting and herding should be used, to provide for better use of a pasture. The following guidelines would be used for placing salt, mineral blocks, or supplements:

  -do not place these items in riparian areas, mountain meadows, or non-riparian drainages in ponderosa pine;

  -do not place these items in spotted owl PACs or goshawk PFAs; and

  -rotate salt and mineral supplement sites regularly, at least every 2 weeks, within spotted owl restricted habitat.
- Follow best management practices as listed under “Watershed Protection.”
- Follow utilization guidelines to provide for favorable growth of forage species.
- If utilization guidelines are exceeded, stocking and management may need to be adjusted to maintain productivity of the allotment for the future.

Sensitive Plant Species: Sensitive plant surveys would be completed before constructing fences. If sensitive plant species are located, coordination with a wildlife biologist or botanist would occur to mitigate impacts as needed (i.e. flagging specific plants and adjusting the location of the improvement).

Cultural Resources: Activities associated with allotment improvements will be managed to avoid cultural resource sites and ensure no effect to cultural resources. Before initiating any activities as part of this project, a District Archaeologist will be notified to ensure the proposed activities have cultural resource clearance and project personnel are aware of the conditions specified in the final Walnut Canyon Allotment Management Plan Cultural Resource Clearance Report. Management practices that tend to concentrate cattle, such as placement of salt, construction of waters or corrals, etc., will be located away from cultural resources. Ground disturbing activities, such as the construction of improvements (e.g., pipelines, stock tanks, cattle guards, etc.), will require separate archaeological survey and clearance prior to implementation.

The District will periodically monitor known archaeological sites to ensure they have been avoided, and such inspections will be reported in writing to the forest archeologist. Should any additional prehistoric or historic archaeological sites be encountered during the course of this project, they are to be avoided and immediately reported to a District or Zone Archaeologist. If any of these new discoveries are rock shelters, they will be closely monitored and if cattle are using these sites for shelter and impacting the fragile nature of the site, the shelter should be excluded from future grazing. Should the tribes identify any plants in the area having traditional importance, the District will encourage and protect the natural regeneration of such plants.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action sometimes provide suggestions for alternative methods of achieving the purpose and need.

No Lane and No Water Lot Alternative

During scoping for the EA for Walnut Canyon Allotment, an alternative was considered that would completely fence the wetlands from cattle and provide water outside the fenced wetlands. The wetlands would be individually fenced and the exclosures would have an upland buffer. This alternative would not include lanes or maintain a water lot.

The Proposed Action (Alternative 3) for the Walnut Canyon Allotment includes lanes to the stock tanks at Lost Tank, Dry Tank, Youngs Lake and use of a water lot at Fisher/Fry Lake. The most reliable water sources in these areas of the Walnut Canyon Allotment are these four wetland stock tanks.

The permittee and the Forest Service both have water claims for stock watering on the Walnut Canyon Allotment. By not allowing cattle to access the stock tank via a lane, the water claim would need to be relocated. No other water exists in this area of the allotment which makes the water claims at these locations even more important for good distribution of cattle.

Constructing replacement stock tanks in locations near Fisher/Fry, Youngs, Dry, and Lost, is unlikely because there are no suitable locations for stock tanks. Many stock tanks have been built throughout this area in an attempt to improve cattle distribution. These attempts have not resulted in reliable water sources. The names of these tanks say it all: Disappointment, Last Chance, Open, Frustration and Why Tanks. Other locations were tried and were filled in due to bedrock in the area. The locations for these tanks were based on the “best” potential to collect and store water. Some of these tanks do hold water for a very limited time. Tank depth, tank materials, flat terrain, and shallow bedrock are the main reasons for the lack for success. A replacement stock tank would need an area of deep clay soils that is flat enough for a tank and has an adequate drainage and watershed to fill the tank with water.

Replacing the water claims with a large capacity trick tank would also be difficult. The large capacity of the collection aprons and water storage tanks would be expensive (approx $200,000) per location and would cover several acres of grassland habitat. It would also be complicated and expensive to move materials into these sites due to the remote and extremely rocky terrain. Maintenance of the trick tanks would also be difficult due to the remote locations and large size of the aprons.

The effects of wetland fencing with lanes at these locations would not have results that are sufficiently different from fencing without a lane. The number of acres of emergent vegetation and upland buffer within the proposed lanes is small compared to the total emergent and upland buffer vegetation protected on the Walnut Canyon Allotment; of all the emergent vegetation acres on the allotment (269 acres), 5.5 acres (2 percent) would be within the lanes. In addition, no bulrush grows within the proposed lane areas. In summary, the effects of cattle grazing within the lanes are minimal when compared to the cost and impracticality of constructing alternative water.

This alternative was not considered for detailed analysis for several reasons:

- There is no Forest Plan direction requiring yearlong protection of the four mentioned wetlands. The proposed action already meets Forest Plan direction for wetlands.
- Would not meet Forest Service and permittee needs for accessing their filed water claims [PRD 36].
- The construction and maintenance of water systems outside of wetlands, is financially expensive and unreasonable to the permittee and the Forest Service.

Reduction in Cattle Number and Utilization Alternative

During scoping for the EA for Walnut Canyon Allotment, an alternative was considered that would have reduced cattle and utilization guidelines by 15 percent, from 350 to 297 head of cattle (1,494 head months) and from 35 to 20 percent utilization.

An alternative with a reduction in cattle numbers and a lower utilization guideline has been brought forward as a full alternative in several recent EIS projects on Anderson Mesa. These projects include: Anderson Spring and Bar T Bar EIS (2005), Pickett Lake and Padre Canyon EIS (2005), and Deep Lake DEIS (2006). The analysis of reducing numbers/utilization in these projects has not shown a large difference from the effects of allowing cattle grazing at 35 percent utilization or at full cattle numbers. There were no important differences in effects to soils, vegetation, wetlands, wildlife, or other resources.

Based on these previous and similar analyses, it has been determined that reducing cattle numbers or the utilization guideline results in little difference to the areas that are being affected by cattle. Whether there are higher or lower cattle numbers in a pasture or a 35 percent or 20 percent utilization guideline, cattle would graze the productive, flat, less rocky terrain and areas near water first, before moving to the surrounding uplands. A reduction in upland use is observed, but this difference in upland use is typically not great and would not be impact the uplands on the Walnut Canyon Allotment.

Recent case law has established that consideration of alternatives which lead to similar results is not sufficient to meet the intent of NEPA [Citizens for Environmental Quality v. United States, 731 F. Supp. 970, 989, (D. Colo. 1989); State of California v. Block, 690 F.2d 753 (9th Cir. 1982)]. Because a reduced cattle number/utilization alternative would result in similar environmental effects as that of the Proposed Action, it was eliminated from further analysis.

No Marshall Lake Riparian Pasture Alternative

During scoping for the EA for Walnut Canyon Allotment, an alternative was considered that would have discontinued cattle grazing with the Marshall Lake riparian pasture. Current management and the Proposed Action both include keeping the Marshall Lake riparian pasture in the grazing rotation for up to 10 days in October. This new alternative would have removed Marshall Lake pasture from the grazing rotation.

The Marshall Lake riparian pasture was established in 1997, when a four wire fence was built around the lake. This fence was built to exclude use of Marshall and Little Dry Lakes from cattle grazing until the fall. This use is consistent with Forest Plan direction.

Since the fence was built, little use (less than 10 percent utilization) of hardstem bulrush and spikerush has been observed [PRD 22]. This light use is a function of several factors including:

- Emergent vegetation is less attractive to cattle during the fall, compared to the spring or summer.
- Marshall Lake riparian pasture is a gathering pasture before the cattle are shipped off the allotment, so the entire herd does not graze this pasture for the entire 10 days;
- The lake bottom is cool this time of year, compared to warmer uplands so cattle tend to stay in the uplands.
- When this wetland has water, the wetland edge tends to have very heavy clay and cattle do not enter the water very far because of the fear of getting stuck.
- Water is available in stock tanks away from the emergent vegetation in this pasture.

In summary, the effects of cattle grazing within the Marshall Lake riparian pasture for up to 10 days in October are minimal. The Walnut Canyon Allotment permittee uses this pasture as a gathering area for their cattle because it is adjacent to their shipping facility and it allows for fast gathering of adjacent pastures. This cattle gathering and shipping works well. If this riparian pasture was removed from this use, additional improvements would need to be added to the allotment on the Forest. With minimal effects to these wetlands, this change is not currently warranted.

Wetland monitoring plots have been established in this area and recent data shows that current management is maintaining desired conditions. Based on this information, it was determined that there is no need to change current management at this time and the alternative was eliminated from further analysis.

Fencing Wetland Complex Alternative

During public scoping for a proposal to fence Prime Lake and Fisher/Fry Lake in June 2004, commenters suggested constructing one fence around these wetlands in order to create a “wetland complex”. The analysis of this earlier proposal was halted and the action has since been incorporated into the Proposed Action for this project. During public scoping for this project, an alternative to fence one or more wetlands into wetland complexes was suggested again. This alternative was considered using a map provided by the commenters [PRD 12].

The proposed complex would include fencing the Prime, Vail, and Fisher/Fry Lakes together. Compared with Alternative 3 (fencing individual wetlands), this complex would result in 1.4 fewer miles of fence and year-round protection from cattle grazing on an additional 0.5 acres of emergent vegetation and 1,178 acres of upland vegetation. The change in upland acres available to cattle grazing would result in the maximum number of permitted cattle being 300 (1,509 head months) contrasted to 350 head (1,761 head months) in Alternative 3.

The proposed fencing in Alternative 3 is primarily for the protection of waterfowl habitat and not for the protection of uplands for water quality and soil protection. Based on previous studies and Forest Service data from plots in rested and deferred pastures on other areas of Anderson Mesa, it has been determined that fencing these upland acres would not result in a change in their current conditions (which includes cattle grazing) [PRD 58].

The alternative would require part of the fence around Vail Lake be removed. The current fence at Vail Lake is in good condition and it includes the entire wetland and approximately 95 percent of the surrounding upland buffer.

By not allowing cattle to access the stock tank at Fisher/Fry via a waterlot, the water claim would need to be relocated. Construction of a replacement stock tank in a location near Fisher/Fry is also unlikely because there are no suitable locations for a stock tank. No other water exists in this area of the allotment which makes the water claim at this location even more important for good distribution of cattle.

Replacing the water claim with a large capacity trick tank would also be difficult. The large capacity of the collection apron and water storage tank would be expensive (aprox $200,000) and would cover several acres of grassland habitat. It would also be complicated and expensive to move materials into this site due to the remote and extremely rocky terrain. Maintenance of the trick tank would also be difficult for the same reasons.

In summary, this alternative was not considered for detailed analysis for several reasons:

- Fences more upland vegetation than required under the scope of the proposed action and purpose and need (see Chapter 1). Alternative 3 addresses wetland management and rangeland conditions consistent with the purpose and need and Forest Plan direction [PRD 17].
- The current fence at Vail Lake is adequate and in good condition; removing it would not be cost effective.
- Would not meet Forest Service and permittee needs for accessing their filed water claims [PRD 36].
- The construction and maintenance of a replacement stock tank outside of Fisher/Fry is financially expensive and unreasonable to the permittee and the Forest Service.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the following tables focuses on activities where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. To begin, a summary of existing and proposed improvements (including maintenance) is provided in Tables 4 and 5.

Table 4. Existing structural improvements and maintenance schedule

Existing Structural Improvements	Alternatives 1, 2*, 3	Maintenance
Fences	48 miles	Annually
Cattle guards: Level 2 and 3 roads	13	Annually
Stock tank within seasonal/semipermanent wetlands	7	No maintenance
Stock tank outside seasonal/semipermanent wetlands	50	As needed, when sediment levels reach 50%.
Pipeline	2	As needed
Trick tanks	5	As needed

*Existing structural improvements would remain in place if the no grazing alternative was selected due to the following reasons: temporary closure of this allotment to cattle grazing could be reassessed at a later date; allotment boundary fences would need to be maintained to keep cattle from other allotments out of this area; wildlife use of stock tanks would need to be assessed.

Table 5. Proposed structural improvements by alternative

New Structural Improvements	Alt. 1	Alt. 2	Alt. 3
Fences – wetlands/springs*	0	0	6 mi.
Pipeline/drinker (Babbitt Spring)	0	0	0.25 mi.

*Prime Lake (~1 mile), Fisher/Fry Lake (~1 mile), Youngs Lake (~1.4 mile), Dry Tank (~1 mile), Lost Tank (~1 mile), Babbitt Spring (~0.5 mile).

Table 6. Cattle grazing statistics by alternative

Grazing Statistic	Alt. 1	Alt. 2	Alt. 3
Season of use	6/1-10/31	None	6/1-10/31
Months of cattle use	5	0	5
Number of cattle (cows/calf)	350	0	350
Head months	1761	0	1761
Percent reduction in head months and cattle numbers from current management	0	100	0
Utilization guideline	35%	N/A	35%

Table 7. Alternative comparison by purpose and need

Purpose and Need	Alt. 1	Alt. 2	Alt. 3
Authorize livestock grazing (purpose of project)	Yes	No	Yes
Maintain and/or improve rangeland conditions	Yes	Yes	Yes
Maintain and protect seasonal and semipermanent wetlands	Yes	Yes	Yes
Maintain Forest Service and permittee access to current water claims	Yes	No	Yes

Table 8. Summary of environmental effects

Effect	Alt. 1	Alt. 2	Alt. 3
New wetland cattle exclosures	None	None	Prime, Fisher/Fry, and Youngs lakes, and Lost and Dry tanks
Mexican spotted owl	May affect, not likely to adversely affect	No effect	May affect, not likely to adversely affect
Bald Eagle	No effect	No effect	No effect
Pasture utilization guideline	35% for cattle and wildlife	N/A	35% for cattle and wildlife
Cattle grazing in seasonal and semipermanent wetlands May 1 through July 15 (Vail Lake has existing cattle exclosure; Marshall and Little Dry Lake are grazed 10 days in October)	No cattle use 5/1-7/15 through grazing rotations	N/A	Prime, Fisher/Fry, and Youngs lakes, and Lost and Dry tanks excluded from cattle grazing (all but Prime Lake would have a lane to water)
Grazing in pronghorn antelope fawning habitat, i.e. open grasslands (Youngs, Observatory, and Cherry pasture) April 1 to June 15	No use 4/1-5/31; use for 15 days during fawning season in the Cherry pasture 2 out of 3 yrs*	N/A	No use 4/1-5/31; use for 15 days during fawning season in Youngs or Cherry pasture 2 out of 3 yrs*

*Based on example grazing schedules (Appendix C)

Chapter 3. Affected Environment and Environmental Consequences

Introduction

This chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the previous chapter linked to references and specialist reports. The following analysis of environmental consequences is organized by resource area and discloses the direct, indirect, and cumulative effects of the proposed action and alternatives on those resources.

Direct effects are those 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. *Cumulative effects* are the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

To analyze cumulative effects, activities and natural events that overlap in time and space with the proposed activities and project area were considered. This area is referred to as the *cumulative effects area* in this EA. The cumulative effects area varies by resource type and is defined under each resource area analyzed in this chapter.

The tables in Appendix B identify past, present and reasonably foreseeable activities and natural events, and adjacent grazing allotments that were considered in the cumulative effects analysis. Information from these lists of activities and/or natural events were carried forward into each resource cumulative effects analysis based on that resource's spatial and temporal parameters. Not all of these activities or events are applicable to each resource cumulative effects analysis.

It is also important to note several historic activities which have altered natural conditions so much that trends cannot be reversed and a new environmental "baseline" exists. These historic activities include:

- grazing of cattle has occurred for more than 100 years. In the 1870s, ranchers began grazing cattle with the numbers of cattle peaking in 1891 [PRD 40]. Cattle numbers have been greatly reduced since the turn of the century as better management strategies have been implemented;
- utilization levels on vegetation from cattle have declined over time as well;
- in the late 1800s and early 1900s, settlers farmed and cut hay on deep soils, which included wetlands and meadows. General wetland and meadow ecosystem health declined as native vegetation was disturbed and/or removed. These sites were hayed and planted with various crops which changed the vegetation component, compacted soils, and changed water flow dynamics. Farming declined after the establishment of the Coconino National Forest in 1908;
- the majority of stock tanks in wetlands were built from 1930 to the 1970s. Stock tanks were dug to create free standing water for cattle grazing; and
- past wildlife grazing, specifically from elk, increased from the 1950s to peak numbers in the mid-1980s and has generally declined since the mid-1980s [PRD 40]. Utilization levels from elk on vegetation have decreased as their population numbers have decreased.

Soils

Soil condition is an evaluation of soil quality based on an interpretation of factors, which effect soil function. Primary soil functions are the ability of the soil to: (1) accept, hold and release water; (2) accept, hold and release nutrients (recycle nutrients); and (3) resist erosion. Watershed condition is a description of the health of a watershed, or portions thereof, in terms of the factors that affect hydrologic function and soil productivity.

Domestic cattle grazing has the potential to affect soil and hydrologic functions that are important in the maintenance of long-term productivity and favorable conditions of water flow. Specifically, changes in the soil's surface structure and its ability to accept, hold, and release water may be affected by compaction caused by trampling. The nutrient recycling function of the soil may be interrupted by removal of vegetation that impacts above ground nutrient inputs into the system. Finally, the soil's resistance to erosion is affected by changes in plant density, composition, and protective vegetative ground cover that are part of the organic components in the soil.

Soil condition status is obtained from the Coconino National Forest Terrestrial Ecosystems Survey (TES) (USDA 1995). Generally, Forest Service lands on the Walnut Canyon Allotment are in satisfactory condition [PRD 40]. Based on TES predictions and field surveys, unsatisfactory, impaired and satisfactory soils exist on portions of the Walnut Canyon Allotment, as shown in Table 9. Figure 9 displays the TES units across the allotment.

Of the 31,607 acres on the allotment, 29,956 acres are satisfactory (94 percent). 1,535 acres are impaired (5 percent), and 117 acres are unsatisfactory (0.4 percent). An *unsatisfactory soil condition* occurs where the current rate of soil erosion exceeds a tolerable level or the rate at which soil formation occurs. *Impaired soils* signify a reduction of soil function and the ability of soil to function properly has been reduced and/or there exists an increased vulnerability to degradation.

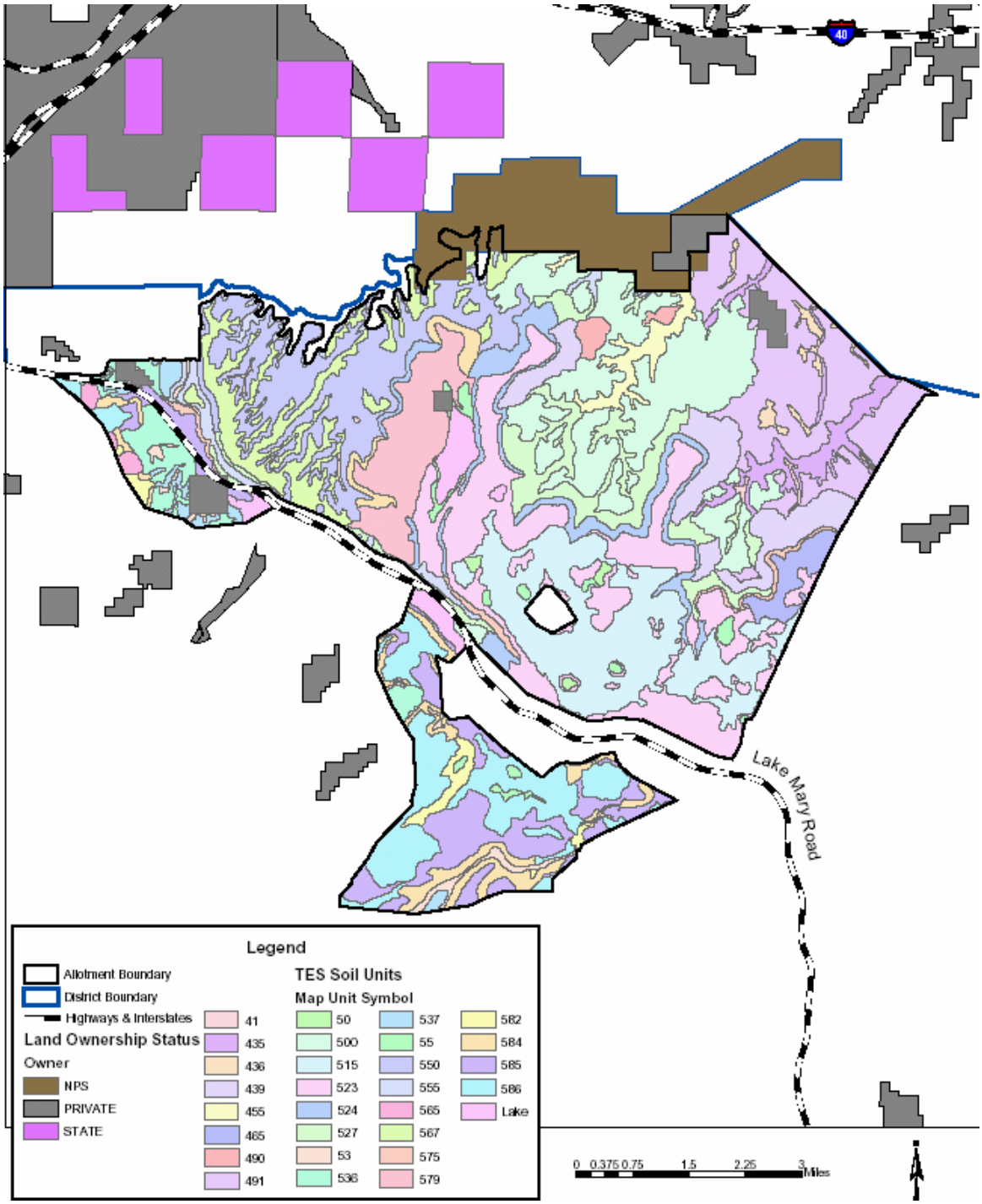
Altogether, 1,652 acres have either/or unsatisfactory and impaired soils with primarily static with some upward trends. These areas include dense juniper stands, grassland basins, swales, valley plains, and elevated grassland plains. Cattle are directly contributing to 807 acres of impaired and unsatisfactory soil conditions on the allotment as a whole (3 percent) and (49 percent) of the total acres of impaired and unsatisfactory soils (see Figure 10). Juniper trees are directly contributing to 845 acres of impaired and unsatisfactory soil conditions on the allotment as a whole (3 percent) and (51 percent) of the total acres of impaired and unsatisfactory soils.

In some of the juniper forested areas, tree densities are increasing enough to increase bare soil and reducing ground cover by out-competing understory vegetation for water. Cattle do not typically graze the densely treed areas due to little forage availability. Since 2000, many of the pinyon trees on the allotment have died due to drought conditions resulting in an increase in understory plants that provide ground cover.

Table 9. Soil conditions on the Walnut Canyon Allotment, shown in TES Units

TES Unit # - Description	Total Acres	Satisfactory Acres	Impaired Acres	Unsatis-factory Acres	Contributing factors	
					Cattle	Pinyon/ Juniper
41-Valley Plains	47	24	24		24	
50-Basins/Swales	73	37	37		37	
53-Valley Plains	279	279				
55-Valley Plains/Swales	269	135	135		135	
436-Elevated Plains	825	825				
439-Hill/Scarp Slope of Plain	1,276	1,276				
455-Escarpments	424	424				
465-Elevated Plains	355	121	117	117		234
490-Elevated Plains	164	164				
491-Elevated Plains	2,738	2,738				
500-Elevated Plains	3,479	3,479				
515-Elevated Plains	3,055	1,833	1,222		611	611
523-Elevated Plains	3,445	3,445				
524-Hills/Scar. Slope of Plain	1,144	1,144				
527-Hills/Scar. Slope of Plain	1,563	1,563				
536-Elevated Plains	667	667				
537-Hills/Scar. Slope of Plain	280	280				
550-Hills/Scar. Slope of Plain	2,720	2,720				
555-Escarpments	508	508				
565-Cinder Cones	106	106				
567-Elevated Plains	1,642	1,642				
575-Escarpments	227	227				
579-Elevated Plains	1,279	1,279				
582-Elevated Plains	262	262				
584-Hills/Scar. Slope of Plain	996	996				
585-Elevated Plains	1,740	1,740				
586-Elevated Plains	2,044	2,044				
Totals	31,607	29,956	1,535	117	807	845

Figure 9. Terrestrial ecosystem survey units on the Walnut Canyon grazing allotment



The five TES units that have impaired soil conditions are: 41, 50, 55, 465, and 515 (unit 465 has both impaired and unsatisfactory soils). The following is a description of these impaired/unsatisfactory soil units.

Impaired Soils

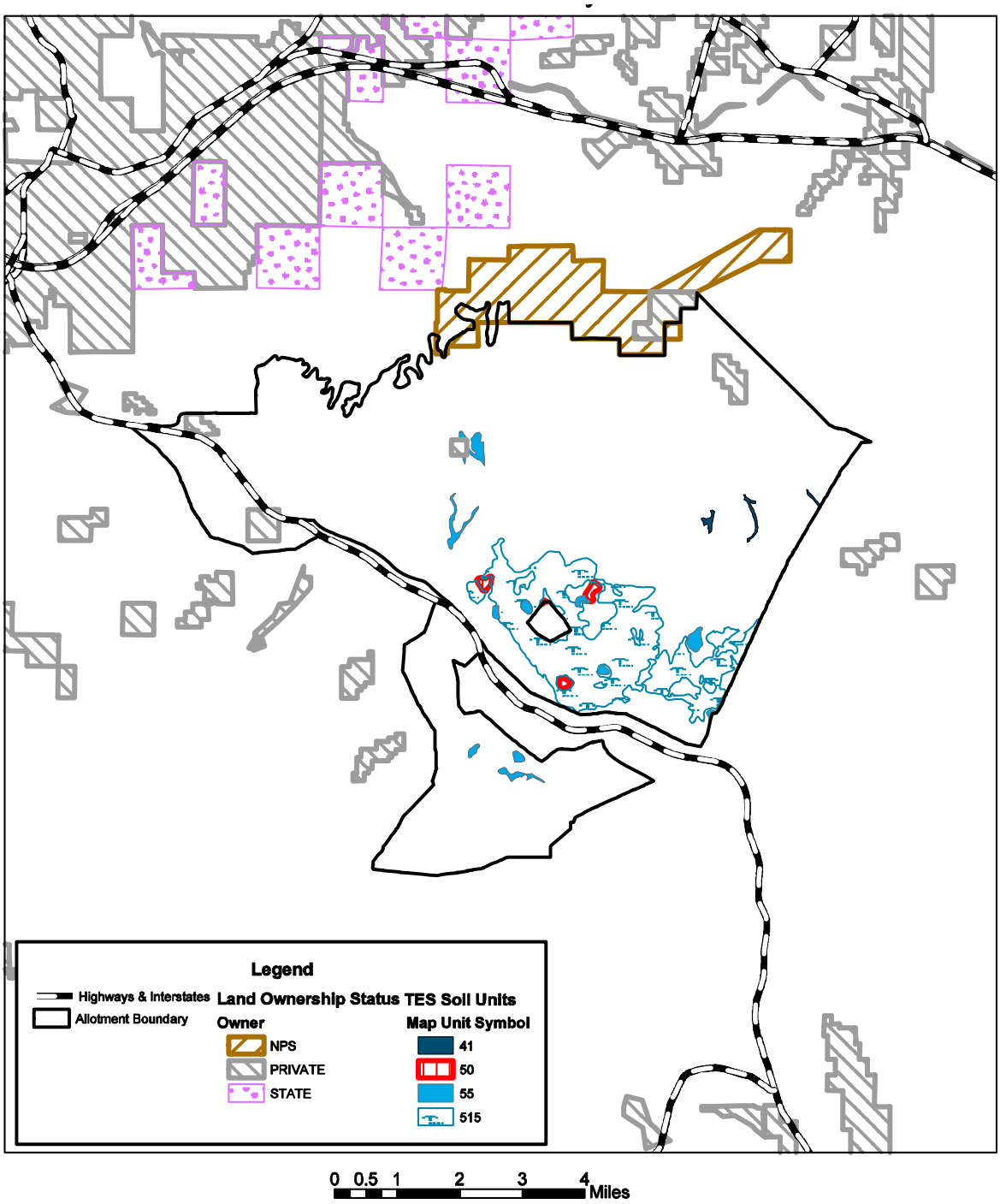
TES Unit 41 is found on grassland valley plains and swales below the Anderson Mesa Rim in the Cherry Pasture. Approximately half of this soil unit is impaired. This impairment is a result of a combination of actions or activities including: historic and current use by cattle and elk, flooding during snowmelt and heavy thunderstorms, growing crops, cutting hay, driving vehicles, and various recreational uses. Current cattle use continues to contribute to these impaired acres. These soils are currently low in vegetation cover (by 15%), low in litter (by 20%) and high in bare soil (by 35%). The erosion hazard is slight because slopes are less than two percent. Improved livestock management such as herding and no salting could improve conditions in these valley plains.

TES Unit 50 is found in Vail, Prime, and Fisher/Fry Lakes, and approximately half of this soil unit is impaired. These soils are often wet and have expanding clay layers at the surface. Much of the impaired portion of this TES unit is a result of historic and current use by cattle and elk, transition between high and low water levels, along with human disturbances from growing crops, cutting hay, driving vehicles, and various recreational uses. Current cattle use continues to contribute to these impaired acres. These soils are currently low in vegetation cover (by 10%) and high in bare soil (by 10%). The erosion hazard is severe. Improved livestock management and exclosures could improve conditions in these basins and swales.

TES Unit 55 is found associated with valley plains and swales associated with Marshall Lake (43%); Youngs, Fisher/Fry, and Dry Tank (53%); and small meadows in Newman and Observatory pastures (4%). Approximately half of this soil unit is impaired. Much of this impaired portion of this soil unit is a result of historic and current use by cattle and elk, transition between high and low water levels, flooding during snowmelt and heavy thunderstorms, along with human disturbances from growing crops, cutting hay, driving vehicles, and various recreational uses. Current cattle use continues to contribute to these impaired acres. These soils are currently low in vegetation cover (by 25%), low in litter (by 40%) and high in bare soil (by 65%). The erosion hazard is slight because slopes are less than two percent. Improved livestock management and exclosures will likely improve conditions in these basins and swales.

TES Unit 515 is found on elevated grassland plains primarily near on top of the Anderson Mesa Rim in Observatory, Youngs, and Cherry pasture. Approximately two thirds of this soil unit is satisfactory. Of the one third of the soil unit that is impaired approximately half of this area is impaired as a result of increasing juniper trees and half is impaired by current cattle use. These soils are currently low in vegetation cover (by 15%), low in litter (by 15%) and high in bare soil (by 30%). The erosion hazard is moderate. The reduction in juniper trees would improve conditions in these elevated plains however; this is beyond the scope of this project. Improved livestock management such as herding and no salting could improve conditions in these elevated plains.

Figure 10. Impaired soil units where cattle are contributing to conditions



Unsatisfactory Soils

TES Unit 465 is found with a mixture of pinyon and juniper on elevated grassland plains within the Walnut Canyon Allotment. Approximately one-third of this area is satisfactory, one-third is impaired, and one-third is unsatisfactory. Impaired and unsatisfactory conditions are due to dense juniper trees. These soils are currently low in vegetation cover (by 5 percent), low in litter (by 15 percent) and high in bare soil (by 20 percent). The erosion hazard is slight to moderate based on compaction problems when wet. Maintenance of vegetative ground cover is essential to prevent sheet and rill erosion. On the Walnut Canyon Allotment, little cattle grazing occurs in the impaired and unsatisfactory areas of soil unit 465 due to the dense trees and little forage availability. Therefore, there will be little effect on the conditions of these elevated plains from cattle grazingMicrophytic soil crusts (also called cryptogamic crusts) are formed when all or some of a diverse array of photosynthetic blue-green algae, fungi, bacteria, lichens, and mosses bind together with inorganic particles in the first few millimeters of a soil. Microphytic soils exist on the Walnut Canyon Allotment in areas that have less than 16 inches of annual precipitation; where canopies are less than 30 percent; where gravel content is 15 percent or less; and where litter is less than 20 percent (Brewer 1999). They are mainly found within TES map units 436 and 465. These two soil map units represent 1,180 acres (4 percent) of this allotment.

TES Unit 436 is in an old pushed area (where trees were pushed over by heavy equipment in the 1960s) that does not have the high canopy cover like other map units, and has the greatest potential for microphytic crust formation; hence unit 436 has the greatest potential for negative effects to microphytic crusts from trampling caused by grazing. Typically, effects to microphytic crusts would be greatest near sites with high use, such as waters and salting locations.

TES Unit 465 was described previously. Cattle typically do not use this area due to the dense trees and low forage availability. However, cattle still travel through the area to get to more productive forage and, thus, some affect from trampling can also occur. While effects to microphytic crusts would be greatest near sites with high use, such as waters and salting locations, none of these sites exist within this soil unit on this allotment

Soil conditions over the majority of the Walnut Canyon Allotment are stable, but some areas on the Walnut Canyon Allotment may shortly decline due to the increase of juniper trees. As these trees become denser in some areas, ground cover will decline and soil conditions will decrease over time. There is a need for vegetation management actions that will restore understory vegetation. However, such treatments are outside the scope of this analysis.

Related to cattle management, there is little need for change for soil quality except within conditions on valley plains, elevated plains, swales and basins (TES units 41, 50, 55, and 515). There are 335 acres from these TES units on the allotment within these soil types and are located at below the rim in Cherry pasture (TES 41); Vail, Prime and Fisher/Fry Lakes (TES (50); ungrazed portions of the allotment (TES 53) and Marshall, Youngs and Fisher/Fry Lakes (TES 55) (see Figure 10). Improvements in these soils could be accomplished by increased pasture deferment, increased pasture rest from cattle grazing, building cattle exclosures, and improving cattle distribution. Elk use will remain a contributing factor to current conditions with any of these possible cattle management changes.

Compaction of soils is limited on Walnut Canyon Allotment. Soil surveys of this area show few reports of compaction. Compaction can occur in areas where cattle are concentrated. Because of the high clay content of most soils in this area, any compaction of the soil is of short duration due to the shrink-swell and freeze-thaw action. However, the seven wetlands (Vail Lake is the eighth and is excluded from cattle grazing) on allotment show some signs of surface compaction, which

can lead to an impaired soil condition. These areas can improve in the short and long term if proper grazing management is combined with years of normal or above precipitation (R. Steinke, pers. comm.).

Trend monitoring for the Walnut Canyon Allotment indicates that there has been a static or positive increase in the number of plants in monitoring sites. With current conditions static trends will continue. Increases in plants will aid in the improvement of soil condition by providing an increased biomass source, as well as providing for increased root mass that aids in soil nutrient distribution and aeration of the soil.

Environmental Consequences

Improved cattle management through the use wetland exclosures herding and salting will likely improve conditions in TES soil units 41, 50, 55, and 515. There is expected to be little effect from cattle grazing on the conditions of elevated plains in TES Units 465 due to the dense juniper stands. Cattle do not typically graze the densely treed areas due to little forage availability, so the effect of cattle grazing to these areas is minimal.

The potential for negative effects to microphytic crusts in TES Unit 436 is from trampling by cattle when they are traveling through the area. The effects to microphytic crusts would be greatest near sites with high use, such as waters (Road, Ditch, Tee, Guzzler and Red Tanks) and salting locations. To mitigate this affect, salting will not be allowed in this soil unit.

Overall, the grazing level throughout the project area would be light to moderate, and the effects to microphytic crusts would parallel the grazing intensity in map units 436 and 465. The trend toward increased vascular plants (grasses and forbs) displayed in current monitoring would decrease the role of microphytic soil crusts concerning soil nutrient cycling and soil stability, therefore, the effect to soil condition from the loss of microphytic plants due to trampling can be offset by an increase in vascular plants and onsite litter.

Trends for all alternatives would be static to upward except where trees limit improvement potential. Rangeland management status would remain satisfactory in areas that are currently satisfactory for all alternatives. Rangeland management status areas that are unsatisfactory would either improve to satisfactory or remain the same for both action alternatives.

Cattle are not currently contributing to impaired and unsatisfactory soil conditions in the steep slopes and dense juniper areas. Steep slopes and dense juniper areas would remain static or decline regardless of the alternative selected. Succession would naturally progress as more trees grow and reduce ground cover over time unless the trees are removed.

Direct and Indirect Effects of Alternative 1

Current conditions for the portions of the impaired, basins/swales, and valley plains/swales, and elevated plains affected by cattle would be maintained or improved in Alternative 1 with current management. Soil surface structure, soil bulk density, organic matter (litter), plant diversity and ground cover would remain at levels that would maintain current conditions. Cattle would have a continued effect on microphytic soils by trampling them thus affecting the ability of the soil to hold and release nutrients.

Compaction of soils is limited on the Walnut Canyon Allotment, but can occur in areas where cattle are concentrated. Because of the high clay content of most soils in these areas of concentration, any compaction of the soil is of short duration due to the shrink-swell and freeze-thaw action. There would be surface compaction at Prime, Fisher/Fry, Youngs, Dry, and Lost in this alternative which can lead to an impaired soil condition.

Conditions and trends in Alternative 1 will be static to upward except where trees limit improvement potential. Rangeland management status will remain satisfactory in areas that are currently satisfactory. Rangeland management status areas that are impaired or unsatisfactory will either improve to satisfactory or remain the same.

Direct and Indirect Effects of Alternative 2

Even though vegetation would not be removed or trampled by cattle grazing, current conditions for the impaired valley plains, elevated plains, basins, and swales and the unsatisfactory elevated plains soils would be maintained in Alternative 2. Soil surface structure, soil bulk density, organic matter (litter), plant diversity and ground cover would remain at levels that would maintain current conditions. There would be no effect on microphytic soils from cattle grazing. Compaction of soils from cattle would not occur.

Conditions and trends for Alternative 2 will be also static to upward except where trees limit improvement potential. Rangeland management status will remain satisfactory in areas that are currently satisfactory. Rangeland management status areas that are impaired or unsatisfactory will either improve to satisfactory or remain the same. There would be no road closures at Prime and Youngs Lake so there would be no direct or indirect improvements to soil conditions from deceased vehicle traffic and movement of soil.

Direct and Indirect Effects of Alternative 3

Cattle exclosures at Prime, Fisher/Fry, Youngs, Dry and Lost would be built to exclude cattle grazing from the wetlands, except for a lane to the stock tanks in Youngs, Dry, Lost, and the current waterlot at Fisher/Fry. These exclosures will improve soil conditions within the exclosures. Compaction of soils from cattle in the lanes would occur in Alternative 3, but overall there would be overall less compaction in these basins due to the exclusion of cattle. Because of the high clay content of most soils in these basins and areas of concentration, any compaction of the soil is of short duration due to the shrink-swell and freeze-thaw action. There would be minor surface compaction at Marshall and Little Dry Lakes which can lead to an impaired soil condition. This short term compaction would vary depending on water availability in the lakes.

Current conditions for the portions of the impaired ????, basins/swales, and valley plains/swales, and elevated plains affected by cattle would be maintained or improved in Alternative 3 with current management. Changes in management are expected to improve these impaired, basins/swales, and valley plains/swales, and elevated plains. Soil surface structure, soil bulk density, organic matter (litter), plant diversity and ground cover would be improved thus maintaining or improving current conditions. Damage to microphytic crusts will remain the same as in Alternative 1.

Conditions and trends for Alternative 3 will be static to upward except where trees limit improvement potential. Rangeland management status will remain satisfactory in areas that are currently satisfactory. Rangeland management status areas that are impaired or unsatisfactory will either improve to satisfactory or remain the same. The road closures at Youngs and Prime Lakes would reduce potential soil erosion from vehicles traveling in these areas.

Cumulative Effects Common to All Alternatives

The cumulative effects analysis area for soils includes the San Francisco Wash and Walnut Canyon 5th code watersheds which includes all drainages on the Walnut Canyon Allotment to the Little Colorado River (Fay Canyon, San Francisco Wash, Walnut Creek, Cherry Canyon, Newman Canyon, and Youngs Canyon). Figure 11 displays these watershed boundaries in

relationship to the Walnut Canyon Allotment. The proportional extent of grazing allotments within the San Francisco and Walnut Canyon watersheds on National Forest System lands is displayed in Table 10. Note that the acres within these 5th code watersheds are gross acres, and include areas that are not suitable for grazing due to slope. Excluded are areas which are not part of an active grazing allotment. Since these allotments are for cattle grazing only, the effects are similar to the cumulative effects for this project and are additive to the Proposed Action and alternatives in this analysis.

Other past, present, and reasonably foreseeable future activities and natural events that affect soils are past wildfires, future prescribed burning, roads, dispersed recreation, off-road vehicle use, elk grazing, stock tank maintenance, and fencing wetlands (Appendix B). The timeframe for these combined effects is 20 years, 10 years in the past and 10 years in the future because noticeable changes in condition and trend in the upland vegetation affecting soil condition occur within this timeframe.

There may be minimal cumulative effects to soil conditions from the initial disturbance of habitat or grassland improvement projects when added to short-term erosion that may occur from this ground disturbance. However, as the vegetative structure and soils improve with increasing species diversity and ground cover, long-term conditions would improve as understory species fill in treated areas and decrease erosion.

Grass and forb production would increase and soil conditions would stabilize or improve in 1 to 3 years depending on moisture availability. This improvement in grass and forb production would result in a positive cumulative effect for soil conditions in these meadow and grassland soils.

Cumulative Effects for Alternative 1

Cumulatively, effects from wildlife on soil conditions is additive to the effects from cattle grazing on impaired valley plains, elevated plains, basins, and swales and the unsatisfactory elevated plains soils. These effects are localized and are not widespread throughout the cumulative effects area.

Cumulative effects to mycrophytic soils crusts include influences from dense pinyon and juniper, increased litter, trampling from recreation, existing roads, and wood cutting. Increased forb and grass production is additive to the cumulative effects on mycrophytic soil crusts. Cattle would have a cumulative effect on microphytic soils by trampling them thus affecting the ability of the soil to hold and release nutrients.

Compaction of soils is limited on the Walnut Canyon Allotment, but cumulatively can occur in other areas of the cumulative affects boundary where cattle are concentrated mostly around waters. Wildlife and off-road vehicles can also compact soils in this area. Because of the high clay content of most soils in these areas of concentration, any compaction of the soil is of short duration due to the shrink-swell and freeze-thaw action. There would be surface compaction at Prime, Fisher/Fry, Youngs, Dry, and Lost in this alternative which can lead to an impaired soil condition, and would lead to cumulative effects when added to other wetlands in the cumulative effects area.

Cumulatively conditions and trends for Alternative 1 will be static to upward except where trees limit improvement potential, particularly on the adjacent Forest Service Allotments. Rangeland management status will remain satisfactory in areas that are currently satisfactory, and management status areas that are unsatisfactory will either improve to satisfactory or remain the same which will cumulatively stay the same or improve in the boundary area.

Figure 11. San Francisco Wash and Walnut Creek 5th code watershed boundaries

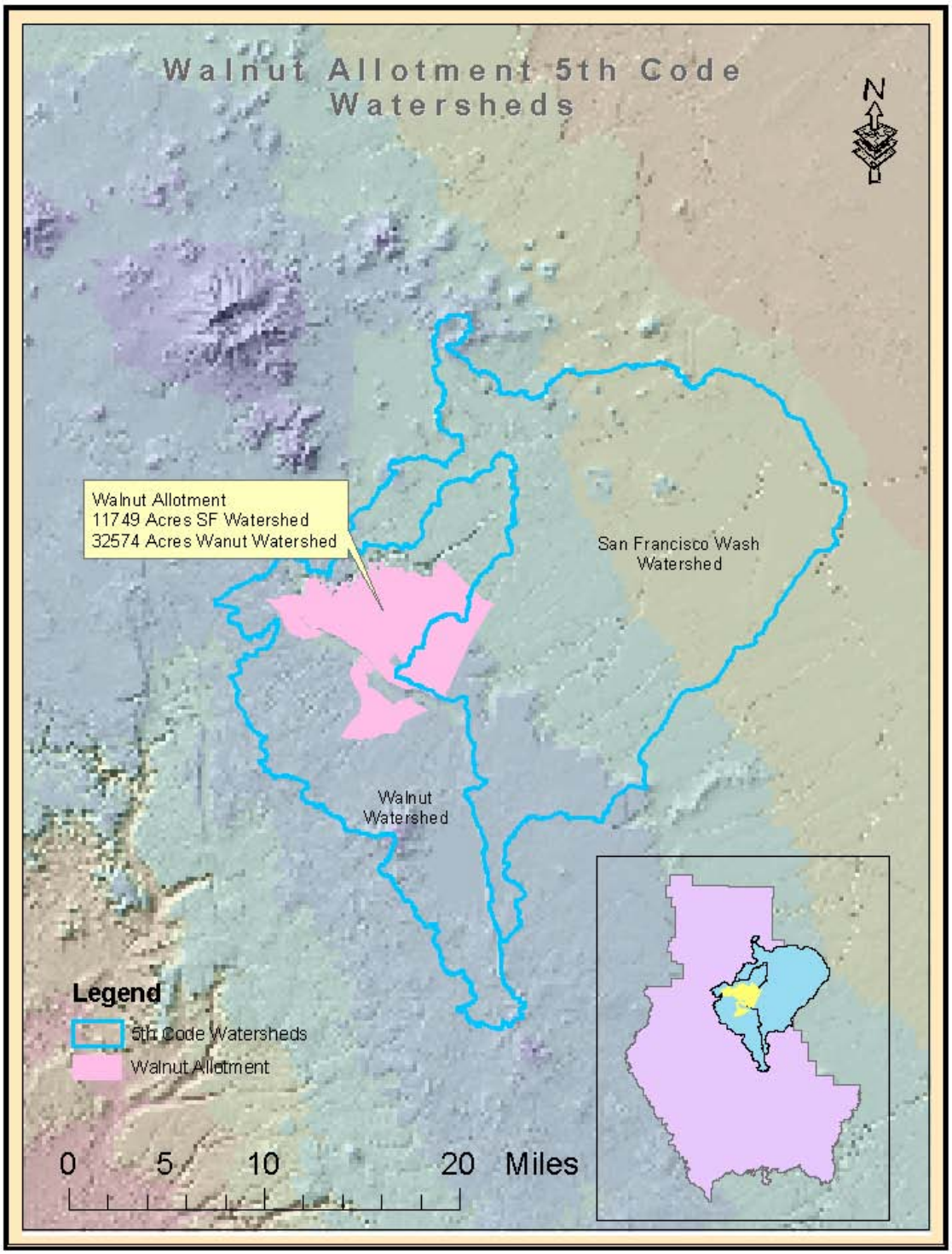


Table 10. Cattle grazing allotments within the San Francisco Wash and Walnut Creek watersheds

5th Code Watersheds	Allotment Name	Acres in Watershed[1]	Percent in Watershed
San Francisco Wash and Walnut Canyon	Anderson Springs	47,310	6
	Angell	59,574	8
	Apache Maid	149,083	19
	Casner Kelly	28,992	4
	Cosnino	10,872	1
	Deep Lake	10,877	1
	Lake Mary	28,118	4
	Mud Springs	16,899	2
	Pickett Lake	34,345	5
	Tinny Springs	58,722	8
	Walnut Canyon	31,607	4
	Youngs Canyon	11,343	1
	Excluded acres/not an allotments	281,132	37
	Totals	**768,874**	**100**

[1]Acres are gross acres and include steep slopes (no grazing capacity lands) and non-Forest Service land.

Cumulative Effects for Alternative 2

Even though vegetation would not be removed or trampled by cattle grazing, current conditions for the impaired valley plains, elevated plains, basins, and swales and the unsatisfactory elevated plains soils would remain the same and there would be no cumulative affects.

Compaction of soils from cattle would not occur. However, wildlife can congregate in areas like cattle do so there would be areas of compaction resulting from this use, mostly around waters. Cumulatively this could affect these areas throughout the analysis area; however, because of the high clay content of most soils in these areas of concentration, any compaction of the soil is of short duration due to the shrink-swell and freeze-thaw action. There would be surface compaction in all wetlands in this alternative which can lead to an impaired soil condition here adding to the cumulative effects in basins throughout the analysis area.

Because there are no cattle authorized in this alternative conditions and trends in Alternative 2 would remain static to upward except where trees limit improvement potential thus cumulatively adding to areas with tree encroachment that may not remain in a static or upward trend. There would be no road closures at Prime and Youngs Lake so there would be no cumulative effect on soil conditions from deceased vehicle traffic and movement of soil.

Cumulative Effects for Alternative 3

Cattle exclosures around Prime, Fisher/Fry, Youngs, Dry, and Lost would be built excluding cattle grazing from these wetlands, except for a lane to the stock tanks in Youngs, Dry and Lost along with the waterlot at Fisher/Fry. These exclosures will improve soil conditions within the

exclosures and the improvements are additive to the improvements in soils in other fenced wetlands in the cumulative effects area that will be fenced to exclude cattle grazing. Cumulatively, short duration surface compaction at Marshall and Little Dry Lakes may occur which can lead to an impaired soil condition and be additive to impaired soil conditions in other basins not fenced from cattle use within the watershed.

The proposed changes in cattle management are expected to improve impaired, basins, swales, and valley plains/swales and the unsatisfactory elevated plains soils on this allotment and benefit soils within the watershed. Soil surface structure, soil bulk density, organic matter (litter), plant diversity and ground cover would be improved thus cumulatively maintaining or improving current conditions. Cumulative effects to microphytic crusts would be the same as Alternative 1.

Cumulatively conditions and trends for Alternative 3 will be static to upward except where trees limit improvement potential, particularly on the adjacent Forest Service Allotments. Rangeland management status will remain satisfactory in areas that are currently satisfactory and management status areas that are impaired or unsatisfactory will either improve to satisfactory or remain the same which will cumulatively stay the same or improve in the boundary area.

Improvements in soils and soil conditions from the closure of roads at Youngs and Prime Lakes would be additive to any other improvements to soils in the cumulative effects area. Dispersed recreation and user created social roads would be limited in the wetlands that are fenced, having a beneficial cumulative effect on soils in these areas.

Water Quality

The intergovernmental agreement signed by the State of Arizona Department of Environmental Quality (ADEQ) and USDA Forest Service Southwestern Region states that the Forest Service will endeavor to minimize and mitigate all potential non-point source pollution activities (ADEQ and USDA 1990). As agreed upon by the State of Arizona and the Forest Service, the most practical and effective means of controlling potential non-point pollution sources from forests and rangelands is through development of preventative or mitigating land management practices, generally referred to as best management practices (BMP), or in the case of Arizona's process, guidance practices.

The purpose of this agreement is to meet objectives defined by the United States Congress in the Federal Water Pollution Control Act (as amended in 1987) and the Clean Water Act. These objectives are to restore and maintain the chemical, physical and biological integrity of the nation's waters in Arizona by complying with water quality standards identified for designated uses in downstream perennial waters.

Arizona Department of Environmental Quality monitors water quality in the area and the 2005 "Arizona's Integrated 305(b) Assessment and 303(d) Listing Report" is a description of the most recent status of water quality in Arizona (ADEQ 2005). A copy of the report for the Little Colorado-San Juan Watershed (which includes the Walnut Canyon Allotment) is included in the project record for this analysis. Water quality monitoring sites adjacent to the Walnut Canyon Allotment are located at Lower and Upper Lake Mary (are non grazed areas and are not part of any allotment) and Ashurst Lake (on the adjacent Pickett Lake Allotment) and are within the San Francisco Wash or Walnut Creek 5th code watersheds (Figure 11).

No perennial water bodies or streams exist on the Walnut Canyon Allotment. The nearest perennial waters to the Walnut Canyon Allotment are Ashurst Lake, Mormon Lake, and Lake Mary. Ashurst Lake is located 2.5 miles away on the Pickett Lake Allotment and was fenced from

cattle use in 2001. Lake Mary is located about one-quarter mile from this allotment and is not grazed by cattle. Mormon Lake is located about 6 miles south of this allotment. Mormon Lake is located on the Tinny Springs Allotment and can be grazed for up to 20 days in October. The next closest perennial water is the Little Colorado River located about 30 miles downstream from the Walnut Canyon Allotment. This river is often dry.

There are no 303(d) listed (water quality impaired) water bodies within the Walnut Canyon Allotment. Wetland and upland condition and trend are currently being monitored by the Forest Service (see Soil and Riparian Condition in Chapter 4, “Monitoring”). Trends toward improvements in species abundance and diversity indicate that management practices are effectively improving soil condition and by inference, maintaining or improving downstream water quality and complying with water quality standards. Based on the TES analysis (USDA 1995), watershed condition is overall stable and functioning in terms of the factors that affect hydrologic function and soil productivity.

There are no water quality monitoring sites within Walnut Canyon Allotment. The most recent water quality data for any site within the Little Colorado-San Juan watershed is contained in the latest 305(b) Assessment and 303(d) Listing Report for Arizona (ADEQ 2005). In general, monitoring results for this watershed did not indicate a problem with fecal coliform and the water quality stressors are heavy metals.

Wetlands have periods of time when they are naturally turbid due to the high variability of water levels causing bare soil, inflows of sediment from uplands (some soils are naturally bare, up to 45 percent), and wave action caused by wind. As an example, Ashurst Lake (a monitored wetland on Pickett Lake Allotment, south of the project area) has been excluded from cattle grazing since 2001 (except for a 300-yard section of rocky shoreline) and this water body has turbid conditions. Results from 2001 water quality samples (ADEQ 2005) at the dam and mid-lake exceeded the former turbidity standard, but samples at the boat ramp did not. ADEQ has placed Ashurst Lake on the “Planning List” for the next monitoring cycle so that sources of turbidity can be investigated. Some of these wetlands do become clear as sediments drop out of the water (D. Fleishman, pers. comm.).

Environmental Consequences

All of the action alternatives are consistent with the Clean Water Act of 1948, as amended, and incorporate best management practices and guidance practices as per the Non-point Source Intergovernmental Agreement (see Chapter 2, “Mitigation Measures”). Wetland and upland conditions will continue to be monitored under any of the alternatives (see Chapter 4, “Monitoring”).

Direct and Indirect Effects Common to All Action Alternatives

Water quality at lentic (standing water) wetlands can be affected by the amount of soil that is disturbed near wetland sites, and the grazing intensity, which can minimize vegetation that traps overland flow into wetland sites (Fredrickson and Dugger 1993). The effect of cattle grazing on water quality in lentic wetlands is limited in scope and intensity due to the short duration of water within these sites. The wetlands are in closed basins with small watersheds only carrying water to these closed basins with no potential for sediments to reach a stream course.

The water quality of perennial water would not be affected under any alternative because perennial water does not exist on the allotment. The wetlands on the allotment actually often go dry. Water quality would not be affected by the impaired and unsatisfactory soil conditions described in the soil section.

Timing of stock tank maintenance, outside of wetlands, can have a short-term negative effect on water quality for tanks located in drainages, occurring after the site is disturbed and has not yet recovered. There is potential for movement of sediments downstream if a large rain event occurred within the first growing season. The likelihood of this happening and affecting water quality is extremely small. Stock tanks within closed basins are usually dry or almost dry when cleaned, so minimal effects to water quality would occur.

Effects to water quality from grazing can occur from sediment transport caused by removal of above ground biomass or disturbed surface crusts that can be easily moved during rain events in the watershed. Monitoring results for the Walnut Canyon Allotment and adjacent allotments indicate that normally there is sufficient litter (residual plant material left behind on the ground) after cattle graze. This litter is beneficial to limiting onsite soil movement by providing surface roughness. A few vegetation monitoring sites indicate less than adequate litter left behind to minimize soil movement. However, these sites recover quickly with favorable climatic conditions.

The watersheds for the wetlands (Table 11) range in size from the area immediately surrounding each wetland up to 1,241 acres. All of these watersheds are on the Walnut Canyon Allotment and are relatively small. Water quality for these wetlands is limited to these areas. Monitoring shows that these watershed conditions will maintain water quality standards [PRD 40].

Table 11. Watershed acres for wetlands on Walnut Canyon Allotment

Wetland	Watershed Acres (includes wetland and associated tank)	Wetland Acres	Tank Acres (if applicable)
Vail	392	73	0.4
Marshall	1241	208	1.5 combined 4 tanks
Little Dry	189	13	0.3
Prime	132	14	0.3
Fisher/Fry	156	18	0.3
Youngs	103	23	0.4
Dry	Small	10.6	0.12
Lost	Small	11.4	0.16

In Alternative 1 if water is present after July 15, cattle could create additional turbidity, in Prime, Fisher/Fry, Youngs, Dry, and Lost. However, this turbidity is limited because cattle rarely walk into the water at these wetlands because of the deep mud [PRD 22]. Cattle graze the shores of these wetlands; however, cattle have little effect on ground cover. Cattle do effect plant height and canopy cover, but this has little effect on turbidity. There would be very little indirect effect to aquatic plants because these organisms are adapted to living in these naturally turbid waters.

In Alternative 3 if there is enough water in the wetlands to reach their lanes, additional turbidity from cattle use could occur, however this additional turbidity would be offset by the numerous emergent plants that filter the wetlands. This increase in turbidity would be limited because the lanes represent a small percentage of each wetland in Alternative 3 (see Table 12 in the “Wetlands and Springs” section).

In Alternative 3 Prime, Fisher/Fry, Youngs, Dry, and Lost would be fenced with a lane to the stock tanks in Fisher/Fry, Youngs, Dry, and Lost along with the current waterlot at Fisher/Fry. The waterlot at Fisher/Fry would be kept as access to the stock tank water for cattle. If there is enough water in the wetland to reach the lane, additional turbidity from cattle use could occur,

however this additional turbidity would be offset by the numerous emergent plants that filter this wetland. This increase in turbidity would be limited because the lanes represent such a small portion of each wetland (see Table 13 in the “Wetlands and Springs” section).

In the unfenced wetlands (Alternative 3-Marshall and Little Dry Lakes), cattle graze for up to ten days in the fall if water is present after July 15, cattle could create minor additional turbidity. However, this turbidity is limited because cattle rarely walk into the water at these two wetlands because of the deep mud [PRD 22]. Cattle graze the shores of these wetlands; however, cattle have little effect on ground cover. Cattle would not greatly effect plant height and canopy cover because they would be grazing in the fall, but this has little effect on turbidity. There would be very little indirect effect to aquatic plants because these organisms are adapted to living in these naturally turbid waters.

Direct, Indirect, and Cumulative Effects of Alternative 2

Because there would be no cattle grazing authorized there would be not be any direct, indirect, or cumulative effect from cattle grazing on water quality.

Cumulative Effects for Alternative 1

The cumulative effects analysis area for water quality is the same as for soils and includes the San Francisco and Walnut Canyon 5th code watershed areas (see Figure 11 in “Soils” section). The past, present, and reasonably foreseeable future activities and natural events considered to affect water quality include past wildfires, future prescribed burning, roads, dispersed recreation, off-road vehicle use, elk grazing, stock tank maintenance, and fencing wetlands (Appendix B).

The timeframe for these combined effects is 20 years, 10 years in the past and 10 years in the future because changes in above ground biomass and the presence of litter depend on the presence of favorable growing conditions after cattle leave the pasture. If growing conditions are favorable, above ground biomass and litter would remain adequate for watershed protection after cattle grazing. If growing conditions are not favorable, production of above ground biomass and subsequent litter would occur more slowly (up to 2 to 3 years). Production of above ground biomass and subsequent litter following activities and natural events besides cattle grazing may take up to 10 years.

In Alternative 1, effects from turbidity could be cumulatively additive for Prime, Fisher/Fry, Youngs, Dry, and Lost as these wetlands are grazed after July 15th. There would be minor effects from turbidity associated with Marshall and Little Dry lakes as these wetlands are gazed for up to 10 days in the fall. The effects would be additive to increased turbidity in other water bodies in the watersheds.

Because there is little direct or indirect effect to overall water quality, there would be little to no cumulative effects to water quality or watershed condition from cattle grazing and past, present, or reasonably foreseeable future activities or natural events.

Cumulative Effects for Alternative 3

In Alternative 3, effects from turbidity would be minimal for Prime, Fisher/Fry, Youngs, Dry, and Lost as these wetlands would be fenced to exclude cattle except for a lane to the stock tank waters in Youngs, Dry, and Lost along with the waterlot at Fisher/Fry. The minimal effects would be associated with the lanes at these locations.

There would be minor effects from turbidity associated with Marshall and Little Dry lakes as these wetlands are gazed for up to 10 days in the fall. The effects would be additive to increased

turbidity in other water bodies in the watershed. Improvements in soils and soil conditions from the closure of roads at Youngs and Prime Lakes would be additive as erosion would be less in the wetland watershed which would be additive to any other improvements to soils in the cumulative effects area.

Because there is little direct or indirect effect to overall water quality, there would be little to no cumulative effects to water quality or watershed condition from cattle grazing and past, present, or reasonably foreseeable future activities or natural events.

Wetlands and Springs

Wetlands and springs on Anderson Mesa were inventoried and evaluated by the Forest Service in 2002 and evaluations have continued through 2005 to determine current conditions [PRD 22 and district files]. The table in Appendix A summarizes this inventory.

There are two types of wetlands found in the Walnut Canyon Allotment: semipermanent and seasonal. There are no permanent, temporary, or ephemeral wetlands located in the project area. The wetlands were classified according to criteria specified by Fredrickson and Dugger (1993) and are defined below. Coconino National Forest Plan direction for wetlands falls under MA 12 (Riparian and Open Water) standards and guidelines.

- **Permanent Wetland (Reservoir)** – Human-made deep perennial water pool in most years, no significant hydrophytic vegetation (except for submergents) because of deep pool and/or fluctuations of pool level.
- **Semipermanent Wetland** – Shallow water pool responding directly to precipitation with a 6- to 12-month flooding regime. Hydrophytic vegetation prevalence (cattail, bulrush and some submergents) and hydric soils present.
- **Seasonal Wetland** – Shallow water pool responding directly to precipitation with a 3- to 6-month flooding regime. Hydrophytic vegetation prevalence (spikerush, carex, juncus) and hydric soils present.
- **Temporary Wetland** – Shallow water pool responding directly to precipitation with a 1- to 2-month flooding regime. No prevalence of hydrophytic vegetation present but upland species exist, such as foxtail barley and western wheatgrass.
- **Ephemeral Wetland** – Shallow water pool responding directly to precipitation with a 2- to 6-week flooding regime. No prevalence of hydrophytic vegetation present but upland species exist, such as annuals, grass and forb species and bare soil.

During the 2002-2005 wetland inventory and evaluations, one additional category was added to describe sites that did not fit the Fredrickson and Dugger (1993) classification scheme; the closed basin. Closed basins are shallow water pools responding to precipitation. Closed basins do not have adequate residence time of water to create hydric soils or hydrophytic plants and as such, do not have wetland characteristics and are not true wetlands. No closed basins exist on Walnut Canyon Allotment.

Eight sites were inventoried for wetland classification in association with Walnut Canyon Allotment. There are eight wetlands within the allotment, Marshall Lake, Little Dry Lake, Vail Lake, Prime Lake, Fisher/Fry Lake, Youngs Lake, Lost Tank, and Dry Tank. Marshall Lake, Little Dry Lake, Vail Lake, Prime Lake, Fisher/Fry Lake are semipermanent wetlands. Youngs

Lake, Lost Tank and Dry Tank are classified as seasonal wetlands. Upper Lake Mary, Lower Lake Mary, and Horse Lake are adjacent to the Walnut Canyon Allotment, but are excluded from cattle use, and are not part of the allotment. Vail Lake is fenced to exclude cattle (more data on wetland monitoring is included in the vegetation section of this report).

Vail Lake was part of the allotment until the mid-1980s, when the lake was excluded from cattle grazing. This lake is included in this analysis because it was once part of this allotment. No change in management is planned for Vail Lake. Vail Lake is a productive hardstem bulrush wetland in most years. From 2002 to 2004 the majority of this wetland was dry. In 2005, the wetland was again producing a large hardstem bulrush community.

Marshall Lake is a productive hardstem bulrush wetland. This wetland has even been used as a fishery. From 2003 to 2004 the majority of this wetland was dry. In 2005, the wetland was again producing a large hardstem bulrush community. Marshall Lake is located within the Marshall Lake riparian pasture. This pasture was created in 1997, and has been used by cattle for up to 10 days in October. Little use (less than 10 percent) of hardstem bulrush has been observed in the last 10 years.

Little Dry Lake is a productive hardstem bulrush wetland. From 2002 to 2004 the majority of this wetland was dry. In 2005, the wetland was again producing a large hardstem bulrush community. Little Dry Lake is located within the Marshall Lake riparian pasture. This pasture has been used by cattle for up to 10 days in October. Little use (less than 10 percent) of hardstem bulrush has been observed in the last 10 years.

Prime Lake is a productive hardstem bulrush wetland. From 2002 to 2004 the majority of this wetland was dry. In 2005, the wetland was again producing a large hardstem bulrush community. Prime Lake is located within the Observatory pasture and is grazed by cattle.

Fisher/Fry Lake is classified as a semipermanent wetland, and is classified as such due to historic documentation that it once produced hardstem bulrush (Ricketson 1990). From 2003 to 2005 this wetland did produce spikerush. The wetland has six duck islands and a stock tank. The wetland is grazed by cattle as part of the Youngs pasture.

Youngs Lake is classified as a seasonal wetland. In 2003, this wetland did produce some spikerush, but it was limited. In 2004, this wetland did not produce spikerush, and in 2005, the wetland again produced spikerush. Youngs Lake is divided by a pasture division fence between Youngs and Cherry pasture.

Dry and Lost Tanks are classified as seasonal wetlands. These wetlands have produced spikerush even during the drought years.

Babbitt and Youngs Springs are the only springs on the allotment. They are both perennial springs and contain emergent vegetation and willows. Youngs spring is currently excluded from cattle grazing by an exclosure fence.

Climatic Conditions: Wetlands are very dynamic due to large fluctuations in water. During an extended wet period, these wetlands may produce more hydrophytic plant species including spike rush and hardstem bulrush. During an extended dry period, these wetlands lose indications of hydrophytic vegetation and upland species may become more prevalent. For example, Prime Lake did not produce a single hardstem bulrush plant in 2004 due to the drought. In 2005, an above average moisture year, Prime Lake produced many hardstem bulrush plants.

The productivity, distribution, and size of wetlands are profoundly affected by the amount and timing of precipitation, influencing whether the basins have water or not; how long they hold

water within and between years; and consequently the types of vegetation and wildlife species that can be supported and when.

All wetland types have some value to wildlife although this may vary depending on individual needs of the species. In general, basins that are larger and hold water longer, and have a combination of vegetation types and retain wildlife values longer. From a waterfowl use standpoint, permanent, semipermanent, and seasonal wetlands have higher values followed by temporary, ephemeral, and stock tank wetlands.

Stock Tanks: Another feature of some wetlands is stock tanks are often located in drainages associated with wetlands. All eight wetlands (including Vail Lake) within the allotment have at least one stock tank built between 1930 and the 1970s. No construction records exist for these stock tanks. Stock tanks were dug to create or supplement water for livestock. Some sedimentation of these tanks has occurred over time. These stock tanks were assessed during the wetland evaluation process and were determined to not be causing the wetland to be classified in the "at risk" category for proper functioning condition (Appendix A).

Depending on the amount and timing of precipitation, water may collect in a tank, reducing the amount of water in the rest of the wetland basin. Stock tanks provide more dependable water because the water is deeper and has less surface area, thus producing less water evaporation. It does not appear that the construction of stock tanks has broken the natural seals of these basins and allowed them to drain [PRD 55]. An analysis was done to determine the hydrologic affects of stock tanks to Walnut Canyon Allotment wetlands and shows the volumetric ratio of wetlands to stock tank capacity [PRD 55]. Regardless if years are wet or dry, wetlands with or without stock tanks show little difference in water levels and associated vegetation. The location of stock tanks in the wetlands may affect where water would go in relation to the wetland. Stock tanks within these wetland types do provide water for wildlife, but no stock tanks have been identified specifically for wildlife habitat needs.

Wetland Vegetation: The dominant plants in semipermanent wetlands are hardstem bulrush (*Schoenoplectus acutus* var. *acutus*) formerly *Scirpus acutus*. These plants grow 3 to 9 feet high in wet years and are dormant during dry cycles. Mats of previous years' growth often stay onsite. Hardstem bulrush provides nesting habitat for overwatering birds and some food for waterfowl. Waterfowl use is year round, with waterfowl using these wetlands for molting, watering, courtship, nesting, brood habitat, wing molt, molt and staging. Inundation potential for the five semipermanent wetlands on the Walnut Canyon Allotment is high [PRD 22].

The dominant plants in seasonal wetlands are needle spikerush (*Eleocharis acicularis*) and creeping spikerush (*Eleocharis palustris)*. Average plant heights are 10 to 15 inches for needle spikerush and up to 24 inches for creeping spikerush. Spikerush provides habitat for many waterfowl. Plants are dormant or nonexistent during dry cycles or when no inundation occurs within a seasonal wetland. Spikerush is dependent on water being present in the basin long enough to allow hydric soils to form and when water is available at a depth that allows it to grow. Spikerush will not grow in water that completely covers the plants.

Waterfowl use of wetlands during inundation is for watering, nesting, brood rearing, and molting, usually during spring and summer. Inundation varies greatly for seasonal wetlands. Youngs Lake, Lost Tank, and Dry Tank inundation is high [PRD 22].

Wetlands have impaired range conditions in the main water body area of the basin due to the ever changing wet and dry cycles. During extended wet periods, portions of these areas produce annual riparian species and spikerush while upland species die back. As these areas dry out, the riparian species die back and upland grasses and forbs become established. During transition

periods, bare soil naturally exists. The duration of these cycles may be months to several years. This can create extreme conditions for the vegetation that may be associated with the basins.

Condition and trend monitoring from 1998, along with three years of canopy cover, species frequency, diversity and composition monitoring specific to wetlands, and TES data related to proper functioning condition all indicate that wetlands on the Walnut Canyon Allotment are in satisfactory condition and trends in these areas are static to upward.

Wetlands have a tendency to attract grazing animals because they are a water source, as well as sites that support higher forage production due to the presence of water (Fredrickson and Dugger 1993). This is especially true at sites with developed waters, such as stock tanks, because the water is more reliable. Thus, the effects to wetlands from grazing is the heavier the graze, the greater the effect to vegetation (Fredrickson and Dugger 1993). The definition of heavy, moderate and light grazing pressure varies by the ecosystem being discussed (ibid).

Plant height and cover varies with seasonal moisture and temperatures. How much plant height and cover is affected by cattle also depends on the palatability and amount of vegetation in a given year [PRD 22]. For example in 2004, at Prime Lake, monitoring showed no use of hardstem bulrush and spikerush because little or no bulrush and spikerush was produced at Prime Lake.

In 2005 at Prime, cattle and elk grazed spikerush to the waterline to 60 percent. There was no hardstem bulrush outside of the water line so none was grazed with the spikerush. Within the waterline less than one percent of the hardstem bulrush and spikerush was grazed.

In 2004, Marshall Lake did not produce hardstem bulrush and little spikerush was produced, so there was little use. In 2005, Marshall Lake produced hardstem bulrush and spikerush. Cattle and elk use was 10 percent on the bulrush within five feet of the waters edge, 30 percent on the spikerush to the waterline, and less than one percent on the spikerush within the water line.

Where cattle grazing does occur, this use may be limiting the vegetation potential of these wetlands by removing plant height, cover, and litter (Hoff 1993). However, wildlife use will continue to affect plant height, canopy cover and litter, even if cattle do not graze emergent vegetation. The Arizona Game and Fish Department (AGFD) have reduced elk numbers since the 1990s in this area. Visual observations show no long-term difference between the wetland areas grazed by elk only and the areas grazed by cattle and elk. Three years of observations were used for this analysis, and the results do correlate to climate, rather then just elk and/or cattle and elk grazing [PRD 58]. Longer term data would lead to more specific results.

Hoff (1993) provided the following recommendations for improving waterfowl nesting cover at wetlands in Arizona montane wetlands (p. 74):

- Delay grazing until the nesting season is completed on or around wetlands that are not fenced. The nesting season may not end until early August for some late nesting waterfowl species and nesting hens, thus it may be difficult to delay grazing until then. If grazing could be delayed until early July, then three of the four primary upland nesting species in the area would be either finished or at least initiated their nesting.
- Maintain existing fences. Some of the fences in the research area were in poor condition and the cattle could graze areas that were supposed to be protected.
- Install more fences around the wetlands, however, only if unbroken tracts of land of at least 20 acres can be protected ([Ringleman 1991] cited in Hoff 1993).
- Be patient, the ungrazed areas that are protected from cattle grazing should eventually provide better nesting cover than the grazed areas.

Wetland Soils (Compaction): As well as affecting vegetation, livestock can affect wetland soils through compaction. Compaction can occur in areas where cattle are concentrated. Because of the high clay content of most soils in this area, compaction of the soil is of short duration due to shrink-swell and freeze-thaw soil action. Most wetlands show some signs of surface compaction, which can lead to an impaired soil condition. These areas can improve in the short and long term if proper grazing management is combined with normal or above normal years of precipitation (R. Steinke, pers. comm.). The ability of these soils to hold and release nutrients would be negatively affected by a lack of litter. Impaired and unsatisfactory soils that are affected cattle grazing occur on TES map units 50, 53, and 55 throughout the project area [PRD 37 and 41].

In general grazing reduces the amount of vegetative litter available onsite, which increases the amount of bare ground (Clary and Medin 1990; Green and Kauffman 1995). Litter is removed by animals eating the vegetation, as well as by trampling from grazing animals. The effect of this grazing use is a reduction in surface roughness that increases erosion and sediment delivery to drainages, as well as a loss of soil fertility. As cattle stocking rates increase and graze periods get longer, the greater the effect of grazing animals on litter.

Low to moderate stocking and short duration graze periods, like those proposed for this project, have minimal impact. Cattle have been reported to be useful for breaking up dense, rank vegetation near wetlands (Weller 1996) and all grasses (Savory 1988), which can improve the health, palatability, and forage production of grass species, but can counter the beneficial effects of litter onsite.

There are no streams associated with the wetlands on the Walnut Canyon Allotment. The watersheds associated with the wetlands are small. For example the largest watershed is for Marshall Lake and consists of 1,241 acres.

Proper Functioning Condition: Overall, wetlands within the project area are in proper functioning condition however; depending on how a particular wetland is grazed by cattle during the year, some wetlands may have a functional at-risk rating that year [PRD 22 and 40]. The proper functioning condition (PFC) rating is an indication of the residual amount of biomass left after cattle grazing occurs after July 15. If enough residual vegetation is left to promote nutrient cycling, then the site would be rated at PFC. If the site is heavily grazed with little or no residual vegetation left, then the site would be considered functional at-risk due to lack of nutrient cycling.

No wetlands on the Walnut Canyon Allotment have been rated at risk from past grazing because the wetlands recover (once cattle are moved from the pasture, vegetation sprouts with timing and growth linked to moisture), with no intensive erosion. It is important to note that the proper functioning condition of a wetland site does not denote that the site is at full potential (Pritchard et al. 1994).

Proper functioning condition is evidenced by 1) aerial photo interpretation which shows that riparian area extent has remained the same between 1948 and 1998; 2) areas of emergent vegetation on wet sites still exist; 3) the sites are stable and there are no signs of excessive erosion; and 4) when water is available, a wide variety of hydrophytic vegetation occurs within the wetland sites [PRD 22].

In years when there is adequate water to cover a wetland to its potential depth, and if there is a stock tank, there is no effect from the stock tank. In marginal precipitation years, the effect of the stock tank is minimal because water would not be deep enough or cover a major portion of the wetland in order to produce abundant emergent vegetation in the growing season (90-120 days) before the water evaporates or transpires.

Evaporation rates in the project area are estimated from the pan evaporation rates for Flagstaff, which vary from 5 to 9 inches between May and September (Western Regional Climate Center, 2005). The pan evaporation rates specific to wetlands are 70 to 80 percent of the total pan evaporation rate. Therefore, projected actual rates would vary from 3.5 to 7.2 inches for wetlands on the Walnut Canyon Allotment. This reduction in water level, plus evapo-transpiration by plants and use from wildlife, naturally decreases the volume of water in these wetlands. For example, in May and June of 2005 (before the cattle grazing season began) water had gone down 24 inches in many of the wetlands on the Pickett Lake Allotment which is southeast of the Walnut Canyon Allotment (D. Fleishman, pers. comm.).

As an example, if Pickett Lake, a small seasonal wetland south of the Walnut Canyon Allotment, received 100,000 gallons of water it would raise the water level by roughly 0.3 inches. These additional 0.3 inches of water, spread out across Pickett Lake; provide some additional water to emergent vegetation. The effects from this additional water would be offset by evaporation due to natural high winds and intense solar heating on the Walnut Canyon Allotment.

Besides high evaporation rates, wetlands on Anderson Mesa have periods of time when they are naturally turbid due to the high variability of water levels causing bare soil, inflows of sediment from uplands (some soils are naturally bare soil, up to 45 percent), and wave action caused by wind. As an example, Ashurst Lake located within the Pickett Lake Allotment to the south has been excluded from cattle grazing since 2001 (except for a 300 yard section of rocky shoreline) and this water body has turbid conditions. Results from 2001 water quality samples (ADEQ 2005) at the dam and mid-lake exceeded the former turbidity standard, but samples at the boat ramp did not. Some of these wetlands do become clear as sediments drop out of the water (D. Fleishman, pers. comm.).

Environmental Consequences

Direct and Indirect Effects Common to All Action Alternatives

Because climate is the primary factor affecting these wetlands the vegetation associated with them may not change extensively with any alternative. If the next 10 years are wet, the wetlands would improve. If the next 10 years are dry, the conditions in the wetlands would remain static or decline. Even though seasonal and semipermanent wetlands contain emergent vegetation and are considered key, they have extreme variations in their wet and dry cycles because they are almost exclusively dependent upon rain and snow for water, as there is no connection to ground water for these sites on Anderson Mesa [PRD 22].

Cattle affect wetland vegetation, in combination with elk, through grazing and trampling of vegetation (Fredrickson and Dugger 1993; Skovlin 1984). The general rule of thumb is the higher the intensity and the longer the duration of the graze, the greater the effect is to wetland vegetation (Heitschmidt, Downhower, and Walker 1987; Skovlin 1984). The climatic regime also directly affects vegetation in the wetlands that occur within the project area. During wet cycles, the wetlands are incredibly productive sites, as evidence by the abundance of species present during the 1980s and reported in Ricketson’s (1990) two volume thesis of wetland plants of the Coconino National Forest.

There may be some effect to emergent vegetation height, and sometimes cover, regardless of climate. Depending on plant species, when height is reduced, cover can be reduced at the same time. An erect morphology allows these plants to grow vertically and not horizontally, thus as their height is removed, their cover is usually not. Removing cattle may not improve plant height due to wildlife use and the natural water regime. Preliminary results from elk/cattle wetland

exclosures on the adjacent allotments show no difference between the areas grazed by elk and areas grazed by both cattle and elk [PRD 58]. The preliminary results show the main factor controlling plant growth in these wetlands is climate. Plant species, abundance, and diversity are not being changed by cattle grazing.

When cattle graze wetlands they may increase turbidity for a short time period however this increase in turbidity does not affect emergent plant growth. These plants are not completely removed when cattle graze them. As wetlands dry and cattle graze at the water's edge, emergent vegetation is not completely removed. There is little effect to emergent vegetation from this decrease in canopy cover or vegetation height as the wetlands dry and the water recedes.

In regards to emergent vegetation, the Coconino Forest Plan states: "Meet the following riparian standards in the Regional Guide for 80 percent of riparian areas above the rim by the year 2030. Maintain at least 80 percent of the potential emergent vegetation cover from May 1 to July 15 in key wetlands" (p. 174). Key wetlands with emergent vegetation on the Walnut Canyon Allotment include: Marshall, Little Dry, Vail, Prime, Fisher/Fry, and Youngs Lakes, along with Dry and Lost Tanks. Vail Lake is already excluded from cattle grazing. These semipermanent and seasonal wetlands are the only wetlands that contain or have the potential for emergent vegetation.

Babbitt and Youngs springs are active and are within the allotment. Youngs spring is currently fenced from cattle and would not be affected by cattle in any of the action alternatives.

When managing for nesting habitat associated with wetlands, the Coconino Forest Plan states that: "The following applies to riparian areas, whether they are large enough to be mapped or not. Wetlands and open water containing emergent vegetation which provide nesting habitat are protected from disturbing uses that would harass nesting birds, such as activities that are noisy or would damage nests or nesting habitat from May 1 to July 15" (p. 173). This guideline applies to the same wetlands and springs listed above. When the wetlands are dry during the nesting season, emergent vegetation does not grow, so nesting habitat is not present.

All of the alternatives would meet the above standards and guidelines by maintaining and/or improving this wetland habitat and protecting nesting habitat. Alternative 1 would not allow grazing in the wetlands until after July 15 through pasture rotations. The wetlands would be fenced to exclude cattle in Alternative 3 prior to cattle grazing the pastures the wetland are in except for a lane to the stock tanks in Youngs, Dry, and Lost along with maintaining the waterlot at Fisher/Fry.

Overall, effects of water consumption by cattle on water sources (wetlands, roadside tanks, and water hauls) on the Walnut Canyon Allotment depend on the size of the water source and when consumption occurs. The water sources in this area range in capacity from 62,000 gallons (small roadside stock tanks) to over two million gallons (large wetlands). In the larger water sources, cattle water consumption would have little effect because of the low ratio of water use to available water. In the smaller water sources, the timing of water consumption and the amount of water in the water source before it is grazed by cattle determines the effects of the alternative on the water source.

If the wetland has a stock tank, the effect of cattle consuming the water is limited due to the ability of clay soils to retain moisture rather than transmit it laterally through the soil profile. If the wetland is shallow and flat then cattle consuming these additional gallons can remove surface water from vegetation. However, the effect of consumption by cattle is not substantial because water would still be shallow and spread out.

When grazing occurs during a good summer monsoon season, the effect from cattle consuming water is negligible because the wetland is being refilled. During drought conditions the wetlands would be dry and cattle numbers are reduced to match forage production. During dry conditions, if water is present in the wetlands it could be completely consumed or nearly so, leaving little water for wildlife or vegetation. Wildlife that need open water would move to other open water sources in the area. Cattle would consume water from other stock tanks or the permittee would have to haul water. Seasonal wetlands dry out first; and semipermanent wetlands dry out last.

Managing wetlands consistent with MA 12 standards and guidelines in the Coconino Forest Plan will help meet Executive Order 11990 (wetland protection). Grazing after July 15 in unfenced wetlands and lanes occurs after these sites have naturally dried out in most years, and the potential effect to wetland function is lessened due to biomass production occurring and being available for nutrient cycling. If cattle grazing after July 15 occurs at a level that nutrient cycling is diminished and not recovering, then the function of the wetlands could be compromised and E.O. 11990 would not be met.

Also in accordance with E.O. 11990, there is no proposed construction (besides a minimum disturbance in fence construction), or disposition of wetlands to other ownership, nor easement through wetlands. To further meet E.O. 11990, no additional stock tanks are planned in any alternative and there is no proposal to remove such stock tanks in any alternative. The stock tanks in Marshall, Little Dry Lake, Prime, Fisher/Fry, Youngs, Dry, and Lost would be not be maintained for the next 10 years in any of the alternatives.

In Alternatives 1 and 3 cattle would graze the Marshall Lake Riparian pasture for up to 10 days in the fall. This pasture contains Marshall Lake itself and Little Dry Lake, both of which are semipermanent wetlands. Since the Marshall Lake pasture was created in 1997, little use of hardstem bulrush and spikerush has been observed (less than 10 percent) [PRD 22 and 40]. This light use is a function of several factors including: emergent vegetation is less attractive to cattle during the fall, compared to the spring or summer; Marshall Lake riparian pasture is a gathering pasture before the cattle are shipped off the allotment, so the entire herd does not graze this pasture for the entire 10 days; the lake bottom is cool this time of year, compared to warmer uplands so cattle tend to hang out in the uplands; when this wetland has water, the wetland edge tends to be very clayey and cattle do not enter the water very far because of the fear of getting stuck; and water is available in stock tanks away from the emergent vegetation in this pasture.

The Walnut Canyon Allotment permittee uses this pasture as a gathering area for their cattle because it is adjacent to their shipping facility and it allows for fast gathering of adjacent pastures. The effects of cattle grazing within the Marshall Lake riparian pasture are minimal. Unless future monitoring shows a need to eliminate this use, there is no need to change it. This use is also consistent with the purpose and need for this project and the Coconino National Forest Plan direction. Wetland monitoring plots have been established in this area.

Direct and Indirect Effects for Alternative 1

Alternative 1 would keep cattle grazing management the same as what has occurred during the last 40 years, with the exception that within the last 3 years and in the future, cattle grazing would not occur on seasonal and semipermanent wetlands until after July 15.

Prime, Fisher/Fry, Youngs, Dry, and Lost would not be excluded from cattle grazing with fencing under this alternative. However, cattle will be kept out of these wetlands prior to July 15th through pasture rotations. The trend in these wetlands is expected to remain static. After July 15th, if cattle are present in Prime Lake, they would graze the hardstem bulrush community, and this grazing would limit production of the hardstem bulrush during that growing season.

Where cattle grazing occurs in wetlands, cattle would graze near the water sources and highly productive grasslands first before moving to the uplands. Cattle do not generally graze in rocky and steep terrain or areas away from water sources. The height and canopy cover of emergent vegetation associated with semipermanent and seasonal wetlands would be affected while cattle are present and until the plants have regrown (typically within the same year). Cattle may directly and indirectly affect species' composition, plant canopy cover, plant production, and ground cover.

Emergent vegetation height and sometimes canopy cover would be reduced as cattle graze wetlands when water is present. The current periods of rest for Prime, Fisher/Fry, Youngs, Dry and Lost from 5/1-7/15 would provide opportunities for emergent vegetation to grow when water is present and cattle are not. After July 15th, site-specific instances of overuse by cattle would continue and include patches of bare soil in and around these wetlands.

Cattle grazing on wetlands after July 15 would affect wetlands by reducing plant height and canopy cover through grazing and trampling. The degree of this effect depends on water availability to the cattle, depth of water and the production of plants in the wetland. If water is not available to cattle at wetlands little use is observed [PRD 22]. If there is water, cattle do not venture very far out into the wetland, most likely because of the fear of getting stuck in the thick, heavy, clay mud [PRD 22].

If the wetland produces little emergent vegetation then there is nothing for the cattle to eat and the cattle are not attracted to the area. This use would affect species abundance and diversity over time, in Prime, Fisher/Fry, Youngs, Dry, and Lost.

If water is present after July 15th, cattle could create additional turbidity; in the grazed wetlands (see turbidity discussion in the water quality section above.). However, this turbidity is limited because cattle rarely walk into the water at these wetlands because of the deep mud [PRD 22]. Cattle graze the shores of these wetlands; however, cattle have little effect on ground cover. Cattle do effect plant height and canopy cover, but this has little effect on turbidity. There would be very little indirect effect to aquatic plants because these organisms are adapted to living in these naturally turbid waters.

Babbitt spring would not be fenced to exclude cattle. Cattle would be able to graze the emergent vegetation at the spring and would effect plant height and canopy cover through grazing and trampling. Utilization could be as high as 70 percent. Emergent vegetation would not be available for migrating waterfowl to take cover in.

When cattle graze in the pastures on the Walnut Canyon Allotment they consume water from various water sources including wetlands [PRD 47]. The maximum projected use (in gallons) for Alternative 1 within each pasture includes the following: Newman 189,000; Observatory 162,000; Youngs 162,750; Marshall 39,375; Cherry 236,250. The number of waters in a pasture determines the projected use by water source by pasture: Newman 37,800; Observatory 16,275; Youngs 20,344; Marshall 6,563; and Cherry 7,159.

Compared to Alternative 3, Alternative 1 uses the same amount of water allotment wide, with 350 head from 6/1-10/31. However, Alternative 3 has more flexibility in water usage because there are no restrictions for when a pasture can be used. In Alternative 1 the Cherry and Newman pastures have to be used from 6/1-7/15 because of the wetland restriction during that time.

These estimates were calculated by taking the length of time these wetlands are available to cattle, the amount of water the wetland can hold and number of other stock tanks available on the allotment. If any of the stock tanks were dry on the allotment, then cattle would increase their

water intake from other stock tanks. Additionally, during dry years, the permittee can haul water to supplement these stock tanks.

Direct and Indirect Effects for Alternative 2

There is no cattle grazing proposed under Alternative 2, so there would be no direct or indirect effects to wetlands or wetland plants from cattle grazing. There would be no direct or indirect effects from cattle on the amount of water consumed from wetlands because there would be no cattle. The unsatisfactory soil conditions in the wetlands would not improve if cattle did not graze these areas.

Wildlife would likely still graze near and/or in wetlands and in more highly productive forage areas. Depending on the area, wildlife use on vegetation and consumption of water can be equivalent to use by cattle, and wildlife grazing can occur year-round. The height and canopy cover of emergent vegetation associated with seasonal and semipermanent wetlands would be predominantly affected by wildlife. Vegetation height and sometimes canopy cover would be reduced as wildlife graze these areas when water and emergent vegetation is present. In Prime, Marshall, and Little Dry Lakes, wildlife would reduce hardstem bulrush height when hardstem bulrush is available to graze.

Direct and Indirect Effects for Alternative 3

Once Prime, Fisher/Fry, Youngs, Dry, and Lost are fenced, these exclosures would not be grazed by cattle on the Walnut Canyon Allotment, except for the lane to the stock tank waters at Youngs, Dry, and Lost and the waterlot at Fisher/Fry. Emergent vegetation height and sometimes canopy cover and soil compaction would be improved within these exclosures. The exclosure fences would also indirectly limit off-road vehicle driving in these wetland and the surrounding upland buffers.

Lanes would be built with the exclosures for cattle to drink water from the above mentioned stock tanks. These new exclosures (Table 12), existing exclosures and the riparian pasture (Table 13) are designed to exclude cattle from the emergent vegetation and surrounding upland buffer to protect waterfowl nesting habitat. Most of the exclosure fences would be approximately 100 meters from the edge of the emergent vegetation. The exclosures are designed so the lane areas would not be located in the wetland vegetation that has the most potential for growth. There would be impacts to the vegetation in the lanes while cattle graze them, including decreased nutrient cycling, compaction and reduced biomass.

The proposed cattle exclosures would exclude 51 acres of emergent vegetation and 156 acres of surrounding upland buffer. Cattle would graze 5.5 acres of emergent vegetation and 8 acres of upland buffer. Compared to the entire 207 acres of new exclosures, this is a relatively small area (6 percent) that cattle would affect. As shown in Table 12, of the 57 acres of emergent vegetation in seasonal and semipermanent wetlands that are not currently protected or restricted, 51 acres (89 percent) would be protected from cattle grazing, and 156 of the 164 acres (95 percent) of upland buffer would be protected from cattle grazing.

Vegetation in the lanes while cattle graze (after July 15 to October 31) would be heavily impacted through grazing, trampling and soil compaction. Seasonal utilization in the lanes would be high (up to 90 percent) which would result in the majority of the area having no vegetation. Recovery of the vegetation in the lanes would depend on the presence of favorable growing conditions after cattle leave the area. If growing conditions are favorable, vegetation abundance and diversity in the lanes would completely recover within one year. If growing conditions are not favorable, recovery of the lanes would occur more slowly (up to 2 to 3 years).

Table 12. Acres of wetland emergent vegetation and upland buffer within proposed exclosures and lanes

Wetland Name	Emergent Veg. Within Wetland	Emergent Veg. Within Exclosure	Upland Buffer within Exclosure	Emergent Veg. in Lane	Upland Buffer in Lane	Wetland Exclosure Details
Prime Lake	13	13	42	0	0	Proposed cattle exclosure, 55 acres.
Fisher/Fry Lake	18	17	26	0.5	1	Proposed cattle exclosure with the existing waterlot, 43 acres. Waterlot represents 3% of the emergent vegetatin and 4% of the upland buffer.
Youngs Lake	15	12	41	3	4	Proposed cattle exclosure with lane; 53 acres. Lane represents 20% of the emergent vegetation and 9% of upland buffer.
Lost Tank	5	4	19	1	2	Proposed cattle exclosure with lane; 23 acres. Lane represents 20% of the emergent vegetation and 10% of upland buffer.
Dry Tank	5	4	13	1	1	Proposed cattle exclosure with lane; 17 acres. Lane represents 20% of the emergent vegetation and 7% of upland buffer.
Babbitt Spring	1	1	15	0	0	Proposed cattle exclosure; 16 acres.
Total	**57**	**51**	**156**	**5.5**	**8**	**207 acres of new exclosures.**

The degree of this effect depends on water availability to the cattle, depth of water and the production of plants in the wetlands. If water is not available to cattle at these wetlands little use is observed [PRD 22]. If there is water, cattle do not venture very far out into the wetland, most likely because of the fear of getting stuck in the thick, heavy, clay mud [PRD 22]. If a wetland produces little emergent vegetation then there is nothing for the cattle to eat and the cattle are not attracted to the area. This use would not affect species abundance and diversity over time.

Babbitt Spring would be fenced to exclude cattle. A one-quarter mile of pipe and a drinker would be added so cattle can access water outside the protected area of emergent vegetation. There would be not effects to the emergent vegetation or willows at Babbitt spring.

The maximum projected use (in gallons) within each pasture includes the following: Newman 189,000; Observatory 231,000; Youngs 162,750; Marshall 39,375; Cherry 236,250. The number of waters determines the projected use by water source by pasture: Newman 37,800; Observatory 25,667; Youngs 20,344; Marshall 6,563; and Cherry 7,159 [PRD 47].

Table 13. Acres of wetland emergent vegetation and upland buffer within existing exclosures and riparian pastures

Wetland Name	Emergent Veg. Within Wetland	Emergent Veg. Within Exclosure /Riparian Pasture	Upland Buffer within Exclosure /Riparian Pasture	Emergent Veg. in Lane	Upland Buffer in Lane	Wetland Exclosure Details
Marshall Lake	196	196	1329*	0	0	Existing riparian pasture, 1533 acres.
Little Dry Lake	8	8	1329*	0	0	Existing riparian pasture, 1533 acres.
Vail	74	74	36	0	0	Existing cattle exclosure, 110 acres.
Youngs Spring	1	1	3	0	0	Existing cattle exclosure; 4 acres.
Total	**279**	**279**	**1368**	**0**	**0**	**1,648 acres of existing exclosures/riparian pasture.**

*Marshall Lake Riparian Pasture includes both Marshall and Little Dry Lakes.

Compared to Alternative 1, Alternative 3 uses the same amount of water allotment wide, with 350 head from 6/1-10/31. However, Alternative 3 has more flexibility in water usage because there are no restrictions for when a pasture can be used. In Alternative 1 the Cherry and Newman pastures have to be used from 6/1-7/15 because of the wetland restriction during that time.

Table 14 summarizes each alternative's grazing strategy for seasonal and semipermanent wetlands.

Table 14. Grazing strategy by alternative for seasonal and semipermanent wetlands

Grazing Strategy	Alt. 1	Alt. 2	Alt. 3
Existing fence already excludes cattle from wetland and surrounding upland buffer.	Vail Lake	Vail Lake	Vail Lake
Existing fence permit cattle grazing only in October for up to 10 days.	Marshall Lake, Little Dry Lake	N/A	Marshall Lake Little Dry Lake
New fencing would exclude cattle from emergent vegetation and surrounding upland buffer.	N/A	N/A	Prime Lake
New fencing would exclude cattle from emergent vegetation and surrounding upland buffer except for a lane for access to stock tank water or waterlot to stock tank.	N/A	N/A	Fisher/Fry Lake, Youngs Lake, Lost Tank, Dry Tank
No cattle grazing from 5/1-7/15 in these wetlands.	All	N/A	All

Cumulative Effects to Wetlands Common to All Alternatives

The cumulative effects analysis for wetlands considers wetlands and springs on the Walnut Canyon Allotment and is analyzed in the following two sections.

1. Consideration of activities additive to cattle grazing that have a localized cumulative effect on wetlands. The cumulative effects boundary is the Walnut Canyon Allotment.

Cattle grazing, along with other activities, could have a cumulative effect on wetlands in the Walnut Canyon Allotment. These activities will be discussed here and are related to stock tanks, wetland vegetation (includes plant height, cover, and residual litter), wetland soils/compaction, and water consumption by cattle. The temporal aspect of these activities will consider those overlapping with current cattle grazing and will consider activities occurring over the past 5 years and reasonably foreseeable activities occurring over the next 10 years. This timeframe applies to the cumulative effects for this project because regardless of the activities and natural events that affect the wetlands, climate is the main force driving their recovery. These areas could recover within a year with favorable climate conditions but this timeframe allows for drought. Rangeland trend for riparian vegetation and soils will be analyzed as the overall measure within the Walnut Canyon Allotment.

Past, present and reasonably foreseeable activities affecting wetlands besides cattle grazing include elk grazing, forest system roads/user-created roads in or immediately adjacent to the wetlands, and existing and proposed wetland fencing (Appendix B). Recreational use (hiking, hunting, and dispersed camping, viewing wildlife) occurs across this allotment but is very dispersed and has minimal to no direct or cumulative effects to wetlands.

There has not been any past stock tank maintenance or construction, firewood gathering, wildfires, new road construction/maintenance, prescribed burning or vegetation treatment (timber sale or vegetative thinning to restore grasslands thinning) contributing effects over the past 10 or more years presently effecting wetlands. None of the latter activities are presently planned in this Proposed Action and/or occurring or planned in wetlands or springs in the reasonably foreseeable future.

Climate is the integral factor affecting wetlands and springs. It is a natural event, and there are no human activities that control it. During drought conditions, the majority of all wetlands are dry. If the next 10 years are wet, the wetlands would be wet. If the next 10 years are dry, the conditions in the wetlands would remain static or decline and if they are wet, they would be static to improving. Cattle grazing is adjusted in drought conditions (through the AOIs) to lessen effects on wetland vegetation and water consumption.

Through this Proposed Action, cattle grazing is changing substantially from the past on the Walnut Canyon Allotment in two ways: grazing is either scheduled after July 15 in areas with seasonal and semipermanent wetlands and/or fencing excludes cattle grazing yearlong or almost the entire year except for lanes accessing water at a stock tank. This represents a recent change (occurred over the past 3 years to the present) in cattle grazing management within wetlands.

Within Walnut Canyon Allotment, the cumulative effects of cattle grazing combined with recreational road use, elk grazing, and fencing results in effects to soil compaction (trampling), increased turbidity, reduced plant height and cover, and the removal or crushing of residual vegetation after July 15. Fencing associated with wetlands provides the most protection to wetlands since it eliminates cattle grazing and prohibits vehicular use inside the wetland/upland buffer. Elk grazing would still occur in fenced areas and would impact vegetation of which the degree would vary.

Water in wetlands is consumed by cattle but this consumption varies at Deep Lake and Horse Tank depending upon the water level. There are no other activities additive to cattle grazing except wildlife. Cumulatively, there is no substantial change in water consumption from cattle and elk than from that of cattle alone.

Stock tanks in wetlands, as described earlier in this section, do affect the water collected in the tank as stock tanks are generally deeper and have less surface area producing less water evaporation. Cumulatively, there is no past, present or reasonably foreseeable activities (no maintenance, reconstruction, or new construction) of wetland stock tanks. They continue to exist in the same location and condition as they have for the past 30 to 70 years, and there are no other cumulative activities that would change them.

Overall, wetlands on the Walnut Canyon Allotment—considering past, present (including the change in grazing management), and reasonably foreseeable activities—would continue to be maintained (and/or improved in the fenced areas) in a proper functioning condition (recognizing that those grazed after July 15 could be in a short-term seasonal functioning at risk condition).

The combination of all these individual actions would not lead to irreversible effects to these wetlands and would still maintain or improve wetland function in the cumulative effects area.

2. Coconino Forest Plan consistency related to riparian standards. The cumulative effects boundary is six cattle grazing allotments that contain seasonal and semipermanent wetlands.

The cumulative effects on riparian areas on six cattle grazing allotments on Anderson Mesa as it relates to meeting the Coconino Forest Plan standard, “Meet the following riparian standards in the Regional Guide for 80 percent of riparian areas above the rim by the year 2030. Maintain at least 80 percent of the potential emergent vegetation cover from May 1 to July 15 in key wetlands.” Key wetlands are defined as seasonal and semipermanent. Actions from the past 10 years include existing fences, fences in current allotment decisions (Bar T Bar/Anderson Springs and Pickett Lake/Padre Canyon) and reasonably foreseeable fences anticipated in future cattle grazing allotment analyses (Tinny Springs and Walnut Canyon) occurring over the next 10 years.

Table 15 displays total wetland acres (including emergent vegetation) within the Walnut Canyon Allotment (336 acres) and within the cumulative effects area (9,573 acres). This table also displays the total wetland acres of emergent vegetation not grazed within the project area (148 acres, Alternative 3) along with the wetland acres not grazed within the cumulative effects area (2,750 acres). In addition, Marshall, Little Dry, and Mormon Lakes are currently in riparian pastures and are only grazed by cattle for up to 10 days in the fall, typically less than 10 percent. These three semipermanent wetlands represent an additional 5,433 acres of wetlands that are lightly grazed by cattle.

Table 15 displays the maximum proposed wetland exclosures (Alternative 3). It also displays the summary of cumulative effects on wetland acres related to cattle grazing including key wetlands on Anderson Mesa. It summarizes cattle grazing in wetlands from a cumulative perspective across six allotments.

Unfenced seasonal and semipermanent wetlands not fenced would not be grazed by cattle until after July 15.

One activity that could contribute effects to seasonal and semipermanent wetland potential emergent vegetative cover above the rim from May 1 to July 15th is present and reasonably foreseeable forest system or user-created roads. Visitors driving these roads can negatively affect emergent vegetation from May 1 to July 15.

Table 15. Acres of emergent vegetation within Walnut Canyon Allotment and the cumulative effects area

Type	Acres in Cumulative Effects Area Outside of Walnut Canyon Allotment	Acres Inside Walnut Canyon Allotment Project Area	Total Acres	Total Acres With No Cattle Grazing in Project Area	Total Acres With No Cattle Grazing in Cumulative Effects Area Outside Walnut Canyon Allotment
Spring	15	2	17	2	9
Reservoir	2,278	0	2,278	0	1,110
Ephemeral	28	0	28	0	0
Seasonal	1,547	25	1,572	20	1,310*
Semipermanent	5,551	309	5,860	104	311
Temporary	154	0	154	0	0
Totals	**9,573**	**336**	**9,892**	**125**	**2,750**

*Includes wetland acres planned in existing Allotment Management Plans.

Springs across Anderson Mesa vary with some springs protected by fencing or topography, some grazed, and some inaccessible to cattle grazing. Two are completely protected from all activities including cattle and elk grazing through fencing [PRD 40]. The past, present and reasonably foreseeable activities that affect springs includes fencing (existing and new) and elk grazing. There are two active springs on the Walnut Canyon Allotment, Youngs Spring and Babbitt Spring. Youngs Spring is currently fenced to exclude cattle. Babbitt spring would not be fenced in Alternative 1 and would be grazed by cattle, whereas it would be fenced in Alternative 3 more on cumulative effects for springs. No other activities that would affect these springs.

There is a special Order (No. 04-00-146) that prohibits vehicular use from April 15 to June 27 on the nearby Anderson Springs and Pickett Lake Allotments. While this closure is tied to reducing disturbance to fawning pronghorn antelope, it also serves to reduce vehicular impacts to vegetation and soils in wetlands. In the next four years, it is expected that the final USDA travel management rule will be implemented which will prohibit cross-country vehicular travel and possibly reduce the number of user-created roads across the forest. The travel management ruling will trigger further analysis of designating roads and trails which will likely reduce the number and density of roads (based on information gathered in the AMLSA road analysis) across this area which will be a beneficial effect in the future [PRD 23].

From a natural event perspective, drought can affect wetlands in terms of water availability and vegetation growth which are cumulatively impacted by cattle and wildlife grazing. Cattle grazing is managed during drought by reducing numbers. The adjustment in cattle grazing considering drought is demonstrated by reviewing the past 10 year history on this allotment (see Table 1 in Chapter 1). This is a key natural event that dramatically affects wetlands. Cattle grazing cumulatively adds to the affects of drought on wetland vegetation.

All alternatives meet the Coconino Forest Plan standard for maintaining the emergent vegetation between May 1 and July 15 [PRD 17]. Cumulatively, activities are maintaining or moving toward meeting the 80 percent protection standard by 2030. Cattle and wildlife grazing is managed through condition and trend analysis and vegetation utilization, with cattle moved once the

seasonal utilization guideline is met. There are minor changes (obliteration) in the forest road system and there has been a slight increase in user-created roads over time. There is no new road construction projects proposed in the reasonably foreseeable future. Over the next 10 years, it is expected that roads (primitive level 2 and user-created roads) would be closed and/or obliterated. Improvements in soils and soil conditions from the closure of roads at Youngs and Prime Lakes would be additive to any other improvements to soils in the cumulative effects area.

Cumulatively, there are scattered, but not substantial or concentrated activities, like recreational use (viewing wildlife, hiking the Arizona trail, dispersed camping) but these activities are not immediately occurring in wetlands.

Cumulatively, conditions for riparian vegetation are expected to remain static or improve. This project (any alternative) would not cumulatively move the condition or trend downward. With fencing and changes to cattle grazing rotations specific to the Coconino Forest Plan standard, the overall trend across these two types of wetlands is expected to remain static or static to upward. The cumulative effects of other activities (existing roads and future closure of roads and prohibition of cross-country vehicular travel) and drought along with cattle grazing would maintain the trend at static and where fenced, static to upward.

Overall, conditions for soils in wetlands are expected to remain the same with cattle grazing being additive to activities like roads, drought, and wildlife grazing. Soils in varying locations across these six allotments are unsatisfactory and/or impaired due to activities such as grazing but primarily are affected naturally (soil type, changing water level in the wetland, and amount/time of precipitation). Wetland fencing across these six allotments would contribute a benefit to these soils by removing cattle grazing. Fencing would also prohibit vehicular use. Wildlife grazing will still occur and depending on the magnitude of use could keep the soils impaired but this would only be in specific locations.

In these locations, soil condition may be improved but natural elements will likely keep them in the unsatisfactory and impaired condition across these six allotments. Wetlands that are not fenced would continue to have grazing and roads along with natural occurring events which cumulatively would not change their unsatisfactory or impaired condition. However, these activities cumulatively would not make soil condition worse as these activities are not increasing in wetlands over the next 10 years and are based on looking at the past 5-10 years to the present.

Cumulative Effects of Alternative 1

Marshall and Little Dry Lakes are currently fenced in a riparian pasture and this fence would be maintained. Cattle would graze this riparian pasture for 10 days in the fall. Cattle grazing would occur after July 15 above the rim on seasonal and semipermanent wetlands. Activities (roads, elk grazing, precipitation/climate) would be additive to cattle grazing in wetlands and would have the most cumulative impact in this alternative as compared to Alternatives 2 and 3. These effects are tied to wetland vegetation, soil compaction, water turbidity, and water consumption.

Cumulative Effects of Alternative 2

Alternative 2 provides the most cumulative protection to wetlands from a vegetation and soil condition standpoint by not authorizing cattle grazing. Elk grazing would still occur and vehicular use would occur on existing or user-created roads. Cumulatively, changes in road management through the reasonably foreseeable cross-country travel prohibition and designation of roads/trails would lessen the impact across the Walnut Canyon Allotment including wetlands. There are presently roads in some of these wetlands but these travel management changes would likely lead to their closure/obliteration over the next 10 years.

Cumulative Effects of Alternative 3

Alternative 3 provides more protection and less cumulative effects to wetland vegetation, soil compaction water turbidity, and water consumption based on fencing five wetlands and one spring.

In Prime, Fisher/Fry, Youngs, Dry, and Lost, there would be no effect from cattle grazing to the emergent vegetation and surrounding upland buffer except where the lanes are and, therefore, nothing to accumulate to the effects of other actions. The vegetation in these wetlands would improve, which would be additive to other seasonal and semipermanent wetlands in the cumulative effects area that would be fenced. The cumulative effects would be additive for the improved vegetation as well as wildlife habitat.

The proposed road closures at Youngs Lake and Prime Lake would maintain the integrity of the wetland exclosures and reduce possible soil erosion and compaction as well as reduce trampling of vegetation from vehicles driving in these areas. These effects would be additive to effects from other road closures associated with wetland exclosures in the cumulative effects area as well as with the upcoming final travel management rule implementation.

There would be cumulative impacts from cattle grazing on 27 acres of lanes in Alternative 3 and to stock tanks at Youngs, Dry, Lost, and the Fisher/Fry waterlot. These include impacts to soil conditions, decreases in nutrient cycling, disturbance to waterfowl potential nesting sites between May 1 and July 15 through trampling and would minimize nesting habitat potential within these lanes. Overall, the functionality of the wetland sites would improve toward the site potential. The exception to this would be the lanes and stock tanks themselves. All wetland sites would maintain proper functioning condition.

Vegetation

This section describes vegetation found in the uplands, woodlands, and grasslands. This section does not include detailed information on vegetation in riparian areas or wetlands. Information specific to these areas can be found in the “Wetland and Springs” section of this chapter.

Juniper and ponderosa pine communities dominate the vegetation on the Walnut Canyon Allotment at an elevation ranging from 6,400’ to 7,200’. The eastern half of the allotment is primarily pinyon and juniper with ponderosa pine stringers. The western half of the allotment is primarily ponderosa pine with pockets of pinyon and juniper. Grasslands exist within the central and eastern portion of the allotment. Since 2000, many of the pinyon trees on the Walnut Canyon Allotment have died as a result of drought. This has allowed grass and forb understory species to increase where the trees have died [PRD 40: condition and trend report].

There are four canyons running though the allotment and include Newman Canyon, Walnut, Cherry Canyon, and Youngs Canyon. These four canyons have diverse vegetation, including some ponderosa pine and gambel oak. There is riparian vegetation in Newman Canyon, Walnut, Youngs and Cherry Canyons, but it is not accessible to cattle on this allotment.

The lower portion of Newman Canyon runs through the south end of the allotment before it drains into Upper Lake Mary. This area is excluded from cattle grazing. Cherry Canyon begins along the Anderson Mesa Rim and enters Walnut Canyon just off of the allotment. The majority of Cherry Canyon is accessible to cattle. Youngs Canyon also begins along the Anderson Mesa rim before entering the adjacent Youngs Canyon Allotment. Youngs Canyon is grazed by cattle.

Upper Lake Mary drains into Lower Lake Mary and then into Walnut Canyon. The only portion of this drainage grazed by cattle is a holding pasture just below the Upper Lake Mary Dam that is used only when cattle are crossing Forest Highway 3 from the Observatory pasture to the Newman pasture.

Grass, forb, and shrub species vary on the Walnut Canyon Allotment depending on soils, slope, and precipitation. Based on TES and condition and trend monitoring from the area, over 25 species of grasses exist on this allotment. Cattle and wild ungulates potentially eat all these grass and shrub species. None of these grasses are threatened, endangered, or sensitive species.

The following is a list of more commonly occurring native grass, shrub, and forb species on the Walnut Canyon Allotment: Above the Anderson Mesa rim, dominant native grass species include western wheatgrass (*Agropyron smithii*), squirreltail (*Elymus elymoides*), and blue grama (*Bouteloua gracilis*). Below the rim, blue grama is the dominant grass species found throughout the area.

Near and on the rim, cliffrose (*Cowania mexicana stansburniana*) and fernbush (*Chamaebatiaria millifolium*) are the two most abundant shrub species and provide important structure and food for wildlife. Forbs found throughout the allotment include: redroot buckwheat (*Eriogonum racemosum*), whiplash daisy (*Erigeron flafellaris*), common fleabane (*Erigeron spp.*), nodding onion (*Allium cernuum*), Wheeler's thistle (*Cirsium wheeleri*), and pinque (*Hymenoxys richardsoni*).

Palatability of native grasses varies by species, time of year, and climate. Cattle graze cool season species that grow during the cooler winter and spring months like squirreltail, pine dropseed, needle-and-thread, wheatgrass, and bluegrass in the spring and early summer, and fall. Warm season species are typically grazed after summer monsoons through the fall. Cool season species would be grazed again in the fall if there is late season moisture to support their growth.

There are noxious weeds found on the Walnut Canyon Allotment and include: Dalmatian toadflax, Russian thistle, flannel mullein, field bindweed, Mediterranean sage, diffuse knapweed, Canada thistle, bull thistle, kochia, garden rocket, and cheat grass. Coconino National Forest permittees who move cattle from neighboring Forests, to the Coconino National Forest typically do not feed their cattle hay before the grazing season begins. If they do, the permittees are encouraged to feed weed-free hay to cattle prior to coming on the forest.

Carrying Capacity and Forage Production: Carrying capacity (see "Glossary") for this analysis is based on; actual use data, cattle and wildlife use patterns, cattle health and condition, condition and trend determinations, TES soil survey, forage production estimates, and professional opinion. Forage production estimates and the use of a computer analysis for capacity are used as tools for management of the allotment. Under each action alternative, the Annual Operating Instructions (AOI) would adjust numbers of cattle and/or length of grazing season to match forage production in a given year with the grazing system to meet goals of maintaining or improving conditions.

Forest Service personnel observe how current cattle management is affecting the allotment and determine if this use is sustainable over time. Long-term monitoring data points, located throughout the allotment were used for this analysis. Cattle health is also used to gauge capacity. If the cattle are in good condition and show good weight gains through the years, this is a positive indicator that cattle numbers are in line with the allotment's vegetative health.

The Walnut Canyon Allotment consists of 31,607 acres. Of these, full capacity rating for cattle is given to approximately 26,528 acres (84 percent). Areas given a potential capacity classification

cover 1,480 acres (5 percent). And, a no capacity classification is given to approximately 3,599 acres (11 percent). Refer to the *carrying capacity* classifications in the "Glossary".

Forage production varies considerably from site to site; depending on soils, moisture availability and overstory density. The main forage ground cover species are blue grama (*Bouteloua gracilis*), squirreltail (*Elymus elymoides*), western wheatgrass (*Agropyron smithii*), blue grass (*Poa pratensis*), three-awn (*Aristida purpurea*), sand dropseed (*Sporobolus cryptandrus*), and needle-and-thread (*Stipa comata*).

Cattle and elk use is calculated within this carrying capacity estimate [PRD 46]. Cattle use was calculated using the existing permit numbers. Elk use was calculated using Arizona Game and Fish Department estimates. The following numbers were used for carrying capacity estimates: 1) a 35 percent use levels for cattle and elk, 2) 25 lbs/day use for cattle on perennial grass, 3) 8.56 lbs/day in the summer and 6.42 lbs/day in the winter use for elk on perennial grasses.

Range Condition and Trend (All Vegetation Including Wetlands): The health of vegetation on the Walnut Canyon Allotment is measured through range condition and trend and is called range management status. Range condition and trend are a subjective expression of the status or health of the vegetation relative to their combined potential to produce a sound and stable biotic community. Soundness and stability are evaluated relative to a standard that encompasses the composition, density, and vigor of the vegetation (USDA 1987).

Rangeland management status is also a comparison of existing vegetation and soil conditions to either the potential natural plant community or desired plant community and vegetation trend. Rangeland management status is considered to be in satisfactory condition when the existing vegetation community is similar to the desired condition, maintaining or improving vegetation trend, and/or short-term objectives are being achieved to move the rangeland toward the desired condition. Similarity is a comparison of existing vegetation and soil conditions to either potential natural community or desired plant community (USDA 1960-present).

The assessment of current conditions and trends in this analysis provides an overview for large areas and does not necessarily uniformly apply to all areas on the Walnut Canyon Allotment. Range management status is generally satisfactory throughout the allotment. Unsatisfactory conditions occur in portions of the mountain grasslands and within dense ponderosa pine and pinyon-juniper communities where trees are encroaching on the understory grasses.

Plant community similarity is analyzed when determining plant community conditions. Similarity is the comparison of existing vegetation and soil conditions to either the potential natural community or the desired plant community. Of the nine plots, five are located in the ponderosa pine plant community and all have a mid-similarity to the desired plant community. Three plots are located in the pinyon juniper plant community, two of which have a mid-similarity with one having a high-similarity to the desired plant community. One plot is located in the grassland plant community and has a mid-similarity to the desired plant community.

Approximately 29,815 acres have satisfactory rangeland management status and a mid to high-similarity to the desired natural community with static to upward trends. Cattle currently graze a large portion of these satisfactory acres. Approximately 1,792 acres have unsatisfactory rangeland management status and a low-similarity to the desired natural community with primarily static but some downward trends. Unsatisfactory rangeland management status acres include unsatisfactory and impaired soils in dense juniper stands, grassland basins, swales, valley plains, and elevated grassland plains. Approximately 335 acres are affected by cattle and approximately 1,456 acres are affected by juniper.

Unsatisfactory rangeland status within the basins, swales, valley plains, and elevated grassland plains may be a result of one or more of the following: historic and current uses by cattle and wildlife; fluctuation in high and low water levels; historic human disturbances from growing crops; cutting hay; intense fires; driving vehicles; and various recreational uses.

Climate conditions are one of the major contributing factors, if not the primary factor, affecting range condition and trend on Anderson Mesa (Matt Loeser 2001 and PRD 58). Generally, drought conditions occurred in the 1950s and early 2000s. Wet conditions occurred in the 1970s through the 1990s and in 2005. Plant species change with these dry and wet periods (SRM 2006).

Since the plots were established in 1961, range trends within the ponderosa pine, pinyon juniper, and grassland communities of the Walnut Canyon Allotment have varied. Throughout the ponderosa pine communities, conditions have remained generally static for three plots, while an upward trend has been observed for the other two plots during the last 25 years. Plots in the pinyon juniper community have all shown a static trend. The plot in the grassland community has shown an upward trend. However, ponderosa pine and pinyon juniper trees are generally encroaching into these areas. As tree density increases, grass, forb, and shrub production declines.

These range condition trends exist under the current cattle grazing system with the current utilization guideline of 35 percent for cattle and elk. Grazing has remained within this utilization guideline and cattle have been able to fully use the area for the full length of the grazing season. Cattle must be moved early if the utilization level is reached prior to planned rotations, or cattle may not enter an area if elk use already meets the 35 percent utilization guideline. Early moves or skipping areas has not been routinely needed under the current grazing system and has only occurred on occasion, mainly related to drought conditions [PRD 40].

The overall trend for this allotment is static. Increases in juniper and ponderosa pine on some portions of the allotment are slowing an improvement in trend. Impacts from historic uses by cattle and elk, poorly located roads, flooding during snowmelt, and heavy thunderstorms may also slow improvements in trend. Specific data for the condition and trend summary of nine cluster plots monitored in 2002 and ten wetland plots monitored in 2005 are in the range and watershed report [PRD 40].

Utilization: Cattle are moved from one pasture to another area to another when seasonal utilization approaches a “moderate” level, approximately 21-50 percent. Moderate seasonal utilization is an approximate value because it takes into account any additional growth which might occur later in the season and considers season of use, wildlife use, weather conditions, availability of forage, and water. This moderate seasonal utilization level leaves residual cover for wildlife and soils and provides for long term health of the grazed plants (Smith et. al., 2005).

Within the utilization guideline cattle graze plants and have the potential to modify understory plant height, reduce seed head growth, affect plant community composition, diversity, physiognomy, and encourage regrowth in years of good precipitation all under well managed moderate (21-50 percent) grazing. Plant height and cover varies with seasonal moisture and temperatures. Loeser et al. (2004) found that on the Anderson Mesa grasslands 5 years without cattle grazing has little effect on forb abundance or standing herbaceous matter. Preliminary data from monitoring upland pastures rested or deferred from cattle grazing for three years in relation to the Anderson Mesa Pronghorn Plan (AGFD 2002) indicates cattle grazing is not negatively affecting plant community composition or diversity [PRD 58]

Environmental Consequences

The following is a list of possible effects of cattle grazing on vegetation for this analysis. Cattle graze mainly grass, but they also graze some forbs and shrubs. Cattle first graze vegetation near water sources and highly productive grasslands before grazing in more rocky uplands. Cattle reduce heights of vegetation by grazing the plants. Cattle grazing can effect plant species' composition, plant canopy cover, and ground cover. Cattle grazing can reduce fine fuels in grasslands that may limit the ability of a fire to carry through it.

Cattle can improve the production of grasslands by removing old, decadent forage from grass plants thus stimulating growth. Cattle grazing can increase the nutrient and water cycle by breaking up soil crusts. Cattle grazing can also increase the nutrient cycle by taking standing forage, processing it, and adding it to the soil.

Grazing can have positive or negative effects on the abundance and diversity of native grasses, depending on the timing and intensity of grazing. Cattle can diversify upland habitat structure by opening up dense stands of vegetation through selective grazing. Grazing can increase habitat diversity through changes in species composition and stimulate vegetation growth (McNaughton 1983). Many plants increase their growth rates as grazing intensity increases. Once the optimum grazing level is exceeded, growth rates decline. Overgrazing can cause death to individual plants, and tends to decrease perennial grassland vegetation favoring the invasion of annual grasses and forbs (Ellison 1960).

Two new studies on Anderson Mesa grasslands show additional details into the effects of livestock grazing on this area. Loeser et al. (2003b) showed that five years of cattle removal did little to affect forb abundance or standing herbaceous matter. Loeser et al. (2003a) showed that an increase in defoliation increased above ground productivity in this area.

Direct and Indirect Effects Common to All Alternatives

Under all action alternatives the range management status for condition and trend would remain the same or move upward, except on steep slopes or where juniper and pine trees limit improvement potential. Treating areas with dense trees is outside the scope of this analysis.

Alternatives 1 and 3 include wildlife use within the proposed utilization guidelines of 35 percent. These alternatives leave 65 percent for site protection, which is above what Galt et al. recommends. Galt et al. 2000 recommended a 25 percent utilization guideline for livestock, with 25 percent allocated for wildlife and natural disturbance, and the remaining 50 percent left for site protection.

Cattle grazing would effect vegetation, by reducing plant height and cover. Plants are expected to recover from this reduction in plant height and cover with favorable climatic conditions. Weedy, exotic, or seeded species are not expected to increase. These effects are based on past monitoring on the allotment, which has not shown detrimental effects from cattle grazing to vegetation over the long term.

There would be direct effects from cattle grazing to understory plants by reducing plant height, canopy cover, and ground cover. This reduction could lead to a decrease in grass, forb and shrub plant species composition, plant abundance, and plant production. Loeser et al. (2004) showed evidence of increased aboveground productivity on Anderson Mesa grasslands in response to defoliation from cattle grazing.

Cattle can improve or decrease plant species composition depending on the timing of grazing. Grazing use is dispersed so forage is grazed and rested at a different time each year. For instance,

spring and early summer grazing occurs mainly on cool season species. After the monsoon season, grazing occurs mainly on warm season species. As the weather cools in the fall, use changes back to cool season species. Future condition and trend monitoring would indicate if proper utilization guidelines are being applied, or if this utilization is not sufficient in maintaining general plant health.

Direct and Indirect Effects of Alternative 1

A moderate seasonal utilization guideline of 21-50 percent is set for cattle and/or wildlife during cattle graze periods. This utilization level by grazing ungulates leaves 65 percent of forage production available to reproduce, grow to maturity, build necessary root mass, produce seed heads, produce litter important for nutrient recycling, propagate and move into new areas, and provide for the needs of other wildlife species.

In this alternative the range management status for condition and trend would remain the same or move upward, except on steep slopes or where juniper and pine trees limit improvement potential.

Direct and Indirect Effects of Alternative 2

By removing cattle in Alternative 2, there would be no direct or indirect effects from cattle grazing on range management status. The range management status for condition and trend would remain the same or move upward, except on steep slopes or where juniper and pine trees limit improvement potential.

Short term reductions in height and canopy cover from cattle grazing would not occur. Through the removal of cattle an increase in plant abundance, diversity, and production is not expected. Preliminary data from several pastures and exclosures on the nearby Pickett Lake and Anderson Springs Allotments, with 3 to 6 years of rest from cattle grazing [PRD 58], indicates there is not an increase in grass, forb, and shrub abundance, diversity, and production when the areas are rested from cattle grazing.

There would be no road closures associated with Alternative 2 because the wetlands exclosures would not be built. There would be not direct or indirect vegetative improvements.

Direct and Indirect Effects of Alternative 3

A moderate seasonal utilization guideline of 21-50 percent is set for cattle and/or wildlife during cattle graze periods. This utilization level by grazing ungulates leaves 65 percent of forage production available to reproduce, grow to maturity, build necessary root mass, produce seed heads, produce litter important for nutrient recycling, propagate and move into new areas, and provide for the needs of other wildlife species.

In this alternative the range management status for condition and trend would remain the same or move upward, except on steep slopes or where juniper and pine trees limit improvement potential.

The proposed road closures at Youngs Lake and Prime Lake would maintain the integrity of the wetland exclosures and reduce possible soil erosion and compaction as well as reduce trampling of vegetation from vehicles driving in these areas.

Cumulative Effects Common to All Alternatives

The cumulative effects analysis area for vegetation includes the San Francisco Wash and Walnut Canyon 5th code watersheds which includes all drainages on the Walnut Canyon Allotment to the Little Colorado River (Fay Canyon, San Francisco Wash, Walnut Creek, Cherry Canyon, Newman Canyon, and Youngs Canyon) (see Figure 8 in the “Soils” section). Cattle grazing

effects on this allotment and other allotments within this watershed area affect vegetation by reducing plant height, canopy cover, and ground cover. The degree of these effects is influenced by utilization guidelines. Utilization guidelines for adjacent Forest Service allotments in the cumulative effects area, based on current Allotment Management Plans, are: Pickett Lake-35 percent, Padre Canyon-35 percent, Youngs Canyon-35 percent, Deep Lake-35 percent, Lake Mary-35 percent, Angell-35 percent, and Cosnino-35 percent. Observations on the State and private lands in the cumulative effects area indicate utilization guidelines fall within similar ranges.

The past, present, and reasonably foreseeable future activities and natural events considered in the cumulative effects analysis for vegetation are dispersed recreation, firewood gathering, juniper treatments, past wildfires, prescribed fire, off-road vehicle use, elk grazing, the Jacket and Mormon Fire rehab projects, and climate (Appendix B).

The timeframe for these combined effects is 20 years, 10 years in the past and 10 years in the future because changes in condition and trend in the upland vegetation are observed over this timeframe. If growing conditions are favorable, plant height and canopy cover would completely recover within 1 year. If growing conditions are not favorable, recovery would occur more slowly (up to 2 to 3 years). Upland vegetation recovery from other activities and natural events may take up to 10 years.

Cattle grazing can cumulatively affect plant height and canopy cover of understory plants in combination with dispersed recreation, firewood gathering, juniper treatments, past wildfires, prescribed fire, roads, OHV use, elk grazing, the Jacket and Mormon Fire rehab projects, and climate.

Rangeland condition trend is expected to remain static to upward with cattle grazing additive to other activities and natural events. This project (any alternative) does not cumulatively change the condition or trend in a downward direction on the allotment. The trends on adjacent allotments within the cumulative effects area are also static to upward, so there is a slight additive effect of the condition and trend on Walnut Canyon Allotment in combination with condition and trend on other allotments. These static to upward trends are additive, and the result for the cumulative effects area is static to upward.

Where trees limit improvement potential, several juniper tree treatment projects are and will be implemented in the cumulative effects area. Meadow and grassland habitat will be restored, improving habitat and travel corridors for pronghorn and other wildlife. Grass and forb production will increase and soil conditions will begin to stabilize or improve in 1 to 3 years depending on moisture availability. These positive effects to the range conditions and trends would have a cumulative benefit to the vegetation and wildlife habitat.

Since 2003, 25,065 acres have been burned by wildfires within the watershed. Despite an immediate reduction of the understory vegetation after the fires grass and forb cover has increased as these areas receive adequate moisture for plants to establish, improving their general health, which is be additive to other improved vegetation conditions in the watershed.

Cumulatively, the combination of these effects and the effects of the action alternatives would not lead to irreversible effects to vegetation.

Cumulative Effects of Alternatives 1 and 3

In Alternative 1, cattle would still graze highly productive forage areas first before moving to less accessible sites or areas with dense trees. The overall cumulative effect of cattle grazing on upland plant height and canopy cover is more than in Alternative 2. These effects could lead to a

cumulative decrease in plant height and canopy cover, ground cover, forb and shrub plant species composition, plant abundance, and plant production when added to other reductions in vegetation in the San Francisco and Walnut Canyon 5th code watersheds. Cumulatively, there would be no measurable difference in the condition and trend in the cumulative effects area.

In Alternatives 1 and 3 the range management status for condition and trend would remain the same or move upward, except on steep slopes or where juniper and pine trees limit improvement potential. Cumulatively, this static or upward condition and trend is additive to other static and/or upward trends in the San Francisco and Walnut Canyon 5th code watersheds.

Improvements in upland vegetation in Alternative 3 from the closures of road at Youngs and Prime Lakes would be additive to any other improvements in the cumulative effects area.

Cumulative Effects of Alternative 2

By removing cattle in Alternative 2, there would be no direct or indirect effects from cattle grazing on range management status, plant height and canopy cover and no cumulative effects.

Alternative 2 provides the most cumulative protection to upland vegetation from a vegetation health standpoint by not authorizing cattle grazing. Wildlife grazing would still occur affecting vegetation. Cumulatively, changes in road management through the reasonably foreseeable future cross-country travel prohibition and designation of roads and trails will lessen the impact across the Walnut Canyon Allotment.

Sensitive Plant Species

Sensitive species are defined as “those plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species’ existing distribution” (FSM 2670.5(19)).

It is the policy of the Forest Service regarding sensitive species to: (1) assist states in achieving their goals for conservation of endemic species; (2) as part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species; (3) avoid or minimize impacts to species whose viability has been identified as a concern; (4) if impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole (the line officer with project approval authority makes the decision to allow or disallow impacts, but the decision must not result in loss of species viability or create significant trends toward Federal listing); and (5) establish management objectives in cooperation with the state when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for Federal candidate species, in cooperation with the U.S. Fish and Wildlife Service and Arizona State (FSM 2670.32).

All plant species on the district’s threatened, endangered and sensitive species list [PRD 35] were considered in this analysis. There are no threatened, endangered, or proposed plant species within the project area. Seven sensitive plant species have potential habitat within the project area and have been evaluated (see Table 16). Listing status refers to a species’ Forest Service designation as a sensitive species.

Table 16. Sensitive plant species with potential habitat on the Walnut Canyon Allotment

Species Name	Scientific Name	Listing Status
Arizona Bugbane	*Cimicifuga arizonica*	SEN
Cliff Fleabane	*Erigeron saxatilis*	SEN
Disturbed Rabbitbrush	*Chrysothamnus molestus*	SEN
Flagstaff Pennyroyal	*Hedeoma diffusum*	SEN
Rusby's Milkvetch	*Astragalus rusbyi*	SEN
Arizona Sneezeweed	*Helenium arizonicum*	SEN
Flagstaff Beardtongue	*Penstemon nudiflorus*	SEN

A sensitive species biological assessment and evaluation [PRD 39] was prepared for this analysis and it is based on the current geographic range of sensitive species on the Coconino National Forest and the area affected by the project. The assessment considers, as appropriate for the species and area, factors that may affect the current trend for the species' population. Additionally, the assessment includes findings under the various management alternatives considered for the project (FSM 2621.2).

Arizona Bugbane

Arizona bugbane is very habitat specific requiring shady, moist environments, and mixed conifer/mixed broadleaf riparian associates. Tall cliffs or narrow canyons and dense overstory canopy in conjunction with a tendency for north-facing aspect combine to provide the required habitats. Its habitat has rich, high-humus soil, higher humidity than adjacent areas in summer, and the soil remains saturated longer in the spring. This species is designated as highly safeguarded under the Arizona Native Plant Law of 1993 and as a result, no collection is allowed except for scientific research with permit.

Threats to this plant include destruction of habitat from livestock grazing, which results from trampling and browsing. Walnut Canyon is potential habitat for Arizona Bugbane. The closest known location is over 6 miles from the allotment.

Environmental Consequences

Direct, Indirect and Cumulative Effects of Alternatives 1 and 3

There would be no direct, indirect or cumulative effects on this species due to the location of habitat on the allotment. Potential habitat for this species is inaccessible to cattle. The very steep rugged slopes of Walnut Canyon prevent cattle from grazing in potential bugbane habitat. There is a determination of "no effect".

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. There is a determination of "no effect".

Cliff Fleabane

Cliff fleabane occurs between 4,400 and 7,000 feet in elevation on various aspects and a variety of vegetative communities, including Rocky Mountain Riparian Deciduous Forest. It is found on

dacite and Coconino sandstone, on mainly inaccessible shaded cliff faces and boulders in shady canyons. The nearest known plant is just north of the project boundary.

Potential habitat is limited in the analysis area to steeper slopes of the Anderson Mesa Rim and Walnut Canyon. Threats to cliff fleabane include those activities that damage cliffs and boulders. No plants were found during plant surveys of the nearby Pickett Lake Allotment (USDA 2000b).

Environmental Consequences

Direct, Indirect, and Cumulative Effects of Alternatives 1 and 3

Potential habitat for this species is inaccessible to cattle. None of the alternatives propose to modify the substrate on which this species depends, so no direct, indirect, or cumulative effects would occur. There is a determination of “no effect”.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. There is a determination of “no effect”.

Disturbed Rabbitbrush

This perennial sub shrub is associated with the open pinyon-juniper woodlands and grasslands. It is found on slopes and flats, and infrequently on steep slopes. It is found exclusively on calcareous soils including those soils whose parent material was alluvium derived from Kaibab limestone and those soils whose parent material was predominantly basalt. In the latter case, known plants grow in accumulations of calcium carbonate resulting from the leaching of precipitates from basalt and possibly from wind and water deposition. The range within Arizona includes Coconino County from the South Rim of the Grand Canyon to the Flagstaff area. There are 21 known populations within Coconino County. Threats to this species are grazing by wild and domestic ungulates and low recruitment.

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

This plant is frequently found as prostrate and hedged due to grazing. Following stress, this plant flowers profusely. Though habitat exists below the Anderson Mesa Rim on the allotment, the nearest known population is over 30 miles away. Excessive concentrations of cattle could result in trampling and damage through erosion; this is more likely to occur within one-quarter mile of water.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is I-40 on the north, the forest boundary on the east, the northern rim of Anderson Mesa and FSR 125 on the south and FH 3 on the west.

Cumulative effects include cattle grazing, prescribed and natural fire and wild ungulate grazing.

Cumulative effects from both cattle and wild ungulates include potential impacts on growth, vigor, structure, seed head production, reproductive processes, and trampling. Wildlife and cattle do forage on this species and the effect of foraging results in hedging, profuse flowering and likely reduces the plants ability to reproduce. High concentrations of cattle or wildlife, normally

around water sources, could result in the loss of individual plants as a result of trampling or excessive grazing.

In 2003 and 2004, about 25,000 acres of potential habitat were burned within the cumulative effects area. Cumulatively, prescribed and natural fires would affect this plant both positively and negatively. Fires can result in plant mortality, loss of foliage and reproduction, which is a negative effect. Fire is not viewed as an effective means to stimulate shoot or flower production. This plant is tolerant of prescribed burns after the growing season, enhancing growth of mature plants; spring burns can cause 25 percent mortality among adult plants (Cobb et al. 1996, in CPC 2003).

Considering direct, indirect and cumulative effects, the determination of effect is ‘‘may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” due to the potential affects to habitat by grazing.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. There is a determination of “no effect”.

Flagstaff Pennyroyal

Flagstaff pennyroyal is associated with rocky, shallow limestone soils in the ponderosa pine vegetation type preferring open, sunny habitats. Canopy cover ranges from 0 to 86 percent. Originally considered to be endemic and exclusive to the urban Flagstaff vicinity, significant additional populations of *Hedeoma diffusum* have since been located on the Mormon Lake Ranger District as well as on the rims overlooking Oak Creek Canyon. Extensive surveys conducted by Boucher in 1986 of the Red Rock-Secret Mountain Wilderness area indicate that many plants occur in those remote, steep limestone canyons and bluffs. Populations of Flagstaff pennyroyal are restricted to limestone outcrops, flat rocks, rock cracks and occasionally in limestone soils (USDA 1985). The plant is not selected by cattle, though trampling and erosion resulting from overgrazing could have a detrimental effect. This species is designated as salvage restricted under the Arizona Native Plant Law of 1993 and as a result, collection is allowed but requires a permit.

The Flagstaff pennyroyal is likely present throughout the Walnut Canyon Allotment where limestone outcrops in the ponderosa pine vegetation type occurs.

Environmental Consequences

Cattle grazing appears to have no effect on the Flagstaff pennyroyal as this plant is not selected by cattle (USDA 1985). However, excessive concentrations of cattle could result in trampling and damage through erosion.

Direct and Indirect Effects of Alternatives 1 and 3

The utilization levels proposed for these alternatives are adequate to maintain sufficient ground cover as to prevent damage to plants from erosion. On the allotment, ponderosa pine areas generally maintain a static to upward trend in range condition.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is I-40 on the north, the forest boundary on the east, the southern boundary of the Deep Lake and Padre Canyon Allotments on the south and FH 3 on the west.

Cumulative effects include cattle grazing, prescribed and natural fire, and wild ungulate grazing.

Cumulative effects from both cattle and wild ungulates include potential impacts on growth, vigor, structure, seed head production, reproductive processes, and trampling. Wildlife and cattle do not appear to key in on this plant as a forage species and the effect of foraging is indiscernible. High concentrations of cattle or wildlife, normally around water sources, could result in the loss of individual plants growing on limestone soils, as a result of trampling or excessive erosion. However, trampling and losses as a result of erosion are not expected to affect the majority of plants, as this species typically grows on limestone outcrops.

In 2003 and 2004, about 25,000 acres of potential *Hedeoma* habitat were burned within the cumulative effects area. Cumulatively, prescribed and natural fires would affect this plant both positively and negatively. Fires can result in plant mortality, loss of foliage and reproduction, which is a negative effect. Fire positively impacts individual plants through increased nutrients following the burn, resulting in increased vigor, growth and reproduction. A study of prescribed fire effects on this plant concluded that fire shows some potential benefit for management of this plant and that no long-term adverse effects were seen (Crisp 1997).

Considering direct, indirect and cumulative effects, the determination of effect is ‘‘may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” due to the potential affects of trampling.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. There is a determination of “no effect”.

Rusby’s Milkvetch

This plant is known only from northern Arizona. It has been located on the San Francisco Peaks, north of Williams and Mount Trumbell, from 6,500 to 9,000 feet. It blooms from May to September. Potential habitat on these two allotments includes ponderosa pine or ponderosa pine/Gambel oak sites in dry or temporarily moist basaltic soils. It is about 5 miles from the allotment to the nearest known population of this plant. No plants were found during plant surveys of the nearby Pickett Lake Allotment (USDA 2000b).

This species is fire-adapted with a high tolerance for disturbance. It is browsed by wildlife, and is probably used by other grazers as well. It seems to prefer an open canopy with light and nutrients reaching the forest floor.

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

Plant response to grazing has not been well studied but observations in the vicinity of the San Francisco Peaks suggest that this plant is not heavily grazed (Green 1999). Where it is grazed, plant responses could include compensatory effects such as development of lateral branches, foliage and flowers. Other responses may include delayed flowering, reduced seed output, and

reduced vigor. Both of these responses would be interactive with the effects of climate, timing of grazing, number of cattle, and timing of subsequent grazing by both cattle and wildlife. The effects to this species of a utilization level of 35 percent would be difficult if not impossible to discern as this plant is not targeted by cattle as a forage species and this plant has not been detected on the allotment.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is I-40 on the north, the forest boundary on the east, the southern boundary of the Deep Lake and Padre Canyon Allotments on the south and FH 3 on the west. Cumulative effects on Rusby's milkvetch include prescribed and natural fire, cattle grazing, wild ungulate grazing, recreation use, and silviculture activities.

Cumulative effects from both cattle and wild ungulates include potential impacts on growth, vigor, structure, seed head production, reproductive processes, and survival of individual plants as described above or trampling. Depending on the intensity of grazing, these impacts may be negligible or they may result in the loss of individual plants.

Cumulative effects from recreational uses include soil compaction associated with road and trail use, the potential for trampling of individual plants, and alteration in habitat for this species. Injury or death of the plant can occur as a result of camping, picnicking, or off-road vehicle use.

Cumulatively, prescribed and natural fires would affect this plant both positively and negatively. Fires can result in plant mortality, loss of foliage and reproduction, which is a negative effect. Fire positively impacts individual plants through increased nutrients following the burn and opening the canopy, resulting in increased vigor, growth and reproduction. More plants have been observed within the boundary of the Pumpkin Fire, which burned in 2000, than in unburned habitat immediately adjacent to the fire.

Considering direct, indirect and cumulative effects, the determination of effect is ''may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability" due to the potential affects by grazing.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. There is a determination of "no effect".

Arizona Sneezeweed

This perennial herb blooms between July and September and is found between 7,000 and 8,000 feet in elevation. It is known only from central Arizona. The type locality is from Mormon Lake (Kearney and Peebles 1951). It is associated with many of the meadows on the Mormon Lake and Blue Ridge Ranger Districts. Habitat includes roadsides and clearings in ponderosa pine forests. This plant has been found within the allotment in the West Walnut pasture.

Threats to Arizona sneezeweed include: changes in hydrological processes in wet and intermittently wet meadows that result in lowered water tables or dewatering; loss of habitat due to housing development or road construction; and trampling or other soil disturbances (USDA 2000a).

Environmental Consequences

Grazing impacts to Arizona sneezeweed have been observed although wildlife and cattle use is low. Cattle seem to avoid the plant although trampling would be expected because cattle tend to concentrate around water where these plants grow.

Direct and Indirect Effects of Alternatives 1 and 3

For Alternative 1 cattle impacts would vary depending on when cattle would be using the seasonal and semipermanent wetlands and Dry and Lost Tanks; early cattle use would have little direct impact because sneezeweed growth appears to be timed with the monsoon. Consequently, late cattle use would have higher impacts. This will vary by year with the timing of pasture use. Alternative 3 proposes additional protection to sneezeweed habitat. Alternative 3 would exclude cattle grazing on potential habitat at Prime, Fisher/Fry and Youngs Lakes, as well as Lost and Dry Tanks.

There are no anticipated effects due to range improvements because these will not occur in habitat for this species; the wetland exclosures at Prime, Fisher/Fry and Youngs lakes and Lost and Dry tanks will include an upland buffer.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is the Walnut, Deep Lake and Pickett Lake Allotments. Cumulative effects on Arizona sneezeweed include cattle grazing, wildlife grazing, and recreation use.

Cumulative impacts from grazing include trampling, potential light grazing and soil compaction. Individual plants will have differential response based on the degree and timing of impacts. For example, the plant may still be able to produce some seed heads if damage occurs relatively early in the season. However, impacts during flowering are likely to have greater impact to reproduction. This same trend of relatively low impacts during some years and higher impacts due to others is anticipated in potential habitat as well.

Cumulative impacts from recreation use include trampling of individual plants by campers or off-road vehicles and collection of flowers. This is expected to affect reproductive rates by reducing seed production and reducing the number of plants in the population.

Considering direct, indirect and cumulative effects, the determination of effect is “may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” due to the potential affects of grazing and trampling.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. There is a determination of “no effect”.

Flagstaff Beardtongue

This penstemon is known only from north-central Arizona in Coconino and Yavapai Counties (Kearney and Peebles 1951). It occurs on dry slopes with ponderosa pine in mountainous or hilly regions south of the Grand Canyon. It may be expected to occur on light, dry neutral soils in eroded or mountainous areas. It is found between 4,480 and 6,965 feet in elevation. It has been documented within the allotment in the Observatory pasture. Threats to Flagstaff beardtongue include seed predators and grazing. There is no known compensatory response to herbivory. It

has seed predators and grasshoppers eat the foliage. According to Barb Phillips, PhD (Botanist for the Coconino, Kaibab, and Prescott National Forests), this species is adapted to fire and generally grows in open habitats.

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

The seed heads can be eaten by cattle or wildlife resulting in delayed flowering, reduced seed output, or reduced vigor. Some plants could be trampled. All of these responses would be interactive with the effects of climate, timing of grazing, number of cattle, and timing of subsequent grazing by both cattle and wildlife. The effects to this species of a utilization level of 35 percent would be difficult to discern as this plant is not targeted by cattle as a forage species.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is the Lake Mary, Walnut and Deep Lake Allotments. Cumulative effects on Flagstaff beardtongue include cattle grazing in adjacent areas, wildlife grazing, prescribed and natural fire, silvicultural activities, and recreation use.

Cumulative effects from grazing include the potential for injury to individual plants. Anecdotal evidence suggests that this species is lightly grazed, but is not preferred as forage by cattle or wildlife. Light grazing has the potential to alter the growth form of individual plants and to result in the loss of flowering stalks and subsequent seed production.

Cumulatively, individuals of this plant would be affected both positively and negatively by prescribed burning. Prescribed fire can result in plant mortality, loss of foliage and reproduction, which is a negative effect. Fire would positively impact individual plants through increased nutrients following the burn and opening the canopy, resulting in increased vigor, growth and reproduction.

Cumulative effects from silvicultural activities would include injury or death of individual plants due to falling trees, human activity, and equipment use where plants occur. The opening of the canopy could have positive effects from increased sunlight.

Cumulative effects from recreational use are similar to those for other plant species and include trampling of individual plants, injury or death from off-road vehicle use or other human activities, and plant or flower collection.

Considering direct, indirect and cumulative effects, the determination of effect is ‘‘may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” due to the potential affects of grazing.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. There is a determination of “no effect”.

Wildlife

The affected environment and environmental consequences of each alternative to wildlife is organized by species status: threatened and endangered, sensitive, management indicator species, and migratory birds.

The cumulative effects area analyzed for wildlife is defined differently for each species. The period of time considered for cumulative effects is 20 years; 10 years before and 10 years after the existing condition.

Threatened and Endangered Species

Section 2 of the Endangered Species Act of 1973, as amended declares that "…all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." Section 7 directs Federal agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats (16 U.S.C. 1536 et seq.).

Federal agencies also must consult with the U.S. Fish and Wildlife Service (USFWS) whenever an action authorized by the Agency is likely to affect a species listed as threatened or endangered or to affect its critical habitat. The act mandates conference with the Secretary of the Interior whenever an action is likely to jeopardize the continued existence of any species proposed for listing as threatened or endangered, or whenever an action might result in destruction or adverse modification of critical habitat proposed for listing (16 U.S.C. 1536(a)4).

The threatened, endangered and sensitive species (TES) list for the Mormon Lake and Peaks Ranger District was reviewed and a TES list for this project was created in March 2006 [PRD 35]. The Walnut Canyon Allotment contains habitat for the Mexican spotted owl and bald eagle, both of which are threatened species. There are no endangered or proposed animal species and no listed or proposed plant species within the analysis area.

The following is a description of the individual species and their habitat and an analysis of the effects of implementation of each alternative on each species.

Bald Eagle

Bald eagles are primarily winter visitors to the Coconino National Forest, and the Walnut Canyon Allotment, occupying all habitat types and elevations. Wintering eagles arrive in the fall, usually late October or early November, and leave in early to mid-April. They feed on fish, waterfowl, terrestrial vertebrates, and carrion. Eagles are often seen perched in trees or snags near water or next to roadways where they feed on fish and road-killed animals. At night, small groups (usually 2-12) or individual eagles roost in clumps of large trees in protected locations such as drainages and hillsides. Eagles usually roost adjacent to or very near food sources.

Surveys: Of the 300 birds detected annually in Arizona, most occur on the Coconino National Forest and west along the Mogollon Rim to the White Mountains (USDA 2005a, p. 58; AGFD 2000). Bald eagle surveys are conducted every January on the Forest. One of the standardized routes traverses portions of the Walnut Canyon Allotment. As many as 69 eagles have been counted on this route (Mormon Lake Ranger District records). Eagle sightings are strongly influenced by the percentage of open water and/or prey availability and viewing conditions. Sightings and are variable year to year. Most birds are generally seen in the vicinity of Mormon Lake and both Lake Marys, which are adjacent to the Walnut Canyon allotment.

Nests: There are no known nesting sites on the allotment. The closest bald eagle nest is found along Lower Lake Mary approximately one-half mile from the Walnut Canyon Allotment. Bald eagles nesting on Lower Lake Mary produced one eaglet in 2005, for the first time in over thirty years. The Lower Lake Mary nest occurs in a historic eagle stand that was thought to be active in

the late 1960s or early 1970s. Other nests on the forest are found along Beaver Creek, lower Oak Creek and the Verde River more than approximately 29 miles from the allotment boundary.

Roosting: According to Ranger District records, there are five known roosts on the allotment, totaling approximately 56 acres. These roosts are found in groves of large yellow pines adjacent to Upper and Lower Lake Mary in the Observatory and Newman pastures. All three roosts and about half of the other two lie within these pastures.

There are seven additional roosts within one mile of the allotment totaling approximately 150 acres. All of these roosts and areas adjacent to Upper and Lower Lake Mary are active during the winter.

Foraging: Eagles forage widely and opportunistically on carrion, waterfowl and fish. The timing and amount of precipitation and fish stocking by Arizona Game and Fish Department drive waterfowl and fish distribution, respectively. Carrion is a major food source for eagles, particularly during elk hunting seasons. Eagles typically use any open water that would support waterfowl and or fish.

There are seven types of wetlands and springs found on Anderson Mesa. These wetland types are distinguished based on flooding regimes, presence of hydric soils and presence of hydrophytic vegetation. Fish are found in Marshall Lake, which is stocked by Arizona Game and Fish Department. Although all waters and wetlands can be used by waterfowl, the abundance and diversity of species will vary by the amount of water, basin size, habitat interspersion, etc. Livestock use does not overlap with wintering bald eagles.

Prior consultation: Consultation with US Fish and Wildlife Service on the effects of ongoing grazing on the allotment was conducted in 2002 (AESO/SE #2-21-02-I-142). There was a “may effect, not likely to adversely effect” determination for bald eagles. The effects of grazing on threatened and endangered species have been consulted on with the U.S. Fish and Wildlife Service.

Environmental Consequences

Bald eagles forage across the entire allotment. Particularly during the winter (October-March), eagles migrate to the Flagstaff area from as far away as the Canadian Northern Territories. Cattle grazing is limited to the summer and early fall (June-October) and does not coincide with the peak period of bald eagle occupancy, which is approximately November to February.

Nesting bald eagles were recently discovered within one-half mile of the allotment. In 2004, a pair of eagles built a nest near Lower Lake Mary, but were unsuccessful at reproducing. In 2005, the pair returned and produced a male fledgling. Unfortunately, the young eagle died only two days after leaving the nest from injuries sustained in a fall. So far in 2006, the eagles were seen performing courtship displays and copulating. At this point they are not using the 2005 nest and may have constructed another nest or are not nesting. As of April 7, 2006 a pair of adult eagles, suspected to be the breeding adults, have been using Lower Lake Mary and the trees in that area for foraging and roosting. Biologists from the Arizona Game and Fish Department and Forest Service have conducted aerial and on the ground searches for a new nest but have not been able to find one.

Bald eagles forage on small mammals, fish and waterfowl that are found in the seasonal and semipermanent wetlands of Anderson Mesa. These wetlands are vulnerable to cattle grazing when it results in an excessive loss of wetland vegetation, which disrupts proper wetland function.

Direct and Indirect Effects of Alternative 1 and 3

Grazing will occur outside the time of use by wintering bald eagles in all years, but will coincide with bald eagle nesting at Lower Lake Mary. There are no direct or indirect effects to nesting or nesting habitat due to lack of nesting within the analysis area. If in the future, nesting is discovered within the allotment the following mitigation measures will be imposed:

Livestock management activities such as salting, herding and construction actions associated with grazing operations within the project area would not occur within one-quarter mile of a bald eagle roost or nest site during any time of occupation by bald eagles.

Cattle grazing does not effect nest trees.

There are no direct or indirect effects to roost sites because although livestock grazing occurs within known roosts, monitoring visits indicate that at the current utilization level cattle do not graze roost or recruitment roost trees.

Livestock will be permitted to graze within the 620 acre Marshall Lake pasture for up to ten days in October. The effects of grazing this pasture for up to ten days is nearly undetectable. The average yearly utilization for the past ten years has been 6 percent. Within the Marshall Lake basin this level of utilization is not enough to affect prey habitat. This level of utilization will provide sufficient water quality, cover, nesting and forage habitat for waterfowl, fish and small mammals using this pasture.

In Alternative 3, the fencing around Prime, Fisher/Fry and Youngs lakes and Dry and Lost tanks will occur at least 0.6 miles from the nearest bald eagle roost and 2.4 miles from the nearest nest. The fencing at Babbitt Spring along with the installation of a pipeline and drinker will occur 500 feet from the nearest known roost and nearly 3 miles from the nearest nest. The construction of fencing at Babbitt Spring along with the installation of a pipeline and drinker will occur from May to September, which is outside the time when wintering bald eagles are present. The activities proposed at Babbitt Spring will not impact the roost area nor will it constitute a disturbance to wintering bald eagles since nesting eagles do not use this roost. Fencing of these wetlands and spring will improve habitat for waterbirds and small mammals, which are bald eagle prey.

Cumulative Effects of Alternative 1 and 3

The area of cumulative effects for bald eagles is I-40 on the north, I-17 on the west, the Mormon Lake and Mogollon Rim Ranger District boundary on the south and the Forest boundary on the east. There were no effects to bald eagles from the implementation of thinning projects on Anderson Mesa, which removed young pine and juniper from about 8,000 acres of semi-open acres in the Ashurst and Kinnikinick Lake area. There are no anticipated effects resulting from implementation of grazing or vegetation treatments in the proposed Deep Lake, Pickett Lake/Padre Canyon, Bar T Bar and Anderson Springs Allotment Management Plans because livestock management on these allotments will not occur with 0.25 miles of a roost or nests during any time of occupation by eagles and vegetation treatments in areas adjacent to eagle roosts at Long Lake and Soldier Annex lake would be outside the November 15 through April 15 time frame when eagles use this area (Mogollon Ranger District wildlife personnel pers. comm.).

Livestock grazing occurs on state and private lands during the winter months. Wintering habitat for eagles, however, is concentrated on the forested portions of the watersheds, which is grazed during the summer. Over the years, a variety of closures on the Forest have been implemented that improve habitat conditions for species like this one, including motorized vehicle closures at Pine Hill on Anderson Mesa and seasonal recreation restrictions such as at nearby Hay Lake, the

Pine Grove Quiet Area, and along the Verde River (USDA 2002c). Habitat treatments on Arizona State Trust Lands and private lands would gradually occur over a long period of time having little effect on eagles, based on their proximity to roosts and nests. Habitat for bald eagles forest-wide has also been improved through structural improvements (such as fencing) and restriction of grazing and recreation use over time (USDA 2002c).

There are no direct, indirect or cumulative effects to bald eagles or their habitat with the implementation of Alternative 1or 3 because grazing occurs outside the primary use period of wintering bald eagles; because there is no known nesting on the allotments; because grazing does not reduce roost trees or roost tree regeneration; because there is no disturbance to known roosts and because the installation and use of drinkers and proposed fence work will not disturb eagles or modify roosts. This is consistent with the "Framework for Streamlining Informal consultation for Livestock Grazing Activities" (USDA 2005a).

Direct, Indirect and Cumulative Effects of Alternative 2

No livestock would be present in the analysis area if this alternative was implemented, so there are no direct, indirect, or cumulative effects from livestock grazing or any connected actions. This determination is based on the following:

- no livestock grazing would occur in the analysis area; and
- no other actions are proposed that would affect nesting or roosting habitat for bald eagles.

Mexican Spotted Owl

The Mexican spotted owl was listed as a threatened species in 1993. On the Coconino National Forest, this species occupies mixed conifer and ponderosa pine-gambel oak vegetation types; usually characterized by high canopy closure, high stem density, multilayered canopies within the stand, numerous snags, and down woody material.

Coconino National Forest lies within the Upper Gila Mountain Recovery Unit. Primary threats to Mexican spotted owls within the Upper Gila Mountain Recovery Unit include catastrophic wildfire, recreation, and grazing (USDI 1995). Effects of cattle grazing on Mexican spotted owls and their habitat are described in the, "Framework for Streamlining Informal Consultation for Cattle Grazing Activities" (USDA 2005a) and relate to grazing effects on habitat structure and composition, as well as the availability and diversity of food for the owl. The "Recovery Plan for the Mexican Spotted Owl" (USDI 1995) summarizes the effects of cattle grazing on Mexican spotted owls in four broad categories: (1) altered prey availability; (2) altered susceptibility to fire; (3) degeneration of riparian plant communities; and (4) impaired ability of plant communities to develop into spotted owl habitat.

Habitat: On the Walnut Canyon Allotment MSO habitat consists of protected, restricted and critical habitats. There are no riparian trees in MSO habitat on the allotment so grazing will not impact riparian tree regeneration.

PAC Habitat:	**1,220**
Other Protected Habitat:	**160**
Target or Threshold Habitat:	**0**
Restricted Habitat:	**1,190**
Critical Habitat:	**1,118**
Total	**3,688**

The majority of protected MSO habitat on the Walnut Canyon Allotment is located on dry, steep (greater than 40 percent), rocky slopes that are largely inaccessible to cattle because of their rugged topography. The majority of this habitat has canopy cover greater than 40 percent, made up of ponderosa pine, gambel oak, and Douglas fir. This high canopy cover generally limits understory production and vigor. The level of use in this area maintains sufficient herbaceous ground cover described in the recovery plan, as well as seed head production and a species composition commensurate with the area potential.

Prior Consultation: Consultation with US Fish and Wildlife Service on the effects of ongoing grazing on the Allotment was conducted in 2002 (AESO/SE #2-21-02-I-142). There was a “may effect, not likely to adversely effect” determination for Mexican spotted owls. The effects of grazing on threatened and endangered species have been consulted on with the U.S. Fish and Wildlife Service.

Environmental Consequences

The average yearly utilization for the allotment is shown in Table 17. When the allotment was monitored in 2005, the utilization standard of 35 percent had been met and the overall allotment had good species composition and diversity [PRD 40]. Some areas immediately adjacent to water received heavier use.

Table 17. Average annual utilization in select Walnut Canyon pastures

Pasture	Average Utilization*
Cherry	10.5%
Observatory/Youngs	24.5%
Marshall	6%

* Average annual utilization calculated from the end of season utilizations between 1996-2005; only the Cherry, Observatory, Youngs and Marshall pastures were used.

Direct and Indirect Effects of Alternatives 1 and 3

Alternatives 1and 3 will be analyzed together because the factors affecting the MSO and its habitat on the allotment are the same for each alternative. Differences in the fencing of wetlands or the removal of the South Newman, Walnut and West Walnut pastures have no effect on the MSO habitat found on the Walnut Canyon Allotment because: MSO habitat is not found in these wetlands and cattle tend to avoid the MSO habitat in these areas because of the high canopy cover, steep rocky terrain and the lack of open water.

There is no human disturbance or cattle associated construction actions proposed within protected or critical habitat. With the exception of fencing and pipeline construction at Babbitt Spring no disturbance or cattle associated construction activities are proposed in restricted habitat. The fence and pipeline construction at Babbitt Spring will occur outside of the MSO breeding season of March 1 to August 31 and will not affect Mexican spotted owls. However, cattle grazing may occur within restricted, critical and protected habitat during the breeding season. About 131 acres of MSO habitat are within one-quarter mile of water where grazing tends to be higher, though only in areas where the canopy cover is less than 40 percent. Approximately 122 acres are in restricted habitat where the terrain is steep and rocky and the remaining nine acres are in areas of high canopy closure where grazing is light, normally less than 20 percent. As was found during monitoring in 2006, the amount of cattle grazing within this habitat is low.

Implementation of Alternative 1or 3 will result in sufficient residual biomass, seed head production and adequate species composition to meet the needs for MSO prey and will not affect the development or suitability of this habitat for MSO nesting. In MSO habitat on the allotment canopy cover, rocky terrain, and the lack of water appear to have a stronger influence over understory structure, abundance and vigor, then cattle grazing.

There would be a determination of “may affect, not likely to adversely affect” for Mexican spotted owls if Alternative 1 or 3 were implemented. This is based on the following rationale and in consideration of the criteria described in the Framework for “Streamlining Informal Consultation for Cattle Grazing Activities” (USDA 2005a):

A determination of “may affect, not likely to adversely affect” is appropriate if:

1. In the action area, cattle grazing or cattle management activities will occur within PACs, but no human disturbance or construction actions associated with cattle grazing will occur in PACs during the breeding season. No cattle management activities are planned during the breeding season.
2. Cattle grazing and cattle management activities within PACs in the action area, will be managed for levels that provide the woody and herbaceous vegetation necessary for cover for rodent prey species, the residual biomass that will support prescribed natural and ignited fires that would reduce the risk of catastrophic wildfire in the forest, and regeneration of riparian trees. Utilization levels are maintained at conservative levels for all action alternatives.
3. In owl foraging areas, forage utilization will be maintained at conservative levels. Utilization levels are maintained at conservative levels for all action alternatives.

A “may affect, not likely to adversely effect” finding is appropriate for Alternatives 1 and 3 because:

- there is no disturbance or construction activities within PACs during the breeding season;
- riparian regeneration is not affected because there are no riparian trees in the Walnut Canyon MSO habitat;
- species composition, residual biomass and seed head production will be sufficient to support MSO prey and to carry fire in restricted and critical habitat; and
- restricted habitat maintains sufficient herbaceous ground cover described in the recovery plan, as well as seed head production and a species composition commensurate with the area potential.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is I-40 on the north; FSR 82 and FH 3 on the east and on the south; FSR 82e, FSR 90 west to FSR 132 west to FSR 133 then southwest to FSR 700 and northwest to the west boundary of I-17.

Cumulatively, the grassland encroachment thinning on Anderson Mesa had no effect to MSO because these projects, which treated over 1,800 acres of sparse pine and juniper, did not occur in MSO habitat or result in disturbance to MSO.

Prescribed fire and thinning is proposed in restricted habitat for the Mountainaire HFRA Project. The effects determination for that project resulted in a determination of “may effect not likely to adversely effect” Mexican spotted owls.

Combined wildlife and cattle grazing in “restricted” or critical habitat has the potential for cumulatively impacting Mexican spotted owls, primarily their prey habitat. Utilization levels monitored in “restricted” habitat on nearby Deep Lake and Pickett Lake Allotments are primarily in the light range. The effects determination for those projects resulted in a determination of “may effect not likely to adversely affect” Mexican spotted owls because grazing was not physically restricted in MSO habitat. The 35 percent utilization level proposed in Alternatives 1 or 3 provides for prey species habitat.

The Elk Park Fuels Reduction project is in the planning stages, but is likely to include thinning and prescribed burning within MSO habitat. Treatments in that project will likely benefit MSO habitat development by reducing competition on important mast producing species that are important for MSO prey and by increasing the development of nesting habitat. Although, treatments may result in short-term disturbance and alter prey habitat.

Drought and insect mortality have affected habitat within the cumulative effects analysis area. The rate and extent of tree mortality in the future is not known. Mortality is expected to continue to a small degree if wet years are in the forecast because insect infestation will continue if host trees are present but adequate moisture will assist with tree resistance to attack by insects. The extent of mortality may increase if dry years are in the forecast because drought mortality will continue and drought will facilitate Insect infestation and die off. This could negatively affect nest trees or foraging habitat for owls, yet create snags, which are important habitat features for other prey species.

The Pine Grove Quiet Area (about 12,000 acres) has a late fall motorized vehicle seasonal closure which provides an area of relatively low human disturbance for part of the year, of benefit to many forest dwelling species, including MSO prey.

Direct, Indirect, and Cumulative Effects of Alternative 2

No cattle would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects on Mexican spotted owls would occur.

Black-footed Ferret

The historical range of the black-footed ferret is nearly identical to that of three prairie dog species: the black-tailed prairie dog (*Cynomys ludovicianus*), Gunnison’s prairie dog (*C. gunnisoni*), and the white-tailed prairie dog (*C. leucurus*). Gunnison’s prairie dogs are the species found on the Coconino National Forest. Ferrets occupy the burrows made by prairie dogs and utilize prairie dogs as a main food source. The black-footed ferret formerly ranged from the Great Plains of Canada to the intermountain region of the interior Rocky Mountains and the Southwest. There is a 1952 specimen from an area 7 miles northeast of Williams, Arizona; another from the Bacas Ranch, 16 miles northeast of Springerville (Hoffmeister 1986); one from Government Prairie near Parks, and another from 12 miles west of Winona (Cockrum 1960).

Prairie dog populations are cyclic and can go from huge numbers to almost no animals within a short time due to disease, weather patterns, predation, and other factors. Population numbers fluctuate yearly, with high numbers in some years and undetectable numbers in others. Bubonic plague has been a significant factor in prairie dog colonies in the Flagstaff area in recent years, and many recently active colonies have been severely impacted. Other impacts to prairie dogs

include predation by coyotes, raptors and bobcats and legal shooting. Prairie dog control is not part of grazing management on the forest. No records of black-footed ferrets exist within the analysis area and there are no known prairie dog towns or complexes meeting the Fish and Wildlife Service's criteria for black-footed ferret suitability. The criteria for black-footed ferret suitability is a white-tailed prairie dog town greater than 200 acres in size.

Prior Consultation: Consultation with U.S. Fish and Wildlife Service on the effects of ongoing grazing on the Allotment was conducted in 2002 (AESO/SE #2-21-02-I-142). There was a "may effect, not likely to adversely affect" determination for black footed ferrets. This determination was based on the "Guidance Criteria for Determining the Effects of Issuing Term Grazing Permit" (USDA 2002d), which has been replaced with "Framework for Streamlining Informal Consultation for Livestock Grazing Activities" (USDA 2005a). The effects of grazing on threatened and endangered species have been consulted on with the U.S. Fish and Wildlife Service.

Environmental Consequences

Direct, Indirect and Cumulative Effects of All Alternatives

There is a determination of "no effect" for black-footed ferrets under any alternative, because prairie dog towns of sufficient size and complexity do not occur on the allotment. Prairie dog control will not be part of the cattle management program and black-footed ferrets do not occur on the project area or forest. Because there are no direct or indirect effects, there are no cumulative effects to black-footed ferrets.

Sensitive Wildlife Species

Sensitive species are defined as "those plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution" (FSM 2670.5(19)). Forest Service policy regarding sensitive species is described in detail in the "Sensitive Plant Species" section of Chapter 3.

All species on the district's threatened, endangered and sensitive species list were considered in this analysis [PRD 35]. Of these, nine sensitive animal species are present or have potential habitat within the project area and have been evaluated (see Table 18). Listing status refers to a species' Forest Service designation as a sensitive species.

Table 18. Sensitive wildlife species on the Walnut Canyon Allotment

Species Name	Scientific Name	Listing Status
Birds		
American peregrine falcon	*Falco peregrinus anatum*	SEN
Northern goshawk	*Accipiter gentilis*	SEN
Amphibians		
Northern leopard frog	*Rana pipiens*	SEN
Insects		
Spotted skipperling	*Piruna polingii*	SEN
Freeman's agave borer	*Agathymus baueri freemani*	SEN
Aryxna giant skipper	*Agathymus aryxna*	SEN
Early elfin	*Incisalia fotis*	SEN
Mountain silverspot butterfly	*Speyeria nokomis nitocris*	SEN
Blue-black silverspot butterfly	*Speyeria nokomis nokomis*	SEN

American Peregrine Falcon

The peregrine falcon was removed from the Federal List of Endangered and Threatened Wildlife in August 1999 (USDI 1999) and is now a Forest Service sensitive species. Essential habitat for the peregrine falcon includes rock cliffs for nesting and a large foraging area. Suitable nesting sites occur on rock cliffs with a mean height of 200 to 300 feet. The subspecies *anatum* breeds on isolated cliffs and is a permanent resident on the Coconino National Forest. Peregrines prey mainly on birds found in wetlands, riparian areas and meadows within a 10- to 20-mile radius from the nest site. The peregrine breeding season is March 1 to August 31.

The main threat to peregrine falcon is the continued contamination of its environment by synthetic organochlorine contaminants, especially DDT. These contaminants result in eggshell thinning and direct mortality to this species. Other threats include disturbance from rock climbing near eyries and mortality from power lines.

The nearest known eyrie is located approximately 400 feet from the allotment boundary in the Walnut pasture. The next closest eyrie is on the Walnut Canyon National Monument and is approximately one-third mile from the allotment boundary in the Cherry pasture. No eyries are known to occur on the allotment. There is potential for eyries on the allotment along the Walnut Canyon.

The ephemeral waters on the analysis area provide foraging habitat for nearby peregrine falcons. Productivity, distribution and size of wetlands are profoundly affected by the amount and timing of precipitation, influencing whether the basins have water or not; how long they hold water within and between years; and consequently the type of vegetation and wildlife species that can be supported and when. From a water bird standpoint, and by definition, semipermanent and seasonal wetlands have higher values, followed by seasonal, temporary and stock tank wetlands. Closed basins, such as stock tanks, function similarly to uplands in dry years, and have some wetland values in wet years, though for a short period of time. There are 50 stock tanks on the allotment. Marshall, Prime, Fisher/Fry, and Youngs lakes, as well as Lost and Dry tanks are the seasonal or semipermanent wetlands on the allotment. Vail Lake is currently excluded from cattle grazing by fencing.

Environmental Consequences

Within the allotment peregrine falcons may use the seasonal or semipermanent wetlands or stock tanks as foraging areas. Vail Lake, a semipermanent wetland, is currently excluded from cattle grazing by fencing. There are approximately 50 stock tanks within the allotment. Typically songbirds concentrate around water and waterfowl may occasionally use the stock tanks during migration, these areas provide opportunities for foraging peregrines. There are no impacts to eyries or disturbance to nesting peregrines under any of the alternatives, because nesting does not occur on the allotment. Cattle grazing and related actions do not occur near eyries in any alternative as the Walnut pasture is not fenced and has not been used in the last ten years, nor are there any plans to use this pasture in the future.

Direct and Indirect Effects of Alternative 1

Grazing in seasonal or semipermanent wetlands would be postponed until after the waterfowl nesting season of July 15 in order to reduce disturbance to nesting waterfowl. Reduced disturbance to nesting waterfowl should result in greater hunting opportunities for peregrine falcons during the waterfowl nesting season. Cattle would be allowed to graze in seasonal or semipermanent wetlands after July 15. Utilization within ¼ mile of water is normally high and important avian cover could be removed potentially reducing the number of prey using the wetland. Cattle use overlaps with fall bird migration, which in good water years could reduce vegetation production in wetlands used by migratory waterbirds. Growth potential of wetland vegetation and residual vegetation would be reduced by fall grazing and result in a reduced amount of cover for breeding waterfowl in the spring.

Cumulative Effects of Alternative 1

The cumulative effects boundary for this species is the boundary of Township 22 and 23 on the north, the forest boundary on the east, the Fourth Standard Parallel North on the south and I-17 and Hwy 180 on the west.

The effects of proposed grazing from these alternatives are additive to cattle and wildlife grazing in the wetlands on adjacent allotments. Wetland productivity as it relates to peregrine prey is strongly influenced by precipitation. High water bird numbers have been observed on Anderson Mesa historically, concurrent with wildlife and cattle grazing (Mormon Lake Ranger District records). Seasonal and semipermanent wetlands on the Pickett Lake, Anderson Springs and Bar T Bar Allotments will be protected from cattle grazing at a minimum during the waterfowl nesting season, which ends on July 15. This level of protection will benefit waterfowl habitat and may increase the number of avian species using these wetlands, particularly during years with normal to high precipitation.

Over the years, a variety of closures on the forest have been implemented to improve habitat conditions for a variety of species. Closures on Anderson Mesa include motorized vehicle closures at Pine Hill and seasonal recreation restrictions such as those at nearby Hay Lake (USDA 2002a). Habitat quality for peregrines forest-wide has improved over time through improvements such as fencing and restrictions and reductions on wetland grazing (e.g. Marshall Lake, Ashurst Spring, Vail Lake and Horse Lake) and recreation use over time (USDA 2002c). Road closures and trail management in the vicinity of Walnut Canyon has reduced disturbance to peregrines. The recent expansion of Walnut Canyon National Monument, with the resulting reduced human access to the rim of the canyon, has also improved conditions for peregrines by reducing disturbance.

Considering direct, indirect and cumulative effects, the determination of effect is ‘‘may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” due to the potential affects to prey habitat by grazing.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle grazing or other actions are proposed in the analysis area, so no direct, indirect, or cumulative effects would occur. There is a determination of “no effect”.

Direct and Indirect Effects of Alternative 3

The scope and magnitude of impacts are similar with the implementation of Alternative 1 with the exception of the following:

- East and West Cherry pastures would be combined and grazed for up to 48 days straight. With the exception of the northeast corner of this pasture, the topography is dry, steep and broken. Because cattle concentrate their use around water, utilization is expected to be high adjacent to the stock tanks in the northeast corner of this pasture. High utilization in this area is likely to affect peregrine prey habitat by reducing the amount of cover and forage available to songbirds in the area.
- for Alternative 3, cattle grazing in Prime, Fisher/Fry and Youngs lakes as well as Dry and Lost tanks will be excluded from cattle grazing. This will benefit peregrine prey habitat by providing residual cover and additional forage; and
- the Walnut, West Walnut and South Newman pastures will be permanently removed from grazing. This will eliminate any potential for future nesting disturbance related to cattle grazing in the Walnut pasture.

Cumulative Effects of Alternative 3

Cumulative effects are the same as those described for Alternative 1. Considering direct, indirect and cumulative effects, the determination of effect is “may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” due to the potential affects to prey habitat by grazing. Cattle exclusion from the wetlands may benefit peregrine prey.

Northern Goshawk

The goshawk is a forest habitat generalist that uses a wide variety of forest stages in ponderosa pine and mixed conifer habitat. The goshawk preys on large to medium sized birds and mammals. It prefers stands of intermediate canopy cover for nesting and more open areas for foraging. All ponderosa pine and mixed conifer above the rim is considered goshawk habitat, including associated pine or mixed conifer stringers that may extend below the rim. Nest stands are typically in later successional stages, especially old growth. Post-fledging family areas (PFA) typically have patches of dense trees, developed herbaceous or shrubby understories, snags, downed logs, and small openings, which provide cover and prey for fledglings to develop their hunting skills. Foraging areas are a mosaic of various successional stages and cover types.

Goshawk foraging is normally associated with ponderosa pine vegetation. Although juniper or pinyon-juniper habitat types are not heavily used by northern goshawks, some foraging may occur there, especially in transition areas between ponderosa pine and pinyon-juniper habitats.

There are six PFAs within the allotment, three of which are within the Walnut and South Newman pastures. The last known nests were visited in 2005 and 2006. Successful nesting was last confirmed in 1993; 1996, 1993, 1993, 1996; and 2005.

Threats to northern goshawks are generally related to timber management. However, fire suppression, catastrophic fire, cattle grazing, drought, and toxic chemicals may also pose a threat. Declines may be related to decreases in prey populations associated with changes in structure and composition of forests.

Environmental Consequences

Cattle grazing has the potential to modify the understory through height reduction and selection of forage species, thereby affecting seed head production and encouraging growth in years with good precipitation. Cattle grazing can modify food and cover for some prey species that nest or feed in these areas. Habitat for deer mice may be improved while cover for voles or ground nesting birds may be reduced by cattle grazing. Other prey species, such as squirrels, are less affected since their habitat requirements are more closely tied to the pine overstory, which would not be affected in any alternative. Within the analysis area, goshawk habitat is most associated with the pine type on the northwestern portion of the allotment.

Direct and Indirect Effects of Alternatives 1 and 3

Cattle grazing is expected to occur at levels that maintain prey species habitat (35 percent). In the pine type, range monitoring shows there is a static to upward trend and satisfactory rangeland condition [PRD 40]. Grazing at these levels would not significantly reduce herbaceous ground cover, thus providing for prey species.

Grazing use by cattle and wildlife tends to be higher within one-quarter mile of water zone than outside, particularly in areas where the canopy cover is less than 40 percent. The fencing of wetlands and Babbitt springs in Alternative 3 will provide additional wetland and an upland buffer that will be excluded from this higher level of use, which will benefit potential prey using these wetlands. Wildlife and cattle grazing in higher canopy cover areas tended to be light. Range crews determined that there was an average yearly utilization of about 14 percent for the allotment over the last ten years, which should not adversely affect prey species habitat.

Human disturbance associated with cattle operations, such as wetland fence construction, will occur over 0.4 miles at its closest point from the PFA and will not result in disturbance to nesting goshawks due to the topography of the area. Infrastructure maintenance will not occur in any PFA during the goshawk breeding season, March 1-September 30.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is I-40 on the north; the forest boundary on the east; FSR 125, FH 3, FSR 90, and FSR 240 on the south; and FSR 700, FSR 253 and I-17 on the west.

Cumulative effects include cattle and wildlife grazing on adjacent allotments, drought and insect mortality, and the effects of the Pine Grove seasonal motorized vehicle closure. There is over 50,000 acres of pine type on adjacent grazing allotments within the cumulative effects area. Grazing on these allotments is anticipated to result in determinations of “may impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability” due to modification of prey habitat by grazing. Cattle and wildlife browsing and grazing through the allotments reduce seed heads and cover for prey species. Limits on cumulative utilization of forage by cattle and wildlife will maintain adequate food and cover for prey species.

Ponderosa pine mortality associated with drought and insects has occurred in goshawk habitat within and adjacent to the analysis area, according to Forest Service aerial detection surveys conducted in August of 2002. This die off is expected to continue as long as insect host trees are

present. The scope of mortality may increase as the drought continues. This could negatively affect nest trees and foraging habitat for northern goshawks, although newly created snags are an important habitat features for many prey species. Currently the scope and magnitude of this effect is small.

The Pine Grove Quiet Area (about 12,000 acres) is located within the Railroad pasture of the Pickett Lake Allotment and has a late fall motorized vehicle seasonal closure which provides an area of relatively low human disturbance of benefit to many forest dwelling species, including goshawks and their prey. As the Flagstaff community continues to grow, more users are expected to recreate within the cumulative effects area, which may result in additional disturbance.

Forest thinning and prescribed fires are planned for the Mountainaire, East Side and Elk Park projects. Mitigation measures for these projects include breeding season restrictions on thinning and burning activities to avoid disturbing goshawks. Additionally, Goshawk Guidelines will be followed. These projects may result in short-term negative effects to prey, but are ultimately expected to be beneficial to goshawk. There is a determination of “may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” for the Mountainaire project; and the analysis for East Side and Elk Park has not been completed.

Considering direct, indirect and cumulative effects, the determination of effect is ‘‘may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” due to the potential affects to prey habitat by grazing within the allotments of the cumulative effects boundary.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or cattle associated activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects on northern goshawks would occur. There is a determination of “no effect”.

Northern Leopard Frog

The northern leopard frog occurs in the northeastern quarter of Arizona, usually in montane streams and wetlands that have aquatic vegetation but also in wet meadows at higher elevations. This leopard frog is generally restricted to permanent waters. There are no known existing locations of this species within or in the vicinity of the Walnut Canyon allotment [PRD 53]. Historic locations include Ashurst Lake (largely excluded from grazing). Ashurst Lake has a sizeable crayfish population, predatory fish, a campground on the west end, and a road nearly all the way around it. It is popular for fishing and boating and has little emergent vegetation. The best potential habitat is at Marshall, Vail and Prime Lakes.

Threats to local populations of northern leopard frogs include changes in wetlands, especially the alteration of marshy ponds to reservoirs and natural local extinctions as ponds dry up during years of low precipitation. Other threats include stocking of predatory fish, alteration of riparian vegetation by crayfish and cattle grazing, and predation and competition by introduced bullfrogs and crayfish.

Environmental Consequences

Due to its diverse vegetative structure and size, Marshall Lake is considered good leopard frog habitat even though the lake is stocked with predatory fish and limited cattle grazing is permitted. Marshall Lake is currently being considered as a potential site for northern leopard frog introductions and if successful could support a sizable population of leopard frogs.

Direct and Indirect Effects of Alternative 1

Alternative 1 does not propose to exclude cattle grazing in seasonal or semipermanent wetlands, which are leopard frog habitat. Wildlife impacts are additive to that of cattle at these sites, and include: reduced height of vegetation in wetlands, isolated soil compaction and possible shifts in wetland species composition. These impacts reduce habitat quality for frogs making them more vulnerable to predation and by reducing habitat structure suitable for laying egg masses and for cover.

Cumulative Effects of Alternative 1

The cumulative effects area is the seasonal and semipermanent wetlands and springs within the Walnut, Deep Lake and Pickett Lake Allotments.

Crayfish and predatory fish populations are high at Ashurst Lake and Lower Lake Mary and are not expected to change. Crayfish are frog predators and limit the vegetation growth that frogs use for breeding and cover. Crayfish control or eradication is not expected to occur within the cumulative effects area over the next 10 years. Consequently, frog habitat at these locations is expected to remain poor.

Cattle grazing within the cumulative effects area is largely limited within the seasonal and semipermanent wetlands and springs. Frog habitat conditions are expected to improve in wetlands where cattle grazing has been eliminated, because breeding and hiding cover and prey habitat are expected to improve.

The effects of wildlife grazing include reduced vegetation height, isolated soil compaction, and potential shifts in wetland species composition. These effects would continue to occur as wildlife continue to access these sites, although to a smaller degree as cattle would be excluded from these areas.

Considering direct, indirect and cumulative effects, the determination of effect is “may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” due to the potential affects to habitat by grazing.

Direct, Indirect, and Cumulative Effects of Alternative 2

No cattle would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects on northern leopard frogs would occur. There is a determination of “no effect”.

Direct, Indirect, and Cumulative Effects of Alternative 3

This alternative is only slightly different from Alternative 1. Alternative 3 would exclude cattle grazing on the wetlands at Prime, Fisher/Fry, and Youngs lakes and Lost and Dry tanks and Babbitt Springs which are potential frog habitat. All other direct, indirect and cumulative effects are the same as Alternative 1.

Mountain Silverspot Butterfly, Blue-black Silverspot Butterfly, and Spotted Skipperling

Scattered populations of these species occur throughout the southwest in wet meadows, grassy springs in mountainous woody areas, seeps, or riparian canyons. Habitat is the upper Sonoran to Canadian zone (Scott 1986). Violets are larval host plants for the silverspot butterflies however the blue black silverspot is more associated with desert landscapes. The spotted skipperling, in southeast Arizona, has been known to take nectar avidly along cool, deep canyons and along

forested road margins. *Dactylis glomerata* (Poaceae) is a strongly suspected food plant. There is a single rainy season brood. It is known to occur along the Mogollon Rim (Bailowitz and Brock 1991). These three species were added to the Regional Forester's Sensitive Species list in 1999. None have been documented on the allotment. Egg and larval timeframes for these species are not known.

The habitat of the spotted skipperling consists of moist meadows and stream sides in low to mid elevation mountains (Opler and Wright 1999; Pyle 1981; Wallesz 1999). This butterfly species has not been documented on the allotment. Orchard grass is a strongly suspected food plant, but is not known to occur on the allotment. According to the NatureServe web site (www.natureserve.org), the global range is, "[l]imited areas in Arizona, New Mexico, and south to Guerrero, Mexico, including in Arizona the Huachuca and Chiricahua Mountains and Mogollon Rim. Probably more colonies in southeast Arizona than elsewhere (Opler 1999)."

The best potential habitat for the mountain silverspots and spotted skipperling are Babbitt Spring, Marshall, Prime, Vail, and Fisher/Fry lakes and Dry and Lost tanks, as well as Walnut Canyon. Although little information is available concerning the specific threats to these species, habitat alteration and loss of riparian habitat are the primary concerns.

Environmental Consequences

Direct and Indirect Effects of Alternative 1

Effects on this species resulting from cattle grazing include loss or reduction of larval host plants resulting from trampling and foraging at seasonal and semi-permanent wetlands and springs. Butterfly eggs or larvae could be trampled or accidentally consumed. This would be a concern when cattle use overlaps egg or larval timeframes.

Alternative 1 does not propose wetland fencing. Cattle grazing may impact butterfly habitat at Babbitt Spring, Marshall, Prime, and Fisher/Fry lakes and Dry and Lost tanks, as well as Walnut Canyon. With the implementation of Alternative 1, these areas will continue to be grazed by cattle resulting in impacts to potential habitat. These impacts include: reduced height to vegetation in wet meadow and spring vegetation, soil compaction and possible shifts in understory species composition. These impacts to vegetation may reduce habitat quality and may result some loss of larvae or eggs as described previously. The effects of cattle grazing on habitat in Walnut Canyon is largely mitigated by the steep, rocky canyon walls that prevent cattle use in the canyon.

Cumulative Effects of Alternative 1

The cumulative effects area for this species is the springs and wetlands within the Pickett Lake, Deep Lake and Walnut Allotments.

Impacts from recreational uses could occur and could result in trampling of host plants, eggs or larvae and compacting soils. Visitation to all of the spring sites by recreationists is low and is expected to remain low in the foreseeable future due to poor road conditions.

Based on the possibility for direct, indirect and cumulative effects, the determination of effect for the Pickett Lake Allotment was "may impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability" due to continued grazing in the potential habitat at Boot and Billy Back Springs.

Potential impacts from cattle have been reduced on adjacent allotments because the majority of seasonal and semiperminant wetlands have been fenced to exclude cattle grazing or are deferred

from cattle grazing until after July 15. Wildlife use is additive to that of livestock. Although effects on the species resulting from wildlife grazing including loss or reduction of larval host plants resulting from trampling and foraging would continue, as wildlife would continue to access these sites, although to a smaller degree as the cumulative impact from cattle would be excluded.

Based on the possibility for direct, indirect and cumulative effects, the determination of effect is 'may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability' for Alternative 1 due to continued grazing in the potential habitat at Babbitt Spring, Marshall, Prime, and Fisher/Fry lakes and Dry and Lost tanks, as well as Walnut Canyon.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. The determination of effect is ''no effect".

Direct, Indirect, and Cumulative Effects of Alternative 3

This alternative is only slightly different than Alternative 1. This alternative proposes cattle exclosures on the seasonal and semipermanent wetlands at Babbitt Spring, Prime, and Fisher/Fry lakes and Dry and Lost tanks that would eliminate the effects of cattle grazing within the exclosures. All other direct, indirect and cumulative effects are the same as Alternative 1.

Considering direct, indirect and cumulative effects, the determination of effect is ''may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability" due to the potential affects to habitat at Marshall Lake and by grazing in the lanes of wetlands.

Freeman's Agave Borer and Aryxna Giant Skipper

The Freeman's agave borer and Aryxna giant skipper are Forest Service sensitive species that were added to the 1999 Regional Forester's Sensitive Species list. The Freeman's agave borer requires agaves, especially *Agave chrysantha*, as host plants. They are far ranging with wide habitat use. They generally inhabit canyons. Adults fly from September through November (Pyle 1981).

The Aryxna giant skipper is found within arid, but well-vegetated desert canyons (Pyle 1981) or in canyons with periodic water and open grassy woodlands. Its host plant is agave. Based on TES units, the amount of agave on this allotment is small (USDA 1995).

Little information is known about threats to these species, but effects to agaves are the main concern. Threats to agave plants include collection as ornamentals and cattle grazing where agaves are abundant.

Environmental Consequences

Agave is not abundant on the allotment, but can be found scattered along the rim of Anderson Mesa and the steep talus slopes of Walnut Canyon.

Direct, Indirect, and Cumulative Effects of All Alternatives

There would be no direct, indirect or cumulative effects for these species due to the minimal amount of habitat present. Hot, rocky slopes that could support agaves are unlikely to support sufficient vegetation to attract or concentrate ungulates, particularly cattle. There are no stock tanks proposed and the additional fence work is expected to avoid agave patches. On Anderson Mesa and Walnut Canyon, poor access limits the collection of agave stalks for ornamentals

compared to other areas on the forest. Considering direct, indirect and cumulative effects, the determination of effect is ‘‘no effect”.

Early Elfin

This invertebrate favors roadsides with flowers (Borror and White 1970) and dry areas in mountains. The larva feed on cliffrose (*Cowania* [*Purshia] mexicana [ssp stansburniana]*). It is locally uncommon among arid plateaus and desert mountains from 6,000 to 7,000 feet (Ferris and Brown 1981). They have a single brood with adults present from March through April (ibid.).

Threats to the early elfin are unknown, but impacts on their larval host plant, cliffrose, are the main concern. Early elfins are not known from the allotment; the closest known location to the allotment is over 114 miles away (Bender et al. 2005). However, cliffrose is located on the allotment along and below the Anderson Mesa and Walnut Canyon rims. Browse conditions vary but use is generally moderate to high by both cattle and wildlife. Cliffrose is an important food item on big game winter range.

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

The scope and magnitude of the effect to early elfin is difficult to describe because of the lack of information regarding early elfin larvae and the different age classes and plant parts of cliffrose they prefer. However, grazing use of cliffrose would be higher within one-quarter mile of water and in flatter topography in all action alternatives. Cattle will have access to cliffrose during the season of use described for each alternative.

In Alternative 3, East and West Cherry pastures would be combined and grazed for up to 48 days straight. With the exception of the northeast corner of this pasture, the topography is dry, steep and broken, with cliff rose scattered throughout. Because cattle concentrate their use around water, utilization is expected to be high adjacent to the stock tanks in the northeast corner of this pasture. High utilization in this area is likely to affect localized cliff rose reproduction and its availability to early elfin for breeding. Cliffrose even though browsed, are likely to persist sufficiently across the allotment to permit reproduction of early elfin.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is the Deep Lake, Pickett Lake, Padre Canyon and Walnut Allotments.

Cumulative effects on early elfin include cattle grazing on adjacent allotments; grazing by wildlife; vegetation treatments on adjacent allotments and private lands; and prescribed and natural fires. Cumulative effects from cattle grazing on adjacent allotments and grazing by wildlife include some localized trampling and consumption of host plants, varying by topography and distance to water. Depending on the location of plants, time of year and the type of grazer present, utilization of browse species including cliffrose can be light or heavy. This could range from little impact to cliffrose to stunted plants with reduced vigor and size, and have either little impact to host plants or reduced availability for early elfin, though throughout the cumulative effects area, sufficient cliffrose will persist to permit reproduction of early elfin.

Vegetation treatments on adjacent allotments, as well as on State and private lands may cumulatively impact early elfin by increasing production of cliffrose in some areas. This could occur by opening up tree canopies which give existing cliffrose plants and seeds a chance to

grow, or by increasing production of other sources of forage and reducing competition for forage by elk and cattle. Cliffrose is not targeted for removal in these vegetation treatments.

Prescribed and natural fires may cumulatively affect this species in both positive and negative ways. Positive effects can occur as a result of low intensity fires “releasing” cliffrose in some areas. Negative effects can occur when higher intensity fires kill individual plants or damage them, allowing insect outbreaks and increasing susceptibility to poor weather conditions. Direct effects to eggs could also occur as a result of fire. If eggs are present during a fire, it is likely that they will be lost if fire gets into the branches and leaves where the eggs are laid.

On the Padre Canyon and Deep Lake allotment there were two recent fires that have created approximately 20,000 acres of opening in the pinyon-juniper woodland and, to a lesser extent, in the ponderosa pine stringers found in Padre, Mormon, Yellow Jacket and Elliott Canyons. In June 2003, the Mormon fire burned approximately 2,516 acres, and during June and July 2004 the Jacket fire burned approximately 17,000 acres. On the Padre Canyon Allotment, the Jacket fire burned into the previous Mormon fire area in July 2004 creating large continuous openings interspersed with islands of unburned pinyon and juniper, which connects with the Lizard fire on the Angell Allotment that burned approximately 5,100 acres in June 2003. In total, approximately 25,000 acres of pinyon-juniper woodland and pine stringers were burned on the Padre Canyon and Angell Allotments in 2003 and 2004. Drought and the associated pinyon mortality have contributed to the intensity and severity of these fires. As a result of these fires, cliffrose germination is expected to increase, in the long-term benefiting early elfin. In the short-term much of the pre-existing cliffrose was likely destroyed.

A determination of “may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” would be made if any action alternatives were implemented because cattle grazing will occur within potential habitat and cattle will graze on cliffrose.

Direct, Indirect and Cumulative Effects of Alternative 2 (No Grazing)

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur. There is a determination of “no effect”.

Management Indicator Species

Management guidance for management indicator species (MIS), other wildlife and fish resources, and diversity of plant and animal populations, is found in several key documents. The 1982 National Forest Management Act Regulations (planning regulations) at 36 CFR 219 set forth a process for developing, adopting, and revising land and resource management plans for the National Forest System (36 CFR 219.1) and identifies requirements for integrating fish and wildlife resources in forest land management plans (36 CFR 219.13).

On January 5, 2005 the Department of Agriculture issued a draft rule to remove the 2000 planning regulations at 36 CFR 219 (a) in their entirety, 70 Fed. Reg. 1023. Clarification for the forests’ MIS obligations is found at 36 CFR at 219.14 (f). For forests, like the Coconino, that developed their forest plan under the 1982 NFMA regulations, the responsible official may comply with any obligations relating to MIS by considering data and analysis relating to habitat unless the forest plan specifically requires population monitoring or population surveys. On the Coconino, population data is required for elk, mule deer, pronghorn and turkey. The appropriate scale for MIS monitoring is the area covered by the forest plan, 36 CFR 219.14 (f). The new planning regulations are intended to provide flexibility for MIS monitoring, which will allow for monitoring of habitat conditions as a surrogate for population trend data. In 36 CFR 219.14, it

clarifies that MIS monitoring is appropriate at the times and places appropriate to the specific species and is not required within individual project or activity areas (70 Fed. Reg. 1021-1091).

A working draft forest-wide assessment entitled “Management Indicator Species Status Report for the Coconino National Forest” (USDA 2002c) summarizes current knowledge of population and habitat trends for management indicator species on the Coconino National Forest. Table 19 displays MIS by management area and Table 20 lists the habitat feature the MIS were chosen to represent and the monitoring requirements on the Coconino National Forest (USDA 2002c).

Lincoln’s sparrow, Lucy’s warblers, yellow-breasted chats and macroinvertebrates are excluded from this analysis. Lincoln’s sparrow is a management indicator species for high elevation riparian scrub habitat, a very small portion of this habitat is found in Walnut Canyon but is not accessible to cattle grazing and is therefore excluded from this analysis. There is no low elevation late-seral riparian habitat within the project area for which Lucy’s warblers and yellow-breasted chats are management indicator species. Macroinvertebrates are considered indicators of high and low elevation riparian areas. The riparian areas targeted for monitoring in the Forest Plan are perennial streams. There are no perennial streams within or adjacent to the project area and, therefore, macroinvertebrates are also excluded from this analysis.

Mexican spotted owls and red squirrels are indicators of late-seral mixed conifer and spruce-fir habitats. There is no spruce-fir habitat on the allotment. There is some late-seral mixed conifer on the north facing slopes of Walnut Canyon, but this habitat is not used by cattle due to its steep rugged topography. This area is characterized by rocky bluffs and slopes greater than 40 percent. The late-seral habitats in this area consist of high canopy covers that restrict herbaceous growth. The steep rugged topography combined with the lack of desirable forage prevents cattle grazing in the late-seral mixed conifer habitat on the allotment. Therefore, Mexican spotted owls and red squirrels will not be analyzed here.

The MIS status of northern goshawk is independent of its sensitive species status. Therefore, potential impacts to habitat and trend for northern goshawk is also included in this section.

Table 19. Management indicator species by management area

Management Area (MA)	Management Indicator Species
MA-3: Ponderosa pine and mixed conifer, less than 40 percent slopes	abert squirrel, elk, northern goshawk, pygmy nuthatch, turkey, and hairy woodpecker
MA-4: Ponderosa Pine on greater than 40% slope	turkey, goshawk, pygmy nuthatch, elk, abert squirrel, red squirrel, hairy woodpecker, Mexican spotted owl
MA-6: Unsuitable Timber Land	elk, abert squirrel, mule deer, hairy woodpecker
MA-7: Pinyon-juniper woodland, less than 40 percent slopes	plain (juniper) titmouse, mule deer, and elk
MA-8: Pinyon Juniper on greater than 40% slope	plain (juniper) titmouse, mule deer, and elk
MA-9: Mountain Grassland	pronghorn antelope and elk
MA-10: Grassland and sparse pinyon-juniper above the rim	pronghorn antelope
MA-12: Riparian and open water	cinnamon teal

Table 20. Coconino National Forest MIS, habitat they represent, and monitoring requirement

Species	Habitat	Monitoring Requirement*
Abert squirrel	Early-seral ponderosa pine	Habitat
Northern goshawk	Late-seral ponderosa pine	Habitat
Pygmy nuthatch	Late-seral ponderosa pine	Habitat
Turkey	Late-seral ponderosa pine	Population
Elk	Early-seral ponderosa pine, mixed conifer, and spruce-fir	Population
Hairy woodpecker	Snag component of ponderosa pine, mixed conifer, and spruce-fir	Habitat
Mule deer	Early-seral aspen and pinyon-juniper	Population
Juniper (plain) titmouse	Late-seral and snag component of pinyon-juniper	Habitat
Pronghorn antelope	Early- and late-seral grasslands	Population
Cinnamon teal	Wetlands/aquatic	Habitat

*Coconino National Forest Plan, Table 14, pp. 211-214

Turkey

Population: Turkey is an indicator of late-seral stage ponderosa pine forests, based on roost habitat requirements. Turkey populations on the Coconino National Forest declined in the early 1990s and have increased since the mid-1990s in probable response to favorable overwintering conditions, changes in hunt design in Game Management Unit (GMU) 7 and contributions to overall mast production from trees from the 1919 seed year. The age class distribution of ponderosa pine has remained the same during Forest Plan implementation. Late-seral stage trees have remained largely unchanged on slopes greater than 40 percent. The loss of some large old trees occurred on slopes less than 40 percent during the early stages of Forest Plan implementation. The rate of loss is now reduced (USDA 2002c).

Forest-wide population estimates of turkey were made in the 1980s and ranged from around 3,150 to 4,380; populations were thought to be decreasing in the early 1980s, and stable or increasing by 1990 (USDA 1982 and 1987). However, by the early 1990s, the turkey population was dropping. Consequently, standard survey procedures used by AGFD did not provide good data because of the low number of observations along survey routes. After a review of survey data and management practices, the department concluded that a new index was needed (R. Miller, pers. comm. with C. Overby). In the mid-1990s, AGFD began to utilize information, such as the number of hunters seeing turkeys and the number of turkeys observed per day, gleaned from archery elk questionnaires as a more reliable index of turkey numbers. Data are available that show percentage of hunters seeing turkeys and the number of turkeys observed per day between 1997 and 2001 for GMUs 5A, 5B, 6A, 6B and 7. Game Management Unit 7 shows a relatively stable trend, with all others showing a general increasing trend for both percent of archery elk hunters seeing turkeys, and number of turkeys seen per day.

Habitat: The allotment contains summer and winter range, in woodland and ponderosa pine habitats. Roosts could be found throughout the allotment particularly on the upper third of east facing slopes. Other key habitat attributes within the allotment include: mast from ponderosa pine, pinyon pine, juniper and oak; small openings for seed head and invertebrate production; and cover, water and forage availability.

Environmental Consequences

Turkey is a management indicator of late-seral ponderosa pine. Ungulate grazing can decrease seed and forage availability for turkeys in small meadows and remove hiding cover for nests and poults but does not affect roost trees, roost tree recruitment, or mast production.

Direct and Indirect Effects of Alternatives 1 and 3

Roosts: Roost tree maintenance, recruitment and mast producing trees are not affected by grazing or related activities because cattle do not graze the overstory, and improvements will not modify roost, or recruitment of large pines and snags.

Grazing: In late-seral ponderosa pine habitat the understory is typically herbaceous. Grazing during the nesting season (April 15-June 30) will remove hiding cover for poults and facilitate predation on nests where understory vegetation is providing concealing cover. Grazing on mast producing species such as oak may reduce the amount of forage available to turkey; this would be less pronounced on steep slopes that receive little cattle use.

Areas within one-quarter mile of water within late-seral ponderosa pine habitat will receive higher use by both cattle and wildlife in all grazing alternatives. Higher use means lower structure height and reduced availability of seed heads of forage species, when cattle or elk are in the area. Overall, seed head production and vegetation height will vary with the schedule of opening or closing of waterlots and precipitation. Implementation of these alternatives will not result in effects that change the population trend on the forest or seral stage that turkeys were chosen to represent.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is the Walnut, Lake Mary, Deep Lake and Pickett Lake Allotments. Cumulative effects on turkey include fire, drought and insect mortality, cattle and wildlife grazing, and habitat treatments.

On nearby Pickett Lake Allotment, some proposed vegetation treatments in the pinyon-juniper will be beneficial, if implemented, because forage and seed production is expected to increase in treated stands. Creation of large openings will not be beneficial due to lack of interspersion of cover with openings. This will be mitigated somewhat because pine stringers will not be treated. Also, some cover will be left to provide movement corridors between summer and winter range and to provide shelter in more open areas created by the vegetation treatments. The fence improvements proposed for Pickett Lake Allotment along Anderson Mesa Rim will reduce cattle use in Boot Spring and Billy Back Spring, improving turkey habitat. Springs can be particularly important for turkeys due to the presence of water and diverse forage species.

Prescribed burning will have a 2 to 3 year benefit to turkeys by improving the nutritional value of herbaceous species and increasing vigor on plants and forbs that produce forage and seeds used by turkeys. Oaks, alligator juniper and large pine will not be cut, maintaining the mast producing size classes and species.

Drought and insect mortality within and outside the analysis area constitutes the biggest concern for turkey habitat. Pinyon and ponderosa pine trees have been affected the most, resulting in loss of mast producing species in turkey summer and winter range and a potential loss of roost trees. The rate and extent of tree mortality in the future is not known. Tree mortality is expected to continue at a smaller scale if wet years are in the forecast because insect infestation will continue if host trees are present, but adequate moisture will assist with tree resistance to attack by insects. The extent of mortality may increase if dry years are in the forecast because drought mortality will continue and drought will facilitate insect infestation and die off.

Direct, Indirect and Cumulative Effects of Alternative 2

No cattle or allotment management activities would be present in the analysis area if this alternative was implemented, so no direct, indirect, or cumulative effects would occur.

Northern Goshawk

This species is an indicator of late-seral stages of ponderosa pine forests. An analysis of effects to this species was described earlier under the “Sensitive Wildlife Species” section of this chapter. However, the MIS status of northern goshawks is independent of its sensitive status. Therefore, impacts to potential habitat and population trends for northern goshawk are described here.

Population: Although the forest has some information on territory occupancy and reproduction, the collection of this information was not designed to detect changes in population trend. The total number of territories has increased and statewide breeding bird survey data indicates a considerable increase, but some indicators of occupancy and productivity appear to be declining on the forest. Year-to-year variability is high. At this time, the population status is considered to be inconclusive on the forest. Monitoring and surveys are ongoing and implementation of Forest Plan standards and guidelines should contribute to improving trends in habitat (USDA 2002c).

Habitat: The age class distribution of ponderosa pine has remained the same during Forest Plan implementation. Late-seral stage trees have remained largely unchanged on slopes greater than 40 percent. The loss of large old trees occurred on slopes less than 40 percent during the early stages of Forest Plan implementation. The rate of loss is now reduced (USDA 2002c).

Environmental Consequences

Direct, Indirect, and Cumulative Effects of All Alternatives

The cumulative effects area for this species is I-40 on the north; the forest boundary on the east; FSR 125, FH 3, FSR 90, and FSR 219 on the south; and FSR 700, FSR 91, FSR 240, FSR 132a and FSR 132d on the west.

Late-seral ponderosa pine and mixed conifer habitat would not be modified by implementation of any of the alternatives. Mature stands of ponderosa pine are not impacted by cattle grazing. Therefore, there are no direct, indirect or cumulative effects as a result of this project. Cattle management in the project and cumulative effects area is not expected to impact habitat or population trends for northern goshawks.

Elk

Elk are indicators of early-seral ponderosa pine, mixed conifer and spruce fir. The elk of today are descendents of Rocky Mountain elk transplanted in 1913. By 1928, 217 head had been released into several remote woodland areas of Arizona. These elk rapidly expanded their numbers and their range, and in 1935 the first hunting season was instituted. The hunting that had extirpated Merriam’s elk also took a toll on predators of Rocky Mountain elk including mountain lion, wolves, and bear. The main factors controlling Rocky Mountain elk populations became hunting and starvation. By 1981, elk populations in Arizona had reached more than 10,000 animals despite a yearly harvest of about 1,500. By 1989, the elk population had increased to 30,000. Evidence of elk impacts on vegetation was first noticed during this time in the riparian meadows and areas seeded following timber harvest, particularly those seeded with orchard grass.

By 1992, harvest practices were initiated to reduce the elk population due to concerns over damage to vegetation. The harvest more than doubled from 3,415 in 1985 to 7,881 in 1995

statewide. Harvest management focused on reducing population numbers in certain game management units using 1991 as a base year.

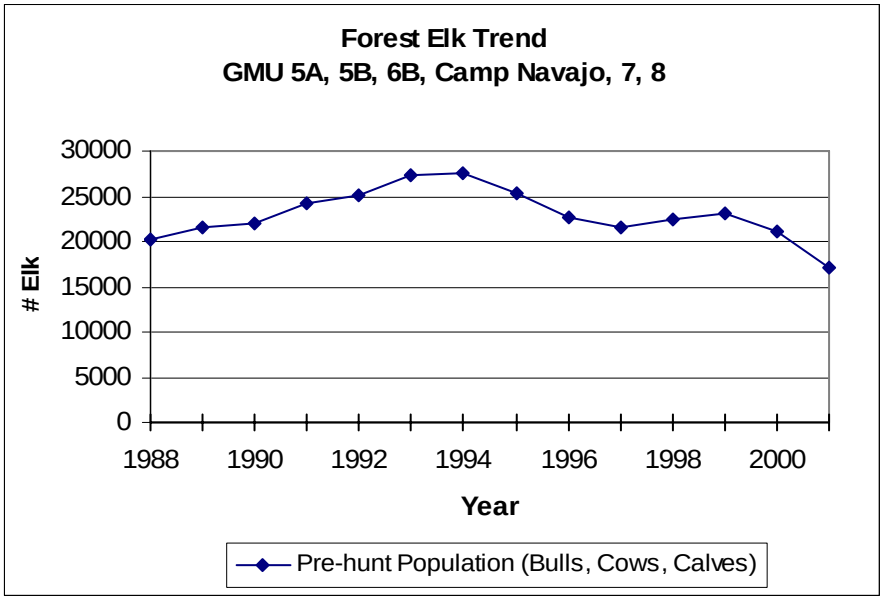
The analysis area provides both summer and winter range for elk. During the summer, elk occupy both pinyon-juniper and ponderosa pine habitat types. During the winter, migrating elk from other areas of the forest move into the pinyon-juniper woodlands. In years when winters are mild, elk remain in the higher elevations and never move to their winter range. This results in yearlong grazing occurring throughout much of the area.

Despite reductions in the elk population since 1993, impacts to meadows and riparian areas can be substantial and additive to that of cattle use. Across the forest Elk can reduce the cover and vigor of highly palatable plants and contribute to trampling and soil compaction.

Other impacts on elk include the lack of reliable water and overstory encroachment into meadows and openings. Most of the stock tanks and natural lakes only provide an intermittent water source. Tree and shrub encroachment has reduced the availability of forage over large areas. This may funnel elk into sensitive areas such as meadows or other grasslands, resulting in heavy use on forage in these areas.

Population: Elk populations have been the most closely monitored of all the game species. Analysis of population trend shows an increase in elk numbers in the early to mid-1990s, with a gradual decline to roughly the late 1980s level (see Figure 12). Habitat conditions were favorable for elk in the late 1980s and early 1990s. As populations increased, concern about habitat impacts resulted in cooperation between the Arizona Game and Fish Department and Forest Service to decrease elk numbers. The observed decline in the latter half of the period resulted.

Figure 12. Approximate number of elk by year for Game Management Units 5A, 5B, 6A



Source: USDA 2002c.

Early seral stages of ponderosa pine have not increased to any large degree since implementation of the LMP, while some early seral stage mixed conifer habitat has been created. Population levels do not appear to be closely tied to these specific indicator habitats. While early seral stages

of ponderosa pine and mixed conifer are important, elk are generalists, and use a wide variety of seral stages and habitats (USDA 2002c).

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

Implementation of the grazing alternatives will not impact elk or the early-seral stage ponderosa pine, mixed conifer, or spruce-fir habitats they represent because:

- there are no vegetation treatments proposed in any of these alternatives;
- the mixed conifer habitats in Walnut Canyon are inaccessible to cattle on the allotment;
- there are no spruce-fir habitats on the allotment;
- early seral stage ponderosa pine is not grazed by livestock;
- grazing does not affect the overstory structure of early-seral stage ponderosa pine, because cattle do not graze the overstory;
- grazing at the 35 percent utilization level will result in sufficient residual biomass, seed head production and adequate species composition of the understory structure of early-seral stage ponderosa pine as indicated by the stable to improving range trends for the ponderosa pine habitats within the project area; and
- the Arizona Game and Fish Department in coordination with the Coconino National Forest has agreed to initiate harvest practices to reduce elk.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is Game Management Units 5B and 6A.

Grazing in adjacent areas would have similar effects as described above. In general, vegetation treatments can benefit elk by opening up dense canopies and providing improved growing conditions for understory plants. This benefits elk by improving forage availability and nutritional value. Depending on the treatment type and goals for treatment, elk may benefit or be negatively affected by impacts on cover conditions. About 50,600 acres are proposed for vegetation treatments in summer and winter ranges on the adjacent Anderson Springs and Bar T Bar grazing allotments. These treatments are expected to improve forage production, plant vigor, species composition, and nutritional value; open up large areas that were barriers to movements by elk and other species; create movement corridors between summer and winter ranges; and decrease competition for forage between cattle and wild ungulates.

Wildfires can negatively or positively affect elk. Large, stand-replacing fires may negatively impact elk by reducing cover and forage values for a number of years after the fire is out where soils were sterilized from the heat. Fires can also benefit elk by stimulating understory plant growth and increasing nutritional values of plants for several years after a fire has gone through. Elk use is usually heavy in burned areas due to the flush of new, highly nutritious plants that sprout once a burned area receives rain. This heavy use can continue for several years.

On the Padre Canyon and Deep Lake allotment there were two recent fires that have created approximately 20,000 acres of opening in the pinyon-juniper woodland and, to a lesser extent, in the ponderosa pine stringers found in Padre, Mormon, Yellow Jacket and Elliott Canyons. In June 2003, the Mormon fire burned approximately 2,516 acres, and during June and July 2004 the Jacket fire burned approximately 17,000 acres. On the Padre Canyon Allotment, the Jacket fire

burned into the previous Mormon fire area in July 2004 creating large continuous openings interspersed with islands of unburned pinyon and juniper, which connects with the Lizard fire on the Angell Allotment that burned approximately 5,100 acres in June 2003. In total, approximately 25,000 acres of pinyon-juniper woodland and pine stringers were burned on the Padre Canyon and Angell Allotments in 2003 and 2004. Drought and the associated pinyon mortality have contributed to the intensity and severity of these fires. As a result of these fires, cover attributes for elk have decreased and are not expected to recover for decades. Though recovery will be slower in the high severity areas of the pinyon-juniper woodlands, highly nutritious plants are expected to germinate in the fire areas, benefiting elk.

The proposed activities for alternative 1 and 3 are not expected to affect the current population trends for elk.

Direct, Indirect and Cumulative Effects of Alternative 2

Implementation of Alternative 2 would not have any direct, indirect or cumulative effects on elk due to lack of grazing. There are no impacts to early-seral stage conifers for which elk are management indicators due to lack of grazing on the understory and the lack of vegetative treatments.

Pygmy Nuthatches

The pygmy nuthatch is a management indicator species for late-seral ponderosa pine habitat on the Coconino National Forest (USDA 1987). Pygmy nuthatches are tree trunk foragers that occur in ponderosa pine and pinyon-juniper up to elevations of 10,000 feet. The pygmy nuthatch is tied to old ponderosa pine within younger stands, stands of old-growth ponderosa, old large oak trees, and cavities. They feed on a variety of insects and seeds, and are more abundant in areas with a high, homogeneous canopy. They may also be more abundant in unburned areas. They are usually secondary cavity nesters, selecting larger trees for nesting and roosting.

Habitat: The age class distribution of ponderosa pine has remained the same during Forest Plan implementation. Late-seral stage trees have remained largely unchanged on slopes greater than 40 percent. The loss of large old trees occurred on slopes less than 40 percent during the early stages of Forest Plan implementation due to natural loss and management activities (primarily timber sales planned prior to the Forest Plan). The rate of loss is now much more reduced in part due to Forest Plan standards and guidelines for old growth (USDA 2002c). Stands of old-growth ponderosa pine within the analysis area occur in small patches, on steep slopes, or in pine stringers in small drainages.

Snags on the forest have, in general, been lost faster than they are being replaced, and large snags are lost at a disproportionate rate to small snags, resulting in a downward trend for snag recruitment (USDA 2002c). However, drought and insect mortality have created snags in habitat within and outside the analysis area within a fairly rapid timeframe and result in an increase in snag recruitment in localized areas. The rate and extent of tree mortality in the future is not known. Mortality is expected to continue at a smaller scale if wet years are in the forecast because insect infestation will continue if host trees are present but adequate moisture will assist with tree resistance to attack by insects. The extent of mortality may increase if dry years are in the forecast because drought mortality will continue and drought will facilitate insect infestation and die off.

Population: Despite concerns about habitat trends for pygmy nuthatches, especially future trends for snag recruitment, data from the Coconino National Forest, as well as statewide data, indicate that pygmy nuthatch populations are stable on a gross, long-range scale. Dramatic population fluctuations occur on a short-term scale (1 to 3 years). Small local populations, such as those in

snowmelt drainages (on the Mogollon Rim) may be temporarily extirpated, indicating a need for a change in management in those areas (USDA 2002c).

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

Implementation of these alternatives would result in no change in habitat capability for this species within the analysis area because late-seral ponderosa pine is not impacted by cattle grazing. No other actions are proposed that would affect habitat for this species.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is the Lake Mary, Deep Lake, Padre and Walnut Allotments.

There are three fuels treatment projects within the Lake Mary and Walnut Allotments. The Lake Mary, Mountainaire and Elk Park thinning projects may have treatments in isolated areas of late seral ponderosa pine which may result in disturbance of nuthatch or the removal of trees used for foraging.

Prescribed burning is proposed in all of the fuels treatment projects. Before prescribed burns take place, snags are lined to prevent them from burning. Some late seral ponderosa pines may be killed by burning, creating a snag that attracts insects providing forage habitat for pygmy nuthatch. Though some large trees may be cut or burned, late seral ponderosa pine and snags are not targeted in these projects. These projects are not expected to result in a change in habitat or population trends on the forest.

On the Padre Canyon and Deep Lake allotment there were two recent fires that have created approximately 20,000 acres of opening in the pinyon-juniper woodland and, to a lesser extent, in the ponderosa pine stringers found in Padre, Mormon, Yellow Jacket and Elliott Canyons. In June 2003, the Mormon fire burned approximately 2,516 acres, and during June and July 2004 the Jacket fire burned approximately 17,000 acres. On the Padre Canyon Allotment, the Jacket fire burned into the previous Mormon fire area in July 2004 creating large continuous openings interspersed with islands of unburned pinyon and juniper, which connects with the Lizard fire on the Angell Allotment that burned approximately 5,100 acres in June 2003. In total, approximately 25,000 acres of pinyon-juniper woodland and pine stringers were burned on the Padre Canyon and Angell Allotments in 2003 and 2004. Drought and the associated pinyon mortality have contributed to the intensity and severity of these fires. The vast majority of these fires burned in pinyon-juniper habitats, which the pygmy nuthatch does not represent. The pine stringers burned in these fires may have provided habitat for the pygmy nuthatch, but were likely not large enough to sustain a viable population of pygmy nuthatch given their small size -less than 5 acres each- and isolation.

Direct, Indirect and Cumulative Effects of Alternative 2

Implementation of Alternative 2 would not have any direct, indirect or cumulative effects on elk due to lack of cattle grazing. Implementation of Alternative 2 would result in no change in habitat capability for this species because no cattle grazing or cattle grazing-related activities are proposed.

Abert Squirrels

The Forest Plan designates the Abert squirrel as a management indicator species for early-seral stage ponderosa pine forests although this species uses intermediate to older aged forest (trees 9-22 inches dbh), where groups of trees have crowns that are interlocking or in close proximity (USDA 2002c).

Habitat: The age class distribution of ponderosa pine has remained the same during Forest Plan implementation. Late-seral stage trees have remained largely unchanged on slopes greater than 40 percent. The loss of large old trees occurred on slopes less than 40 percent during the early stages of Forest Plan implementation due to natural loss and management activities (primarily timber sales planned prior to the Forest Plan). The rate of loss is now much reduced in part due to Forest Plan standards and guidelines for old growth (USDA 2002c).

Ponderosa pine habitat on the forest remains predominately mid-aged, with some declines in the older age classes and old trees (see section above on turkeys). The recent emphasis on uneven-aged forest management should benefit Abert squirrels, except where treatments result in low tree densities and lack of interlocking crowns.

On the forest, past fire suppression combined with climate has resulted in dense stands of trees, many unhealthy, but with interlocking crowns that favor this species. Abert squirrel populations fluctuate with ponderosa pine cone crops. This is related to weather patterns and can be highly variable over time.

Drought and insect mortality have created snags in habitat within and outside the analysis area and probably constitutes the biggest concern for the overstory. The rate and extent of tree mortality in the future is not known. Mortality is expected to continue at a smaller scale if wet years are in the forecast because insect infestation will continue if host trees are present but adequate moisture will assist with tree resistance to attack by insects. The extent of mortality may increase if dry years are in the forecast because drought mortality will continue and drought will facilitate insect infestation and die off.

Abert squirrel habitat within the analysis area occurs along Anderson Mesa Rim in the analysis areas, on steep slopes, and in pine habitat in small drainages.

Population: Population trend for Abert squirrels on the Coconino National Forest was thought to be stable in the early 1980s and various research studies on the forest have likewise suggested a stable trend. Statewide information compiled by the Arizona Game and Fish Department also indicates a stable trend for hunter harvest of squirrels (USDA 2002c).

Environmental Consequences

Direct, Indirect and Cumulative Effects of All Alternatives

No vegetative treatments are proposed, therefore, there is no modification of the overstory used by squirrels and no anticipated changes to population trend or trend of habitat forest-wide due to grazing or grazing related activities. Grazers on these allotments do not feed on the overstory.

Hairy Woodpeckers

The Coconino National Forest Land Management Plan lists hairy woodpecker as a management indicator species for the snag component of ponderosa pine, mixed conifer, and spruce-fir (USDA 1987). Hairy woodpeckers are overwintering cavity nesters that use larger trees. For nesting purposes, they often select the dead or dying branches of live trees. Unlike the pygmy nuthatch,

hairy woodpeckers tend to occur more often in burned areas. Seventy-five percent of food items are insects, including high numbers of wood boring larvae. Other foods include berries and acorns.

Population: Overall, data from the Coconino National Forest, as well as statewide data, indicate that hairy woodpecker populations are stable, or slightly increasing, on a long-range scale. Minor population decreases occur on a short-term scale (1 to 3 years), but are generally followed by a recovery. Habitat trend in ponderosa pine cover type for snags is declining, but the trend in mixed conifer and spruce-fir is increasing (USDA 2002c).

Habitat: The age class distribution of ponderosa pine has remained the same during Forest Plan implementation. Late-seral stage trees have remained largely unchanged on slopes greater than 40 percent. The loss of large old trees occurred on slopes less than 40 percent during the early stages of Forest Plan implementation due to natural loss and management activities (primarily timber sales planned prior to the Forest Plan). The rate of loss is now much reduced in part due to Forest Plan standards and guidelines for old growth (USDA 2002c).

Stands of large, old ponderosa pine within the analysis area occur in small patches, on steep slopes, or in pine stringers in small drainages.

Snags on the forest have, in general, been lost faster than they are being replaced, and large snags are lost at a disproportionate rate to small snags, resulting in a downward trend for snag recruitment (USDA 2002c). However, drought and insect mortality have created snags in habitat within and outside the analysis area within a fairly rapid timeframe and result in an increase in snag recruitment in localized areas. The rate and extent of tree mortality in the future is not known. Mortality is expected to continue at a smaller scale if wet years are in the forecast because insect infestation will continue if host trees are present but adequate moisture will assist with tree resistance to attack by insects. The extent of mortality may increase if dry years are in the forecast because drought mortality will continue and drought will facilitate insect infestation and die off.

Environmental Consequences

Direct, Indirect and Cumulative Effects of All Alternatives

Implementation of all alternatives would not change population or habitat trend for this species due to the lack of impacts on snags. There are no direct, indirect, or cumulative effects from cattle grazing or other actions on old growth ponderosa pine, mixed conifer, and spruce-fir stands, including snags. No other actions are proposed that would affect habitat for this species. There are no effects from Alternative 2 due to lack of cattle grazing.

Mule Deer

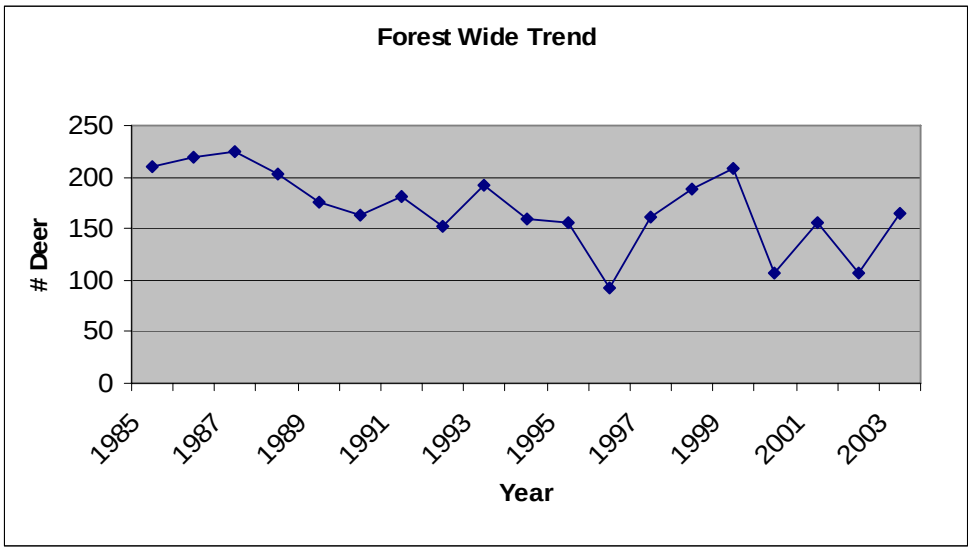
The mule deer was selected as an indicator species of early-seral stages of aspen and pinyon-juniper woodlands. There is no aspen within the analysis area. Early-seral stages of ponderosa pine, mixed-conifer, and chaparral habitats are also used by this species, but this analysis will focus on pinyon-juniper woodlands. They are browsers and feed on shrubs and mast as well as forbs and, to a lesser degree, grasses.

Population: Although widespread and abundant statewide and nationally, mule deer populations have been variable on the Coconino since plan implementation (see Figure 13), possibly due to many factors, such as disease, poaching, climatic conditions, and habitat changes (USDA 2002c). Creation of early-seral aspen and pinyon-juniper habitats has not occurred at a sufficient scale to

positively influence browse production that would benefit mule deer. The fawn/doe ratio is down from the 5-year average in GMUs 5A, 5B and 6A (see Figures 14 and 15).

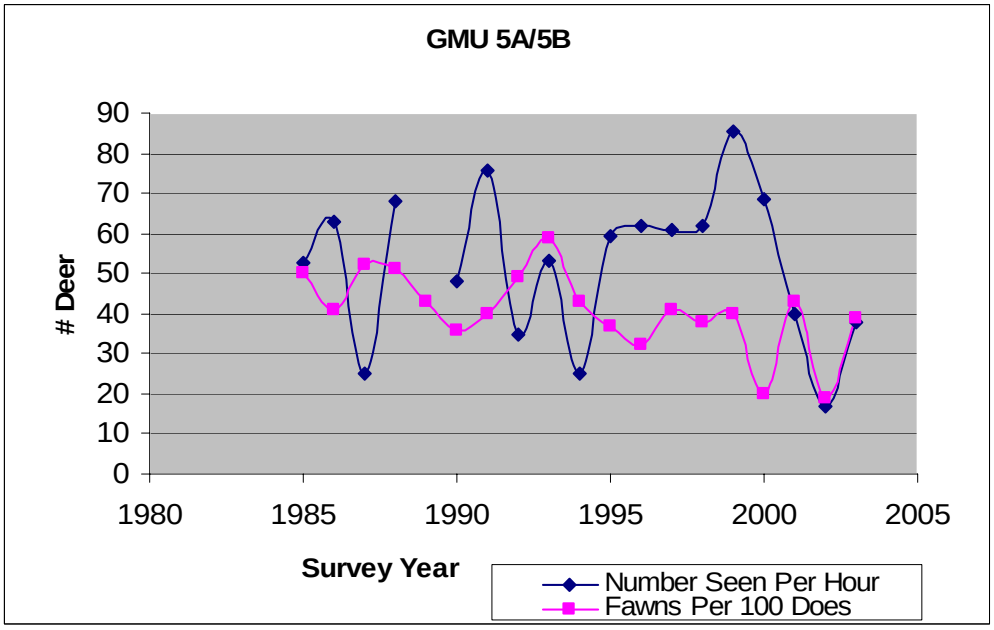
Based on observed trends in survey observation rates and reproduction, forest-wide mule deer populations have declined and will probably continue to decline for the foreseeable future.

Figure 13. Forest-wide trend of mule deer population (GMUs 5A, 5B, 6A, 6B, 7 combined)



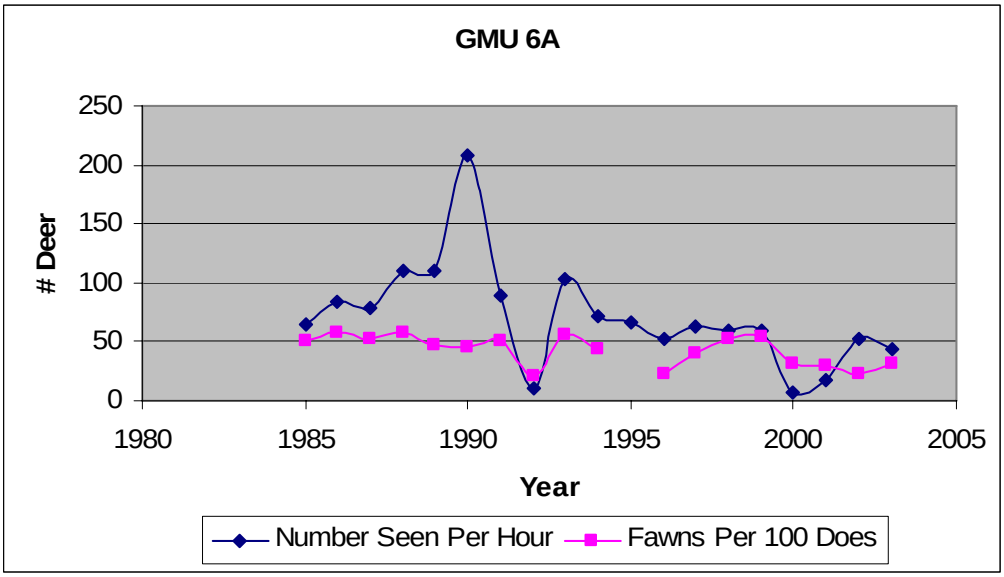
Source: USDA 2002c

Figure 14. Mule deer and fawns in the project area (GMUs 5A/5B)



Source: USDA 2002c

Figure 15. Mule deer and fawns in the project area (GMU 6A)



Source: USDA 2002c

Habitat: Habitat for this species within the analysis area is located largely below Anderson Mesa Rim. On the forest, age class distribution has remained relatively stable in pinyon-juniper; however, the vigor of understory components, including mule deer forage, continues to be affected in areas with a dense overstory. Loss of herbaceous understory and vegetative ground cover has resulted in accelerated sheet and rill erosion.

According to the range and watershed report [PRD 40], the mule deer habitat (pinyon-juniper and steep slopes) has both satisfactory and unsatisfactory rangeland management status. About half is unsatisfactory due to steep slopes and dense woodland. They have low vegetative cover, low litter and relatively high amounts of bare soil with various erosion hazards due to slopes. Little cattle grazing occurs on steep slopes (due to access) and in areas of high canopy cover (due to lack of vegetative cover) so there is little effect due to cattle grazing. These areas produce less than 100 pounds of forage per acre. Overall, the area produces 100-350 pounds of forage per acre with tree density and precipitation main determining factors for this low amount of forage. Cattle and wildlife grazing can affect grass, forb and shrub heights, vigor and abundance, particularly within one-quarter mile of water. Range monitoring suggests range conditions in pinyon and juniper grassland both above and below the rim show a static to downward trend. Some young pinyon and juniper trees have increased since the early 1960s. Tree establishment in some openings creates cover for mule deer, yet will ultimately result in loss of ground cover and forage plants and an increase in bare soil as canopy cover and tree density increases [PRD 40].

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

Cattle grazing at moderate levels in early-seral pinyon-juniper habitat types on the allotment will maintain food and cover for mule deer overall. Grazing use by wildlife and cattle around one-quarter mile of water will remain high regardless of the alternative. However, for Alternative 3, East and West Cherry pastures would be combined and grazed for up to 48 days straight. With the

exception of the northeast corner of this pasture, the topography is dry, steep and broken, with mule deer forage and cover scattered throughout. Because cattle concentrate their use around water, utilization is expected to be high adjacent to the stock tanks in the northeast corner of this pasture. High localized utilization in this area is likely to affect mule deer cover and forage reproduction. Although the wetland and spring fencing proposed in Alternative 3 should provide additional forage for deer.

Cumulative Effects of Alternatives 1 and 3

The cumulative effects area for this species is GMUs 5A, 5B, 6A, 6B and 7.

Implementation of these alternatives would contribute to further increases in early-seral pinyon-juniper habitat because no vegetation treatments are proposed. Encroachment of pinyon-juniper vegetation into openings and historic grasslands would continue to occur over time. This would result in increased canopy cover and tree density that will ultimately result in loss of vegetative ground cover and be additive to the current low production in some of the formerly treated areas.

In pinyon-juniper woodland, fires normally burn infrequently and only affect small areas due to lack of fuels. Small openings are generally the result. Scorched soils and tree removal occurs when the infrequent high intensity wildfire occurs. Scorched soils can delay positive vegetation results. On the Padre Canyon Allotment there were two recent fires that created about 20,000 acres of openings in the pinyon-juniper woodland and, to a lesser extent, in the ponderosa pine stringers found in Padre, Mormon, Yellow Jacket and Elliott Canyons. In June 2003, the Mormon fire burned about 2,516 acres, and during June and July 2004, the Jacket Fire burned about 17,000 acres. On the Padre Canyon Allotment, the Jacket Fire burned into the Mormon fire area in July 2004, creating large continuous openings interspersed with islands of unburned pinyon and juniper, which connects with the Lizard Fire on the Angell Allotment and burned about 5,100 acres in June of 2003. In total, about 25,000 acres of pinyon-juniper woodland and pine stringers have burned on the Padre Canyon and Angell Allotments in 2003 and 2004. Drought and the associated pinyon mortality have contributed to the intensity and severity of these fires. As a result of these fires, cover attributes for mule deer have decreased and are not expected to recover for decades. Though recovery will be slower in the high severity areas of the pinyon-juniper woodlands, highly nutritious plants are expected to germinate in the fire areas, benefiting mule deer.

Firewood cutting impacts pinyon-juniper habitat. Early-seral pinyon-juniper is not generally cut for firewood, with firewood cutters preferring large dead trees, so little impact on habitat for mule deer occurs as a result.

Hunting is another cumulative effect for this species. Although hunting does not impact habitat trends, it does regulate populations. Statewide, populations of mule deer are declining. Arizona Game and Fish Department’s management goal for deer is to maintain deer populations at levels which provide diverse recreational opportunities, while avoiding adverse impacts to the species and its habitat. Both white-tail and mule deer are combined for the purposes of hunt permits for deer. Harvest data for mule deer has shown a decrease in total harvest from 1986 to the present. In 2001, the department recommended a reduction of deer hunting permits statewide. This was the lowest number of deer permits recommended since the draw system began.

Implementation of either alternative will not result in a change to the forest population trend for this species.

Direct, Indirect and Cumulative Effects of Alternative 2

Implementation of Alternative 2 would not have any direct, indirect or cumulative effects on elk due to lack of grazing and cattle management.

Juniper (Plain) Titmouse

Formally known as the plain titmouse, this species is an indicator for late-seral pinyon-juniper, particularly the snag component. The juniper titmouse is a cavity nester in pinyon-juniper woodlands.

Population and Habitat: The forest-wide trend for the juniper titmouse is stable to declining. Analysis done at the time of the original Forest Plan, predicted slight declines in habitat capability for the juniper titmouse as a result of implementing the plan (USDA 1987). This was the only MIS where trends were predicted to decrease. Old age classes of pinyon-juniper were expected to decrease as treatments to increase the amount of early successional habitat were implemented (EA). Not many of those planned treatments have occurred, therefore, observed population trends are probably largely explained by other factors. Juniper titmouse breeding bird density has been documented to decrease with increased tree density, increasing total bird densities, increasing proportion of junipers in a stand, and increasing canopy cover (Latta et al. 1999). Because the juniper titmouse uses snags for nesting, firewood cutting can influence nest site availability.

Since the age class distribution of pinyon-juniper has not changed much, the snag component has probably remained relatively stable. Firewood cutting has probably reduced snag densities of both pinyon and juniper snags, especially close to Flagstaff. The loss of older pinyon pine trees due to drought creates new snags, but insect attacks result in rapid deterioration of snags, affecting their longevity and value to wildlife.

Habitat for this species is common in the analysis area. About 25,000 acres of pinyon-juniper woodland burned in 2003-2004 on the Angell, Padre Canyon and Deep Lake allotments, yet continues to increase on other parts of the forest. Old-growth trees that provide nest cavities are decreasing due to drought, insect and fire mortality, and the removal of large diameter trees for firewood. A substantial die off of pinyon and juniper has occurred recently due to insect infestation and drought in localized areas on the forest. This has resulted in a temporary increase in large dead trees, but recruitment in the future is a concern due to loss of various age classes.

Environmental Consequences

Direct, Indirect and Cumulative Effects of All Alternatives

Implementation of these alternatives will not impact forest-wide population or habitat trends for juniper titmice. The grazing levels proposed would not provide for change in the late-seral pinyon-juniper woodland. Cattle grazing or proposed cattle management actions will not impact pinyon-juniper snags or late-seral pinyon-juniper habitats because cattle do not graze on mature pinyon or juniper or on the snag component of the late-seral pinyon-juniper habitat, and there are no habitat treatments proposed in any alternative. Therefore, there are no direct, indirect or cumulative effects associated with any alternative.

Pronghorn Antelope

Pronghorn antelope are indicators of early- and late-seral grasslands. Pronghorn are grassland and opening dependent species. Throughout their range, they use areas where slopes are less than 30 percent, precipitation of about 10 to 15 inches per year, and water every 1 to 4 miles. Pronghorn appear to prefer areas recovering from wildfire. Low vegetative structure, averaging 10 to 15

inches in height, is preferred. Vegetation greater than 30 inches in height is not used much (Lee et al. 1998). Much of this analysis is tiered to the Arizona Game and Fish Pronghorn Plan (AGFD 2002).

Pronghorn diet consists of forbs, grasses and shrubs and varies seasonally depending on availability, palatability and succulence. Pronghorn diet is generally higher in forbs and shrubs when compared to other ungulates. There is a higher diet overlap with mule deer. However, deer tend to choose more rugged areas compared to more open areas preferred by pronghorn so spatial segregation offsets this competition to some degree. Pronghorn diet also overlaps with elk and less so with cattle since both cattle and elk have relatively higher proportion of grasses in their diet. Ockenfels et al. (1996) found that plant species richness varies by month in many grassland and shrub steppe habitats in Arizona, with the greatest species richness expressed in spring. Based on range monitoring data and work conducted by Northern Arizona University, there are at least 80 vegetative species known to exist in the project vicinity. Forb abundance and diversity is strongly influenced by precipitation, and they are especially important during the fawning period. Pronghorn does choose fawning areas within one-half mile or so of water due to increased nutritional and water needs during pregnancy and lactation.

Forest Service monitoring data and field observations of 3 years of cattle deferral on Boot and Ducknest pastures of the Pickett Lake Allotment shows an increase of vegetative diversity and abundance in both grazed and ungrazed pastures [PRD 58]. This is likely due to below average precipitation in 2002, average precipitation in 2003 and 2004, and above average precipitation in 2005; suggesting that forb production responds more to climate change than cattle grazing alone. These findings are consistent with those of Loeser et al. (2004) whose preliminary results suggested that inter annual variability is high and that different grazing strategies did not have a dramatic short-term effect on the plant community in regards to native and exotic species richness and ground cover of grasses and forbs.

Furthermore, a photographic assessment of vegetation cover for pronghorn fawns was conducted on Anderson Mesa in 2001 and 2002. This assessment compared cover in 4-year-old exclosures and adjacent grazed areas managed with high cattle stocking densities for short duration rotations. These comparisons did not show any significant differences in percent hiding cover (Mezulis 2003).

Fawn recruitment is a concern for the Anderson Mesa herd. As recommended in the Pronghorn Plan, coyote control was conducted for 3 consecutive years on Anderson Mesa. The last year of coyote control was 2004. The Arizona Game and Fish Department is currently analyzing the effects of this control to the Anderson Mesa pronghorn population. Ongoing nutrition and disease research may also shed some light on condition and productivity of pronghorn within the project area (AGFD 2002).

Antelope are shy and do not respond well to disturbance. Adults have been known to leave fawns when disturbed by humans. Disturbance is a concern due to the potential for disruption during breeding or fawning (Neff 1986).

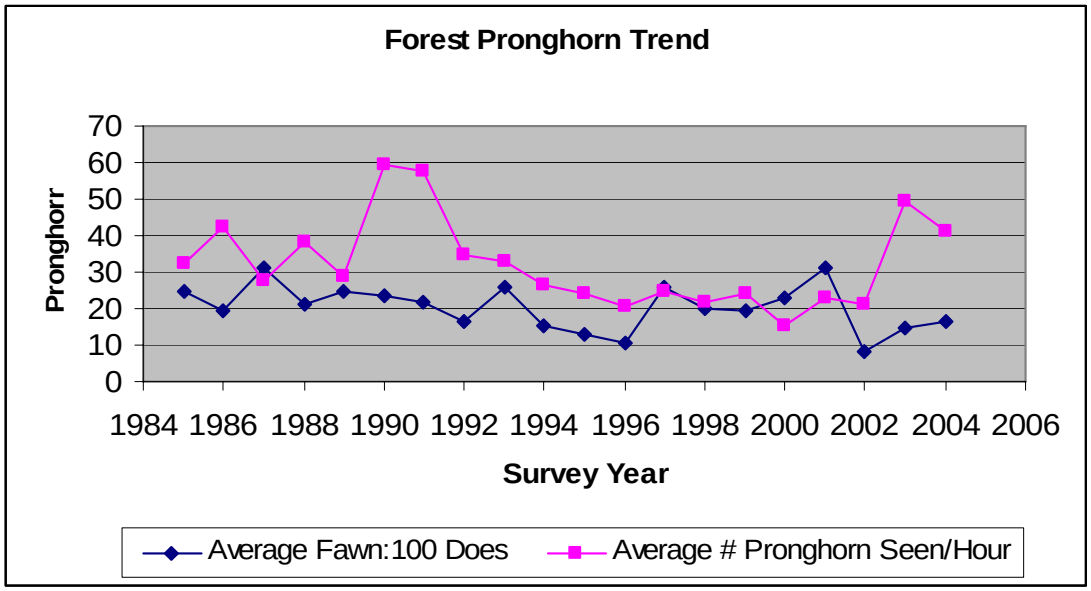
Fences can be complete or partial barriers to pronghorn movements depending on location, size of area fenced, design and snowfall depth. (Neff 1986; Lee et al. 1998). “In the relatively fractional time since fencing of the West began…pronghorn have not learned to go through most fences (as do bison) or vault them (as do elk and deer). Instead, many have learned to negotiate certain fences by crawling underneath. But, if the bottom wires of fences are too low, by virtue of design or buildup of vegetation or snow, pronghorn mobility can be impeded” (O’Gara and

Yoakum 2004). Additionally, fences can impede pronghorn when constructed adjacent to highways or railroads, or fences constructed of woven wire or logs.

Barbed wire fence is generally considered wildlife friendly with bottom and top wire heights that allow for easier animal passage below or above the fence. Yoakum (in O'Gara and Yoakum 2004) recommends a smooth bottom wire 16-inches off the ground to help alleviate access problems for pronghorn without compromising control of cattle. For new or reconstructed fence, Coconino Forest Plan Amendment 11 (1996) specifies an 18-inch smooth bottom wire height, which exceeds the recommended 16-inch bottom wire height of Yoakum and the Pronghorn Management Guides (Lee et al. 1998) and a 42-inch top wire height, which is intended to accommodate wildlife that jump over fences.

Pronghorn antelope populations have declined although not equally on the forest (USDA 2002c). GMU 7 appears to be maintaining at the break-even point, while other GMUs remain below the break-even point of 20 to 35 fawns per 100 does in many years. The Walnut Canyon Allotment occurs within GMU 5B. Arizona Game and Fish Department survey data suggest declining trends in number of observed animals in all but GMU 7.

Figure 16. Forest-wide population trend of pronghorn antelope, Coconino National Forest



Source: AGFD

The Forest-wide MIS status report (USDA 2002c) summarized the amount of grassland habitat and evaluated the trend since the Forest Plan was signed in 1987. The amount of grassland forest-wide had generally remained stable, with the exception of about a 4 percent increase in seral grasslands due to firewood treatments and fire. The forest-wide habitat trend was determined to be stable to declining, showing a great deal of variability across the forest. Negative impacts on trend include tree encroachment, fire suppression, long- and short-term climate, and overgrazing (USDA 2002c). Historic overgrazing combined with fire suppression and favorable climatic conditions has lead to the encroachment of woody vegetation in meadows, grasslands and previously treated openings. Positive impacts on the forest-wide habitat trend include improved grazing management and firewood cutting that has helped to maintain or improve grasslands.

Since 2002, there have been a number of changes affecting the forest's grasslands. The most notable changes include:

1. In 2003, the Mormon and Lizard Fires burned 7,900 acres of pinyon-juniper northeast of Anderson Mesa resulting in open savannas. Based on professional judgment from field visits in 2003-2005 and a review of fire severity maps, about 800 acres were so severely burned that they are not likely to offer much ground or grass cover (R. Steinke, pers. comm.). Therefore, the amount of grassland habitat has increased by about 7,100 acres.
2. In 2004, the Jacket Fire burned 17,218 acres of mostly pinyon-juniper northeast of Anderson Mesa and adjacent to the Mormon and Lizard Fires resulting in open savannas. Based on professional judgment from field visits in 2004 and 2005 and a review of the fire severity maps, about 4,800 acres were so severely burned that they are not likely to offer much ground or grass cover (R. Steinke, pers. comm.).
3. As part of meeting the objectives of the Anderson Mesa Pronghorn Plan:
    a. Since 2003, volunteers, the Coconino National Forest and the Arizona Game and Fish Department have improved grasslands by thinning about 12,000 acres of trees that were encroaching on grasslands on Anderson Mesa.
    b. In 2003 the Coconino National Forest conducted test burns on 700 acres. Initial results appeared unsuccessful at improving habitat conditions for pronghorn. Though anecdotal evidence, however, suggests that pronghorn are concentrating in the burned areas.
4. In 2004 and 2005, the Coconino National Forest restored meadows by thinning about 300 acres of ponderosa pine plantations, which were planted in mountain meadows in Game Management Units 6A and 7M.
5. In 2005 the Coconino National Forest conducted a prescribed burn on approximately 1,100 acres of Anderson Mesa.

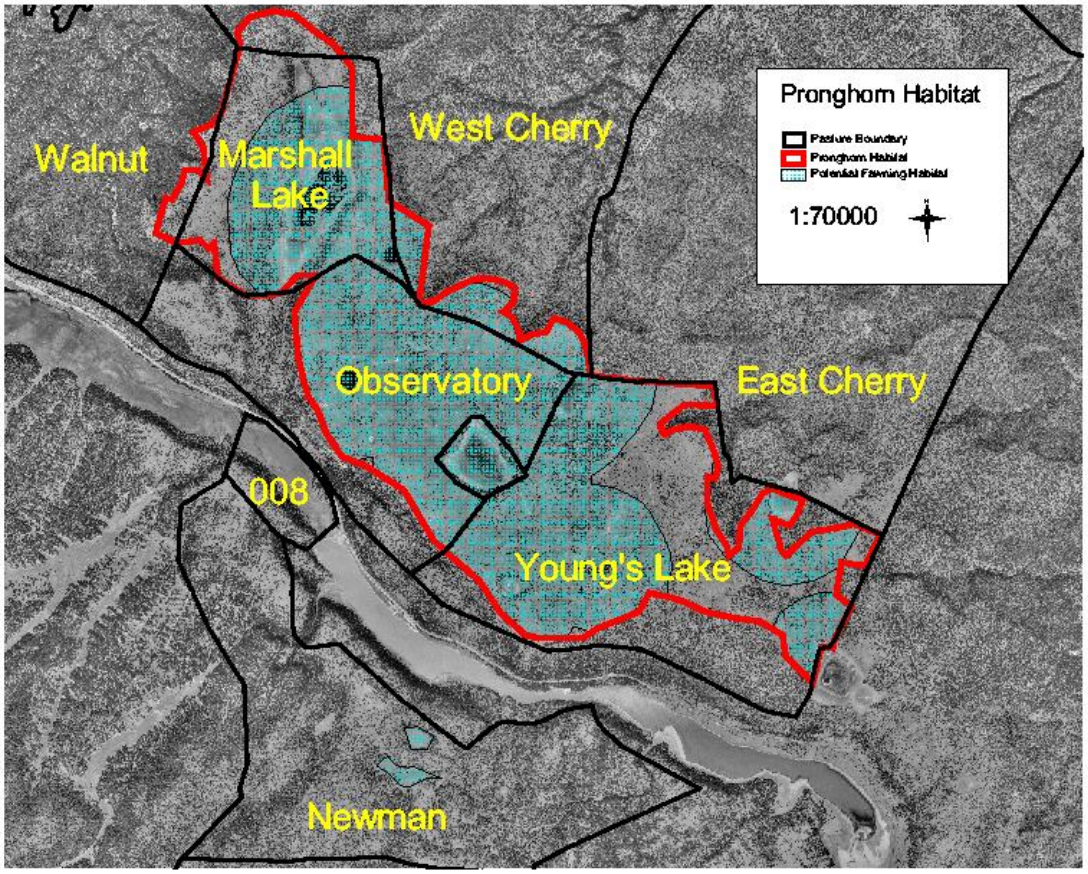
The 2002 Coconino National Forest MIS Status report estimated pronghorn habitat at 161,000 acres of grasslands in MAs 9 and 10 (Mountain Grassland and Grassland and Sparse Pinyon-Juniper above the rim) plus an unspecified amount of grassland in MA-11 (Verde Valley). For the purpose of this analysis, 25,000 acres of grasslands were estimated for MA-11, for a forest-wide total of 186,000 acres of grassland.

Since 2002 about 34,211 acres of grassland habitat has either been restored or created on the forest. This represents about 18 percent of the forest's overall grassland habitat. Of these acres, about 29,711 acres or 16 percent of the forest's grassland habitat has been improved.

These changes in the amount of grassland habitat forest-wide and its suitability for use by pronghorn will be considered in the next update of the forest-wide MIS status report. The significance of these changes will be reviewed and may be enough to indicate a change in habitat trend from stable to declining, to stable to improving.

Antelope Habitat in the Project Area: There are approximately 6,029 acres of pronghorn habitat within the allotment; the majority of this habitat is found in the Observatory and Youngs Lake pastures (see Figure 17). Pronghorn does choose fawning areas within one-half mile or so of water due to increased nutritional and water needs during pregnancy and lactation. Water is well distributed on the allotment. Water on the project area consists of 50 stock tanks, and the wetlands at Marshall, Vail, Prime, Fisher/Fry and Lost lakes. There are approximately 4,668 acres of habitat that is considered potential fawning habitat.

Figure 17. Location of pronghorn habitat on the Walnut Canyon allotment



Water is not dependable in portions of the analysis area because it is dependent on precipitation, flooding regimes and size of the basin. Areas surrounding waters receive heavier grazing use by cattle and wildlife in general. Unless there is rest from grazing or fencing to exclude cattle, the potential height, diversity and abundance of vegetation close to waters may be limited (Hoff 1993). Because plant phenology can be so variable, residual cover (from the previous year) can be an important feature in providing fawning cover from predators. This can vary year to year depending on the timing of moisture and temperature, and duration and timing of snow pack (which can flatten vegetation).

A review of the literature shows that studies conducted in different areas often had different results. Mezulis (2003) conducted a fawn hiding cover study on Anderson Mesa that measured hiding cover in grazed and ungrazed plots (four years of no grazing), finding little difference in the amount of fawn hiding cover. She concluded that the cessation of cattle grazing on Anderson Mesa grasslands would not yield an immediate radical change in close range hiding cover for fawns. However, the short duration of the study and drought conditions may have major influences on the study outcome.

In some areas, young fawns avoided shrub cover (Barrett 1981), preferring grass and forbs over 25 cm tall. Tucker and Garner (1983) found that fawns chose sites with taller vegetation than random sites, while in Texas, fawns chose bed sites with less shrub density and cover than random sites (Canon and Bryant 1997). Alldredge et al. (1991) found bed sites had greater shrub

cover than random sites, but heaviest shrub cover was not used. In a semi desert grassland in central Arizona, Ticer and Miller (1994) found that fawns selected areas with mean grass height of 29 cm and mean forb height of 12 cm, while Ticer (1998) found that fawns avoided sites with tall grass (greater than 15 cm) in a short-grass prairie.

In his assessment of pronghorn habitat on Anderson Mesa in 2001 through 2002, Yoakum (2002) found that the vegetative composition appears high for grasses (estimated at 85 percent) and low (less than 15 percent) for forbs and shrubs. Based on an analysis of Parker 3-step transects, he concluded that there was a declining trend in diversity of grass and forb taxa, and increasing trends in pinyon-juniper and pine communities that are a detriment to pronghorn. Grasslands appeared to be in advanced seral stages, with a lack of early and mid-seral stages. Yoakum further concluded that the height of herbaceous vegetation during the fawning season appears inadequate to provide hiding cover for neonates. These findings indicate a declining trend in pronghorn habitat, but 2002 was one of the driest years on record, which likely affected his determination. Since Yoakum visited Anderson Mesa in 2002, there have been about 7,000 acres of juniper treatments and 25,000 acres of pinyon-juniper burned adjacent to pronghorn habitat, which has improved overall pronghorn habitat on Anderson Mesa.

The variation of pronghorn habitat is primarily due to moisture, temperature and location (Loeser in Mezulis 2003). There was exceptional precipitation during the fall of 2004 and winter of 2005 which resulted in increased diversity, abundance and height of vegetation on the mesa. Brown et al. (2002) found that both winter rainfall and April Palmer Drought Severity Indices correlated with fawn survival rates in arid and semiarid areas, although neither winter rainfall or drought indices correlated with fawn survival rate on Anderson Mesa. Brown et al. (2002) conducted a linear regression analyses comparing October through March rainfall totals, from other high elevation grassland areas near Springerville and Williams, with surrounding fawn survival rates since 1990. This analysis also showed an insignificant relationship between winter precipitation and fawn survival rates. Brown et al. (2002) concludes that these analyses indicated that other variables than annual forb production might be affecting fawn survival in these high elevation relatively mesic areas.

Recreation use within the analysis area is generally low with areas of high to moderate use, as well as areas of low use. Recreational use around some lakes, particularly Marshall and Lower Lake Mary, may reduce use of the lakes by pronghorn. There is a campground and boat launch at Marshall, Upper & Lower Lake Mary and nearby Ashurst Lake all of which are areas that could be used by pronghorn. Antelope habitat is used by antler gatherers during the spring and by hunters during the fall and winter with other recreational users during the summer. Fuelwood gathering, both for personal and commercial use, occurs in this area from mid-April through mid-December, as is year-round off-road vehicle use, except in few areas where motorized traffic is restricted. A nearby 20,000 acre fawning season motorized vehicle closure has been in place since 1989. The nearly 12,000 acre Pine Grove Quiet Area limits motorized traffic during the fall. Most roads are in poor condition, which restricts traffic to high clearance vehicles.

Much of the habitat has small trees on the edge of openings or has regrowth of trees following past treatments. Growth of pine and pinyon-juniper threaten the future use of isolated forest openings, grassland and travel corridors. Lack of fires to maintain grasslands and forest openings is evident in the area. Cattle and wildlife grazing, historic and current, can affect shrub and tree encroachment by removing fine fuels that might otherwise carry fire that would kill woody growth. Climate also influences the establishment of trees in existing openings. Recent drought conditions have created abnormally high amounts of dead pinyon, which have fueled fires in the

pinyon-juniper woodlands consuming over 25,000 acres in 2003 and 2004, resulting in type conversions to early-seral woodlands and the potential for grassland.

Understory species composition and residual height of vegetation is influenced by climate and grazing. This in turn influences forage, nutritional status, as well as fawn hiding cover. Grazers overlap diets. Vegetation height is reduced when grazed. The ability of the area to recover from grazing is influenced by climate and rest. Amount, distribution and quality of fawn hiding cover varies spatially and temporarily on these allotments and is influenced by amount and timing of precipitation, timing and intensity of grazing by ungulates, and area productivity. Cover heights can be low at fawning time compared to other areas in the State and the West. This is due to low productivity soils, soils with a high clay content, plant phenology, climate and grazing.

In pinyon and juniper grasslands below the Anderson Mesa rim, range conditions have generally remained static however; juniper trees are encroaching on some grasslands reducing grassland production since the early 1960s. There are some areas with high plant cover and others with low. Likewise, there are some areas with litter and bare soil ranging from high to low. Overall forage production is low on slopes greater than 40 percent and where there is a relatively closed canopy of pinyon-juniper. Generally speaking, monitoring in lake and deep soils showed most areas had high plant cover, or plant cover near potential; litter ranging from low to near potential and high to low bare soil.

Tree encroachment is a concern within the project area because it reduces the amount and quality of pronghorn habitat. Pinyon-juniper woodland and young ponderosa pine have established in areas that were historically grassland, savannah-like grassland interspersed with trees, and in areas where antelope were historically more common. Many areas have been treated to remove or limit this encroachment and to increase grass and forb production. Growth of shrub and tree species since the treatments were done has reduced the quality of habitat for antelope in these areas. As tree density and canopy cover increases, predator hiding cover may increase; herbaceous understory can decline in vigor, abundance and diversity, and erosion may increase.

Environmental Consequences

Diet overlap between cattle and antelope is usually minimal, but competition for early spring forage may occur (Lee et al. 1998). On the Walnut Canyon Allotment, cattle grazing does not begin until May 1, which further reduces competition for early spring forage. Loeser et al. (2001) found that different grazing strategies had no dramatic short-term effect on the exotic species richness and ground cover of grasses and forbs. Although, the plant height and the potential fawning cover it provides is reduced immediately after grazing.

Direct and Indirect Effects of Alternatives 1 and 3

Alternative 1 proposes to re-authorize grazing on the Walnut Canyon Allotment under the current grazing management system for cattle numbers and season of use. No new fences are proposed. Alternative 3 proposes 6 miles of fencing to protect the seasonal and semipermanent wetlands at Prime Lake, Fisher and Fry Lake, Youngs Lake, and Lost and Dry Tanks. Except for the lanes in Alternative 3, none of the alternatives would permit cattle grazing on seasonal and semipermanent wetlands containing emergent vegetation from June 1 to July 15.

Grazing impacts to pronghorn antelope can be both negative and positive. Early season grazing by cattle or wildlife has the potential to reduce fawn hiding cover provided by new growth and residual growth from the prior year. Reduced hiding cover may facilitate predation of pronghorn fawns. Grazing effects on hiding cover is dependent on: the amount of growth that occurs between cattle removal in the fall and fawn use the following spring; the density and height of the

residual vegetation following cattle grazing; and the amount and timing of wildlife grazing and how these variables interact with the timing and amount of precipitation. Alternatives 1 and 3 propose to end the season of use on October 31 each year, these alternatives have the potential to impact residual vegetation that could otherwise be available as fawning habitat the following spring. The magnitude of effects varies by the number of animals, and timing and duration of graze during the fawning season as directed in the AOIs.

Poorly constructed or maintained fences can be barriers to pronghorn movements. In a conversation with Mike Dunbar from Hart Mountain National Wildlife Refuge (pers. comm., 2003), he encourages the use of wildlife friendly fencing to manage areas where cattle use may be a concern. Alternative 1 does not propose the creation of waterlots or fencing of wetlands, both of which would benefit pronghorn habitat if implemented. The proposed fencing of wetlands in Alternatives 3 may have some negative effects to pronghorn movements, such as partial barriers in areas where snow drifts or topographic features, such as rock outrcrops prevent passage. When considering how the construction of wildlife friendly fencing increases the potential for improved pronghorn fawning cover within one-half mile of water, the potential negative effects to pronghorn are largely mitigated.

Over time, cattle grazing can alter plant composition, species diversity, vegetative ground cover, plant community structure, and plant vigor over large areas. These changes are largely dependent on the grazing intensity, number of cattle grazed, season of use, climatic conditions, and amount of rest an area receives. Competition for forage between domestic cattle and antelope is usually minimal, but competition for early spring forage occurs at times (Lee et al. 1998). Loeser et al. (2001) compared the effects of four grazing regimes on plant communities in semiarid grasslands for 3 years. Their preliminary results suggested that inter annual variability is high and that different grazing strategies did not have a dramatic short-term effect on the plant community in regards to native and exotic species richness and ground cover of grasses and forbs (ibid).

Neither alternative proposes rest-rotational grazing schemes, which on a rotational basis, would give pastures a full year of rest. Though studies conducted by Loeser et al. (ibid) did not show dramatic short-term effects in species richness as a result of grazing, pasture rest would increase forage resilience and vigor.

The effects of grazing from this project would not change the habitat trend for grasslands, meadows, open pinyon-juniper, or the population trends for pronghorn on the forest.

Cumulative Effects of Alternatives 1 and 3

The pronghorn herd that frequents Anderson Mesa migrates between the mesa and areas below and to the east. Game management units (GMU) 5A and 5B contain the Anderson Mesa pronghorn herd. The cumulative effects boundary is Interstate 40 and Walnut Canyon on the north, the division of Range 12E and 13E on the east, Highway 87 on the south, and the western allotment boundaries of Lake Mary and Walnut Canyon Allotments on the west.

Cumulative effects include those associated with wild ungulate grazing, cattle grazing, hunting, recreational use, highways and right-of-way fencing, fires, and vegetation treatments within the cumulative effects area.

Cumulatively wildlife and cattle grazing within the cumulative effects area for these pronghorn would remove fawning cover, influence vegetation around waters, result in some forage competition and diet overlap. This can fall within a range of effects that pronghorn successfully live with under good conditions or may stress adults or young if predators, forage, nutrition, climate or other factors have an undue influence on populations or habitat.

Pronghorn have co-existed with various recreational uses for decades. However, they may be unduly influenced at critical time periods like fawning, breeding or wintering or when human uses increase above a certain level. This could result in increased stress to animals, fawning spread over a long time period or less time spent with young. Human use in this area is expected to increase over the life of the permit. Over the years, a variety of closures on the forest have been implemented that can improve habitat conditions for species like pronghorn, including motorized vehicle closures at Pine Hill on Anderson Mesa and seasonal recreation restrictions such as at nearby Hay Lake (USDA 2002a).

As a result of hunting, gut piles, animals wounded and not recovered, and other human related food sources could provide a nutritional boost to predators resulting in higher reproductive output and better condition. Hunting or scouting during the breeding season may result in disturbance that could extend the breeding and parturition dates out to the point where predators may have a longer advantage period when fawns are small and unable to outrun predators. Hunting is not expected to affect the population through over-harvest, as only a very small portion of the males is harvested.

The fences built along the railroad and Interstate 40 on the north end of the cumulative effects area are considered a negative cumulative effect because the combination of traffic and fence barriers have been shown to be barriers to pronghorn movements in both central Arizona and in areas north of the project near Wupatki National Monument. Old fences within and outside the project area, both on Federal and non-Federal lands, that do not meet the recommended standards for pronghorn passages are also considered negative effects. Fence inventories and improvements as described in the Pronghorn Plan will continue to improve these fences during the period of cumulative effects.

Past wildfires have created or improved about 19,518 acres of grassland within the cumulative effects boundary. The result of these fires for pronghorn is greater visibility, fewer obstructions between winter and summer habitats, and more nutritious plants are expected to germinate in the fire areas. Since 2001, there have been about 16,000 acres of pronghorn habitat improvement projects within the pronghorn cumulative effects boundary. These projects are consistent with the Forest Plan and Pronghorn Plan. The tables in Appendix B, as well as the 2005 Anderson Mesa Pronghorn Plan Accomplishments and Planned Activities report, outline these projects. Cumulatively, these activities have improved 34,518 acres of pronghorn habitat. Additionally, about 70,000 additional acres have been identified for future treatment in the implementation plan of the Anderson Mesa Pronghorn Plan.

Cumulatively, when considering these past and planned projects that have or would improve forest pronghorn habitat, the forest-wide habitat trend may change from “stable to slightly declining” to “stable” or “stable to slightly improving” when the forest-wide MIS status report is updated. These activities should have a positive effect on the pronghorn population though it may not be evident in the population trend for the forest.

Direct, Indirect and Cumulative Effects of Alternative 2

If Alternative 2 were selected, no cattle grazing or improvements would be implemented so there would be no direct, indirect or cumulative effects from cattle associated with the project.

Cinnamon Teal

Cinnamon teal are indicators of lakes and wetlands. Productivity, distribution and size of wetlands are profoundly affected by the amount and timing of precipitation, influencing whether the basins have water or not; how long they hold water within and between years; and

consequently the type of vegetation and wildlife species that can be supported and when. The types of wetlands present on Anderson Mesa are in the “Wetlands and Springs” section of this chapter and are indexed in Appendix A.

The cinnamon teal is a summer resident that feeds on plants and invertebrates (Terres 1991). Waterfowl nesting season is May 1 to July 15. They nest within 100 meters of seasonal and semipermanent wetlands, choosing taller and denser cover for nesting. Since Forest Plan implementation, open water habitats have remained stable, semipermanent wetlands have improved and seasonal wetlands are stable, but well below potential. Some habitat has improved and some has been acquired (Hay Lake) (USDA 2002c). Also since Forest Plan implementation, several years of drought conditions have resulted in many wetlands being unavailable for waterfowl use (NOAA 1975-1993).

The Forest wide trend for cinnamon teal is inconclusive however there appears to have been lower numbers of breeding pairs in the mid-1990s compared to the early 1980s. This is complicated by the fact that studies in the early 1980s study were preceded by unusually wet years. The Breeding Bird Surveys between 1980 and 2000 suggest a downward trend statewide although the sample size is small (USDA 2002c). Population data on the forest is limited to two studies on Anderson Mesa which reported low nest success and low reproductive success on Anderson Mesa, compared to other areas in Arizona and the U.S., largely as a result of nest losses to avian predators (Myers 1982; Gammonley 1996), which is probably due to a lack of nesting cover.

About 59 known lakes and wetlands were considered in the Forest Plan in addition to about 230 acres of unnamed lakes on Anderson Mesa. Of the 59, 19 (32 percent) are considered teal nesting habitat (excluding open water sites like Ashurst Lake which might be used for rest during migration) within the analysis area. Waterfowl nesting season is May 1 to July 15. Many wetlands on the Mesa have been modified by the creation of tanks or dams within the natural lake basins. Stock tanks are often deeper than the surrounding ephemeral lake basin and hold water well past the time when the surrounding more shallow lake basin will have dried up. Surface area, aquatic and emergent vegetation interspersion and aquatic macroinvertebrate production is often less in a stock tank. Stock tanks can provide better distributed, longer lasting and more reliable waters than wetlands and are of great benefit to many wildlife species. However they do not provide the quality or quantity of feeding or nesting habitat present in a semipermanent, seasonal or ephemeral wetland in a good to moderate water year.

The quality and quantity of wetlands are directly affected by precipitation received during the winter and spring. In wet years, many ephemeral lake basins are watered and provide feeding and nesting sites for teal and other water birds. In drought years, ephemeral lake basins may have little to no water resulting in greatly reduced surface area for water birds or none at all. No water, no water birds.

Nesting success and teal habitat is influenced by grazing, recreation, predation and climate. Development of dense cover is influenced by temperature and the amount and timing of winter and spring precipitation. Grazing can have two primary effects on water birds and their habitat. Cattle presence during nesting and incubation can crush nests and eggs or disturb hens, causing them to flush, facilitating nest predation. Cattle and wildlife grazing during the nesting season may reduce nest hiding cover, facilitating predation. Fall grazing around key lake basins can reduce the amount of residual vegetation available in April and the amount of residual vegetation would vary by the amount of growth that would occur following grazing. Cattle grazing may reduce potential nest sites to isolated patches of cover often associated with unpalatable plant species.

Recreational activities can result in nest damage, habitat deterioration, or disturbance that can result in nest loss, abandonment, facilitated predation or death, particularly if vehicles, dogs or dispersed use negatively interface with habitat or teal. The nearly 26,000 acres of motorized vehicle closures on Anderson Mesa during all or part of the waterfowl nesting and spring migratory season includes a number of important nesting areas for teal. Motorized vehicle use in the remainder of the area is largely unregulated and varies by season and area.

Predation is a key factor in teal breeding success and predator success is influenced by a number of factors. The number of crows and ravens in the project vicinity may be increasing in response to increased human development and increased food availability from an urban setting. Wetlands in the project area tend to be small and unconnected, especially when compared to the White Mountains of Arizona or more productive nesting areas in the United States. Ephemeral lake basins and their associated uplands can be incorporated in regular search patterns once they have been identified as potential foraging sites by aerial predators. Crows and ravens fly at low levels over wetlands and can easily detect nests prior to the growth of dense vegetation. They forage along shorelines seeking invertebrates and frogs and in the wheat grass zone of the basin upland. Ponderosa pine trees are frequent perch sites adjacent to water. Predation pressure can be intense within the 100 meters of water preferred by nesting teal.

Environmental Consequences

Waterfowl habitat primarily exists in the seasonal and semipermanent wetlands at Marshall Lake, Prime lake, Fisher and Fry Lake, Youngs Lake, Vail Lake and Lost and Dry Tanks. There are 50 stock tanks on the allotment that could be used by cinnamon teal for resting. Semipermanent and seasonal wetlands have higher values for teal due to habitat interspersion within the wetland, extended flooding regimes, and higher plant species diversity within and adjacent to the basin. Within the wetlands development of dense cover is influenced by temperature and the amount and timing of precipitation. Grazing can have two primary effects on water birds and their habitat. Cattle presence during nesting can result in crushed nests or eggs and disturb incubating hens, causing them to flush and increasing the potential for nest predation. Cattle and wildlife grazing during nesting season may reduce nest hiding cover further increasing the potential for nest predation. Predation is a key factor in teal breeding success. Crows and ravens fly at low levels over wetlands and can easily detect nests prior to the growth of dense vegetation. Predation pressure can be intense within 100 meters of water, which is the area preferred by nesting teal. Grazing may reduce potential nest sites to isolated patches of cover often associated with unpalatable plant species.

Cattle may also affect the amount of available water in wetlands. Overall, effects of water consumption by cattle on the Walnut Canyon Allotment depend on the size of the water source and when consumption occurs. The water sources in this area range in capacity from 65,000 to 2 million gallons. If the wetland has a stock tank, the effect of cattle consuming the water is limited due to the ability of clay soils to retain moisture rather than transmit it laterally through the soil profile. Stock tanks provide limited habitat to teal and are generally used for resting.

If the wetland basin is large and shallow, water consumption by cattle can remove surface water and may decrease the amount of hydrophytic vegetation. However, the effect of consumption by cattle in a large basin is not substantial. Even though the amount of water is less in terms of gallons present, the surface area would remain largely unchanged. The effect would be that the wetland would become even shallower going into the winter or monsoon season. This could contribute to the wetland going dry sooner.

If the wetland basin is small and shallow, water consumption by cattle would be more evident. In small wetlands the surface area of water would be reduced faster, because the ratio of consumption to the amount of available water is higher than a large wetland. The effect would be that the wetland may go dry before the monsoon or winter precipitation is able to refill it. The effect to teal could be a reduction in cover, the timing and amount of available resting and foraging areas. The effect to teal nesting would be negligible because these small wetland basins generally do not contain water long enough to provide nesting habitat for teal independent of cattle consumption.

When grazing occurs during a good summer monsoon season, the effect from cattle consuming water is negligible because the wetland is being refilled before it goes dry. During drought conditions, the majority of all wetlands would be dry and cattle numbers are reduced to match forage production. During these dry conditions if water is present in the wetlands, it could be completely consumed or nearly so, leaving little water for teal cover, resting or forage. The permittee would have to haul water for cattle. Closed basins such as stock tanks would dry out first, and the semipermanent wetlands typically dry out last.

Direct and Indirect Effects of Alternatives 1 and 3

Vail and Marshall Lakes provide excellent habitat for teal. Vail Lake is excluded from cattle grazing by fencing and Marshall Lake is used for ten days in October as a holding and shipping pasture. The Marshall Lake pasture is 1,533 acres; the effects of grazing for ten days in October could result in disturbance to migrating teal and a removal of cover. These effects are minimal given the short duration of grazing in this pasture.

The following direct and indirect effects are anticipated for cinnamon teal with the implementation of Alternative 1:

- cattle would not graze the seasonal and semipermanent wetlands at Marshall Lake, Prime Lake, Fisher and Fry Lake, Youngs Lake and Lost and Dry Tanks. before July 15, so there would be no disturbance associated with cattle during this time;
- cattle use occurs after spring migration. As a result, vegetation production during migration would primarily be influenced by climate and fall and/or winter grazing by cattle and/or wildlife;
- cattle use occurs in the seasonal and semipermanent wetlands during the fall migration (September and October). Cattle grazing during this time period could cause waterfowl disturbance and reduce vegetation height;
- the hardstem bulrush community at Prime Lake, Fisher/Fry Lake, Youngs Lake and Lost and Dry tanks are not fenced in this alternative and would be grazed by cattle, which may affect nesting habitat for cinnamon teal; and
- cattle utilization within one-quarter mile of water is normally much higher than 35 percent resulting in a decrease of cover for teal.

Alternative 3 proposes the exclusion, except for lanes, of cattle grazing at Prime Lake, Fisher and Fry Lake, Youngs Lake and Lost and Dry Tanks wetlands, which should increase the amount of residual wetland and upland vegetation which functions as forage and cover for nesting teal and reduces the potential for disturbance to nesting and resting cinnamon teal.

Cumulative Effects of Alternatives 1 and 3

The area analyzed for cumulative effects to cinnamon teal includes Anderson Mesa and the San Francisco Wash and Walnut Creek 5th code watersheds.

Past actions may have affected cinnamon teal. Forest-wide cinnamon teal habitat trends are generally static with current cattle grazing. There would be some variation in cinnamon teal habitat due to timing of the cattle grazing season related to wildlife grazing, recreation use, and climatic conditions. Effects to cinnamon teal habitat would vary because the effects may overlap for habitat in the wetland ecosystems.

The effects to vegetation in the vicinity of wetlands are cumulative to use by elk. Cattle and wildlife use occurs in wetland areas at similar times of the year as cinnamon teal. In addition, recreation activities also occur in wetland areas in the summer months. The effects of grazing in these alternatives are additive to cattle and wildlife grazing in the wetlands on adjacent allotments. This is because wetland productivity as it relates to cinnamon teal habitat is strongly influenced by precipitation.

Historically, high waterbird numbers have been observed on the mesa, concurrent with wildlife and cattle grazing (Mormon Lake District wildlife records). Over the years, a variety of closures on the forest have been implemented that improve habitat conditions for species like cinnamon teal, including motorized vehicle closures at Pine Hill on Anderson Mesa and seasonal recreation restrictions such as at Hay Lake (USDA 2002a). Habitat quality for wetland dependent species forest-wide has improved over time at some sites through fencing, restriction of grazing (Marshall Lake, Ashurst Spring, Vail Lake and Horse Lake), and recreation use over time.

Populations of avian predators will remain high, and this may continue to offset reproductive success. Based on the above discussion, forest habitat trends for cinnamon teal are not expected to change with the implementation of Alternative 1, but may improve with the implementation of Alternative 3 because cattle would not graze in the seasonal and semipermanent wetlands and because wetland productivity is largely associated with precipitation received during the winter and spring..

Direct, Indirect, and Cumulative Effects of Alternative 2

No cattle grazing or other actions are proposed in the project area, so no direct, indirect, or cumulative effects from cattle grazing would occur.

Migratory Bird Species

President Clinton signed Executive Order 13186 on January 10, 2001, placing emphasis on conservation of migratory birds. This order requires that an analysis be made of the effects of Forest Service actions on species of concern listed by Partners in Flight; the effects on important bird areas (IBA) identified by Partners in Flight (Latta et al. 1999); and the effects to important overwintering areas. The Anderson Mesa IBA occurs within the project area.

The following is a description of migratory bird species status within the project area and an analysis of effects for each alternative. Species of concern are organized by the type of habitat they use.

Pine Habitat Type Priority Species: Ponderosa pine and pinyon-juniper/ponderosa pine transitional habitat types are one of the dominant vegetation types in the project area. Partners in Flight identified four species of concern for pine habitats: northern goshawks, olive-sided flycatchers, Cordilleran flycatchers, and purple martins. Table 21 describes the habitat needs for these species. The northern goshawk and olive-sided flycatcher will not be addressed under this

"Migratory Birds" section. Northern goshawks were previously discussed in detail under the "Sensitive Wildlife Species" section and the olive-sided flycatcher is associated with aspen, which does not occur in the project area.

Table 21. Pine habitat migratory bird species on the Walnut Canyon Allotment

Species	Vegetation Composition/ Structure	Abiotic/Landscape Factors	Special Factors
Cordilleran Flycatcher	-Ponderosa pine, Douglas-fir, maple, oak, aspen. -Dense canopy closure. -Mid-late successional.	-Drainages to create a cool microclimate.	-Snags and downed trees for nesting. -Rare cowbird host.
Purple Martin	-Ponderosa pine. -Open canopy. -Open midstory cover. -Open understory cover. -High snag density.	-Large snags, cavities. -Open space for flying. -Snags need to be close to or in open areas. -Just above and below Mogollon Rim, Mormon Lake area.	-Often prefers habitat near open water. -Prefers tall snags adjacent to open areas.

Cordilleran Flycatcher

Cordilleran flycatchers are considered a common summer resident and uncommon transient (Morrall and Coons 1996). They are associated with snags and high overstory canopy closure. Stands of old-growth ponderosa pine and closed canopy forest within the project area occur in small patches, on steep slopes, or in pine stringers in small drainages. Cordilleran flycatchers are considered to be on the increase, but at risk due to concerns about loss of suitable habitat and habitat components such as snags, downed logs, and loss of closed canopy. Within the project area, it is expected that this species is static to increasing.

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

Concerns about the loss of suitable habitat and habitat components ideal for Cordilleran flycatchers are primarily: (1) loss of snags and downed logs for nesting and (2) loss of closed canopy causing reduction in cool microclimates that they are most frequently associated with (Latta et al. 1999). Cattle grazing at the levels proposed in these alternatives does not impact recruitment of snags and downed logs. Cattle grazing in pine habitats at utilization guidelines of 35 percent or less is considered to have no impact on habitat for Cordilleran flycatchers. No other actions are proposed that would impact this species.

Snags on the forest have in general been lost faster than they are being replaced, and large snags are lost at a disproportionate rate to small snags, resulting in a downward trend for snag recruitment (USDA 2002c).

However, drought and insect mortality have created snags in habitat within and outside the project area within a fairly rapid timeframe resulting in an increase in localized snag recruitment. The rate and extent of tree mortality in the future is not known. Mortality is expected to continue at a slower rate if wet years are in the forecast. The extent of mortality may increase if dry years

are in the forecast because drought mortality will continue and drought will facilitate insect infestation and die off.

Cumulative Effects of Alternatives 1 and 3

The area of cumulative effects for this species is the pine habitat types on the Deep Lake, Walnut, Pickett Lake, Padre Canyon, Anderson Springs and the Mud/Tinny Allotments.

Overgrazing in the past, combined with fire suppression and favorable climatic conditions, has probably contributed to the development of dense stands of young to middle-aged timber, an important habitat component for this species, but these dense stands are susceptible to high intensity, stand-replacing fires. Cumulative effects from past logging include the loss of large trees and the loss of old-growth stands, reducing snag recruitment. In general, cattle and wildlife grazing can cumulatively impact this species by decreasing forage quality and quantity.

Wildfire can result in the loss of trees and snags with negative impacts to this species habitat. It can also result in decreased water availability and increased runoff. There were two recent fires that created about 20,000 acres of openings in the pinyon-juniper woodland and, to a lesser extent, in the ponderosa pine stringers found in Padre, Mormon, Yellow Jacket and Elliott Canyons. The majority of the fires was on the Padre Canyon Allotment and burned in pinyon-juniper habitats, which are not considered habitat for the cordilleran flycatcher. The ponderosa pine stringers involved in these fires may have been habitat, which is now lost as a result of the fires.

Direct, Indirect and Cumulative Effects of Alternative 2

No effects would occur to Cordilleran flycatchers from cattle grazing if this alternative was implemented. No other actions are proposed.

Purple Martin

Purple martins are an uncommon summer resident in ponderosa pine (Morrall and Coons 1996, USDA 2000b). This species has been nearly extirpated from ponderosa pine forests since fire suppression has resulted in much denser conditions and logging has reduced the number of snags and large old trees. Breeding bird survey (BBS) data indicates that this species is static to slightly declining in the project area.

Environmental Consequences

Direct, Indirect, and Cumulative Effects of All Alternatives

The area of cumulative effects for this species is the pine habitat types on the Deep Lake, Walnut, Pickett Lake, Padre Canyon, Anderson Springs and the Mud/Tinny Allotments.

Effects are similar to those for the Cordilleran flycatcher. Habitat loss, especially snags and large old trees, is the primary concern with purple martins. Cattle grazing is not expected to impact this species. As with the Cordilleran flycatcher, there may be some long-term cumulative impacts from overgrazing in habitat for this species, but moderate grazing levels do not result in loss of snag recruitment or large old trees. Moderate grazing at levels of 21 to 50 percent utilization or less are considered to have no impact on habitat for this species. No other actions are proposed that would impact this species.

Pinyon-Juniper Habitat Type Priority Species: Pinyon-juniper habitat is some of the most common within the project area. Partners in Flight have identified five priority bird species of concern for this habitat type: gray flycatchers, pinyon jays, gray vireos, black-throated gray

warblers, and juniper titmouse. Table 22 lists the habitat needs for each of these species. Juniper titmouse was addressed in detail under the “Management Indicator Species” section, and the project area is not considered habitat for gray vireos, so these species will not be discussed here.

Table 22. Pinyon-juniper habitat migratory bird species on the Walnut Canyon Allotment

Species	Vegetation Composition/ Structure	Abiotic/Landscape Factors	Special Factors
Gray Flycatcher	-Primary: pinyon pine and/or juniper, with an open overstory of ponderosa pine. -Larger stands of PJ with open understory, some areas with sagebrush. -May need some ground cover to support insect populations for foraging. -Larger, taller stands of sagebrush and greasewood.	-Elevation 4,500 to 7,500 feet, locally to 9,000 feet. -Mid to late successional stages. -Edge effect and fragmentation do not appear to be an issue.	-Brown-headed cowbird host (may be increasing). -Insectivore low forager; often ground gleaner.
Pinyon Jay	-Breeds in pinyon and ponderosa pine. -Usually in pinyon-juniper where pinyon is dominant. -Over 85 percent of nests found in bottom half of canopy. -Commonly in extensive stands of pinyon-juniper with open physiognomy. -May increase as middle and understory decrease.	-Nest and cache on south side of trees. -Elevation 5,000 to 7,500 ft. -May key in on warmest microclimate for nesting. -Mid to late successional (pine nuts in mature trees). -Use extensive stands for foraging, colony may have up to an 8 square mile home range.	-Roost and nest colonially up to 250 individuals. -Only one nest per tree, usually. -Communal feeders of fledglings between 3-6 weeks old. -Long-term pair bonds. -Coevolved with pinyon trees. -May suffer from common raven predation.
Black-throated Gray Warbler	-Mostly pinyon. -Also commonly occurs in Madrean oak/pine-oak in southeastern AZ w/shrub component. -In taller and denser PJ woodland. -Usually nest 2-15 ft. -Low to mid-story nester. -Forage most often in pinyon.	-Not found where juniper becomes dominant. -In PJ, usually between 4,700 and 8,200 ft. in AZ. -Locally below 6,500 feet in PJ. -Commonly found in lower elevations in southeastern AZ habitats. -May prefer woodlands with interspersed shrubby openings. -Successional stage: mid to late pinyon woodland.	-Brown-headed cowbird parasitism occurs, but effect unknown. -Forages low to mid-canopy, foliage gleaner.

Gray Flycatchers

Gray flycatchers primarily occupy pinyon pine and juniper, or ponderosa pine with an open overstory. These birds may need some ground cover to support insect populations for foraging. Larger, taller stands of sagebrush and greasewood are also used.

The status of gray flycatchers is expected to be static to increasing and expected to be common in the project area. Large-scale chaining and juniper pushes were done in much of the pinyon-juniper vegetation types on Anderson Mesa. As a result, large acreages were affected with few trees being left regardless of size, age, or value from a wildlife perspective. These early treatments greatly reduced the availability of mature stands of pinyon and juniper trees tied mainly to rocky, inaccessible sites.

Environmental Consequences

Direct and Indirect Effects of Alternatives 1 and 3

Impacts on gray flycatchers are usually related to breeding habitat loss and modification of pinyon-juniper woodlands that has occurred through chaining, clearing, and burning of large, mature woodland tracts for cattle and wildlife forage, house and road development, and firewood cutting.

Grazing by wildlife and cattle reduces ground cover, inhibits regeneration of shrubs, and increases local cowbird populations (Latta et al. 1999). Cattle grazing in the project area is expected to occur at a level that maintains grass cover and the shrub component, although there would be some impact to grass and shrubs. Gray flycatchers may get parasitized when grazing occurs in nesting habitat during the nesting season. This is offset by waterlot schedules that rest or vary the timing of grazing in gray flycatcher habitat, so that not all nesting habitat has the potential for parasitism every year. No other actions are proposed in habitat for gray flycatchers.

Cumulative Effects of Alternatives 1 and 3

The area of cumulative effects for this species is the pinyon-juniper habitat types on the Pickett Lake, Padre Canyon, Deep Lake, Walnut, and Anderson Springs Allotments.

Cumulative effects on gray flycatchers include cattle grazing in adjacent areas, wild ungulate grazing, vegetative treatments in adjacent areas, prescribed and natural fires, house and road development, firewood cutting, and recreational uses.

Cumulative effects from prescribed and natural fires are less common, but have similar impacts to grazing and chaining and clearing of pinyon-juniper woodland depending on fire intensity. Intense wildfires have the potential to destroy nesting habitat, while less intense fires can have short-term impacts on vegetative ground cover and prey availability. On the Padre Canyon Allotment there were two recent fires that created about 20,000 acres of openings in the pinyon-juniper woodland and, to a lesser extent, in the ponderosa pine stringers found in Padre, Mormon, Yellow Jacket and Elliott Canyons. The majority of these fires burned in mature pinyon-juniper habitats and will result in a loss of habitat for gray flycatchers.

Development of roads and subdivisions has the potential to permanently destroy nesting habitat, as well as provide a permanent source of disturbance to habitat that survives. Bird feeders, cattle and/or horses in subdivisions create a food source and attractant for cowbirds and facilitate parasitism in surrounding areas.

Firewood cutting has the potential to alter or destroy nesting habitat, as well as provide a source of disturbance during nesting.

Cumulative effects from recreational use can include disturbance to individual birds during nesting and alteration or destruction of nesting habitat. Pinyon seed collectors, off-road vehicle users, campers, picnickers, and antler hunters can all disturb nesting birds or impact their habitat.

Direct, Indirect, and Cumulative Effects of Alternative 2

No effects would occur to gray flycatchers from cattle grazing if Alternative 2 was implemented.

Pinyon Jays

Pinyon jays are common to uncommon permanent residents in the pinyon influenced portion of the project area (Morrall and Coons 1996).

Three major factors are considered to affect the long-term success of pinyon jays: (1) size of pinyon pine seed crops; (2) amount of nest predation; and (3) harshness of the physical environment, particularly the amount of snow during the nesting season (Marzluff and Balda 1992). Cattle grazing does not directly affect this species. This species is expected to be greatly affected by drought and beetle kill that has occurred recently and could continue in the foreseeable future.

Pinyon jays are thought to be relatively stable in Arizona. Mixed stands of pinyon-juniper occur over large areas and pinyon trees are heavily impacted by drought and beetle kill. In general, trees greater than 75 years old are preferred in large numbers. Pinyon jays were common to the project area prior to beetle kill. Their presence and breeding behavior is dependent upon the availability of pine seed crops.

Environmental Consequences

Direct, Indirect and Cumulative Effects for Alternatives 1 and 3

None of the grazing or grazing related activities in any of the alternatives should have an impact on these species due to lack of impact to pinyons. Therefore, there are no direct, indirect or cumulative effects.

Direct, Indirect and Cumulative Effects of Alternative 2

Implementation of this alternative would have no impact on pinyon jays from either cattle grazing or associated vegetation treatments. No actions are proposed.

Black-throated Gray Warblers

Phillips et al. (1964) described black-throated gray warblers as common summer residents in pinyon pine-juniper woodlands. This species favors open woodlands and is commonly encountered nesting in pinyon-juniper woodlands. This species is encountered much more frequently in tall stands with a higher density of mature pinyon pine. During Arizona Breeding Bird Atlas surveys, they were frequently absent in drier stands primarily composed of juniper (Corman and Wise-Gervais 2005). Habitat on the project area is primarily found below Anderson Mesa Rim where there are large pinyon, and ponderosa pines are interspersed with juniper and pinyon. This species is thought to be stable or slightly increasing in Arizona. They are common within the project area and are considered to be stable to increasing.

Environmental Consequences

Direct, Indirect Effects for Alternatives 1 and 3

None of the grazing or grazing related activities in any of the alternatives should have an impact on these species due to lack of impact to pinyons. Therefore there are no direct, indirect or cumulative effects.

Direct, Indirect and Cumulative Effects of Alternative 2

Implementation of this alternative would have no impact on black-throated gray warblers from either cattle grazing or associated vegetation treatments. No actions are proposed.

High Elevation Grassland Habitat Type Priority Species: High elevation grassland habitat types are common on the project area particularly in the Observatory and Youngs Lake pastures. There are few dry meadows within the ponderosa pine vegetation types along the western portion of the project area. Partners in Flight have identified four species of concern for high elevation grasslands: ferruginous hawks, Swainson's hawks, burrowing owls, and grasshopper sparrows (see Table 23).

Table 23. High elevation grassland habitat migratory bird species on the Walnut Canyon Allotment

Species	Vegetation Composition/ Structure	Abiotic/Landscape Factors	Special Factors
Ferruginous Hawk	-Scattered, isolated junipers for nesting. -Sparsely vegetated grassland. -Nest on elevated areas.	-Elevation: 4,900 to 6,200 ft. -Nest sites in isolated junipers, ledges, knolls, rock outcrops or pillars, cliff faces. -Nests are placed in open with grand view. -Shows no preference for shading.	-Occur where larger populations of prairie dogs, ground squirrels, rabbits, and pocket gophers exist. -High sensitivity to human disturbance around nests.
Swainson's Hawk	-More grass and less small woody shrubs than Ferruginous Hawk habitat. -Sparse shrublands, small, open woodlands. -Nest trees include: cottonwood, catclaw acacia, tall cholla, and juniper. -Will forage in agriculture fields, but the crop cannot be taller than local grass; prey difficult to locate. -Nest in small trees in smaller clumps, wind breaks, woody washes especially when adjacent to red-tailed hawks.	-Elevation 4,900 to 7,000 feet, locally to 9,500 feet in the White Mountains. -Prefer large expanses of grasslands with interspersed trees or large shrubs. -Primarily a tree nester, but also nests on utility poles, windmills.	-Eat grasshoppers during migration and on wintering grounds. Foods: lizards, snakes, birds, ground squirrels, voles, pocket gophers. -Non-breeders hunt communally and eat primarily insects. -not as sensitive to human activity as ferruginous hawk.
Burrowing Owl	-Grasses and plant communities in early succession. -Grasses and plant communities in early successional stage. -Rock outcrops that attract burrowing mammals to provide burrows.	-Elevation 4,900 to 7,000 feet -Little to no slope. -Dry, open, short grass, treeless plains, often associated with burrowing mammals. -Need perches: fencepost, mounds, power lines, etc. -Early successional stage (grassland).	-Limited to areas with active small and/or burrowing mammals. -Food: insects (grasshoppers, crickets, beetles) and small mammals, herps, birds.

Grasshopper sparrows are not known from the project area and will not be discussed. In Arizona, grasshopper sparrows are limited to southeastern Pima County (Buenos Aires National Wildlife Refuge) east through Santa Cruz and southern Cochise County and south into northern Sonora, with a separate population breeding in the plains grasslands of Chino Valley in Yavapai County (Latta et al. 1999).

Ferruginous and Swainson's Hawks

Ferruginous hawks are uncommon winter residents and fairly common transients (Morrall and Coons 1996). They are regularly spotted in late fall in open grasslands on the Anderson Springs Allotment about 6 miles from the project boundary. There is fall migratory use in grasslands on nearby Pickett Lake Allotment, but no known nesting sites.

Swainson's hawks are rare transients in ponderosa pine grasslands and in pinyon-juniper grasslands at lower elevations (Morrall and Coons 1996). Swainson's hawks occupy grassland habitats within the project area, although habitat is limited to short grass prairie habitats. Woodland encroachment into these grasslands and global decreases in this species' numbers are expected to result in static to decreasing numbers of Swainson's hawks within the project area.

Environmental Consequences

Direct and Indirect Effects for Alternatives 1 and 3

Impacts are generally related to prey availability and habitat loss. For ferruginous hawks, rodents (e.g. prairie dogs) are important as prey for this species. Many prairie dog colonies were eradicated in the early part of the century and have never recovered. Prairie dog control is not part of management of cattle on these allotments.

Impacts on Swainson's hawks are generally related to habitat loss and alteration. The shift from open grasslands to scrublands and pinyon-juniper woodlands has reduced habitat availability for prey species, primarily insects.

Cattle grazing can reduce cover and forage for prey. Grazing at the 35 percent utilization level will result in sufficient residual biomass, seed head production, and adequate species composition of the understory. Cattle grazing, as proposed in any alternative, is not expected to impact this species to any great degree.

Cumulative Effects for Alternatives 1 and 3

The area of cumulative effects for this species is the grassland habitats on the Deep Lake, Walnut, Pickett Lake, Padre Canyon and Anderson Springs Allotments.

The shift from open grasslands to shrublands and pinyon-juniper woodlands has reduced habitat availability for prey species. Woodland encroachment would continue to occur on the Padre Canyon, Walnut and Walnut Canyon Allotments since no vegetation treatments are proposed. Vegetation treatment on the Pickett Lake and Anderson Springs Allotments would improve habitat. Long-term negative trends in loss and alteration of grasslands resulting from combined climate change, grazing, and fire suppression would continue.

Prescribed and natural fires may have both positive and negative impacts. Positive impacts would include restoration and maintenance of grassland sites through removal of woody species encroaching into native grasslands. Negative short-term effects could occur to prey species habitat. Decreased food and cover can result from fires, but over time, burning would enhance

prey species habitat by increasing nutritional value of forage species and increasing plant vigor and cover.

Direct, Indirect and Cumulative Effects of Alternative 2

If Alternative 2 were selected, no cattle grazing or improvements would be implemented so there would be no direct, indirect or cumulative effects associated with the project.

Burrowing Owls

Burrowing owls are an uncommon grassland species in the project area but have been documented in the area. Burrowing owls are considered to be declining throughout the majority of their range. Population numbers vary with burrow availability. Within the project area, they are expected to be stable to slightly declining.

Environmental Consequences

Direct, Indirect, and Cumulative Effects for Alternatives 1 and 3

The presence of nest burrows is a critical habitat requirement for this species. Indirect effects of cattle grazing can include prairie dog control that reduces prairie dogs and the number of burrows available for burrowing owls. No prairie dog control would be done within the project area, so no impacts on burrows should occur. As described for the ferruginous hawk and Swainson's hawk, woodland encroachment would continue to occur since no vegetation treatments are proposed. Long-term negative trends in loss and alteration of grasslands resulting from the combination of climate change and fire suppression would continue. Vegetation treatments as proposed on the adjacent Pickett Lake, Anderson Springs and Bar T Bar Allotments that benefit grasslands will be beneficial for this species when implemented.

Cumulative effects for this species are the same as those described for the ferruginous and Swainson's hawks.

Direct, Indirect and Cumulative Effects of Alternative 2

If Alternative 2 were selected, no cattle grazing or improvements would be implemented so there would be no direct, indirect or cumulative

effects associated with the project.

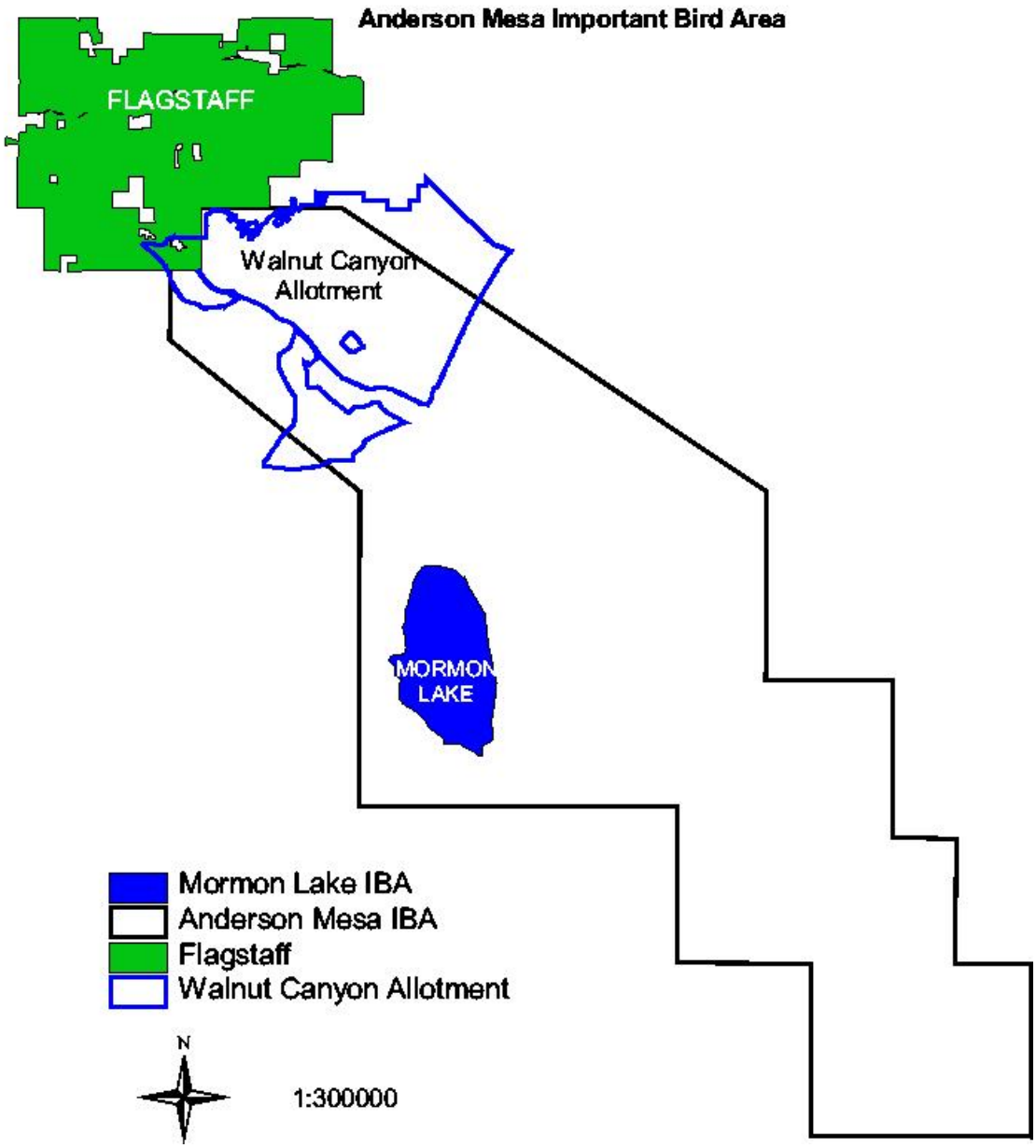
Important Bird Areas

The Important Bird Areas (IBA) program is an international, site-based approach to bird conservation. The IBA program recognizes that there are places on the landscape that provide exceptionally valuable or essential habitat for one or more species of birds, including breeding, wintering or migratory habitat. The Northern Arizona Audubon Society nominated Mormon Lake and Anderson Mesa as IBAs. The nominations were submitted to and accepted by Arizona Partners in Flight.

The Anderson Mesa IBA is diverse, encompassing more than 207,000 acres on and adjacent to Anderson Mesa and the Walnut Canyon Allotment. The habitats found within this IBA include: ponderosa pine, mixed conifer, aspen, pinyon-juniper, and grasslands to include meadows, wetlands, springs, reservoirs and high elevation riparian habitats. The Anderson Mesa IBA encompasses the entire Mormon Lake IBA (see Figure 18). Because the Anderson Mesa IBA encompasses all habitats found in the Mormon Lake IBA, the discussion will focus on the Anderson Mesa IBA.

Figure 18. Mormon Lake and Anderson Mesa IBAs in relationship to Walnut Canyon Allotment

Figure IBA-1. Map of the Mormon Lake and Anderson Mesa Important Bird Areas.



The Anderson Mesa IBA is particularly important to waterfowl species that use its seasonal and semipermanent wetlands and reservoirs. Climatic conditions vary widely as the amount of precipitation dictates the amount of wetland habitat available. During wet cycles this area provides a diversity of waterfowl habitat, ranging from semipermanent wetlands to closed basin stock tanks. Migrating waterfowl may use the wetlands for foraging, nesting, and resting during migration. The reservoirs within these IBAs are valuable as resting and to a lesser extent for foraging. These reservoirs do not provide much habitat for nesting waterfowl as they have very little emergent vegetation.

Springs are particularly important to neotropical migratory birds. The vegetative conditions surrounding springs provide cover for resting nesting and foraging. As a Forest Plan guideline, utilization in springs is limited to 20 percent.

High elevation grassland habitat types are interspersed throughout the analysis area, with the largest acreages occurring on Anderson Mesa on the Pickett Lake Allotment. There are a few dry meadows within the ponderosa pine vegetation types in the west and south end of the project area, but these are generally small in size and make up only a small proportion of the total project area acreage. Grasslands and meadows are important to a wide variety of birds including raptors and neotropical migratory birds.

Environmental Consequences

Cattle grazing on the Walnut Canyon Allotment does not occur in mixed conifer, aspen or high elevation riparian habitats. Furthermore, cattle grazing does not affect the structure of ponderosa pine or pinyon-juniper habitats. Therefore, these habitats would not have direct, indirect, or cumulative effects associated with cattle grazing.

Direct and Indirect Effects for Alternative 1

Cattle would not be permitted to graze in seasonal or semipermanent wetlands from June 1 to July 15 in order to provide protection during the waterfowl nesting season. In this alternative, wetland and upland nesting cover may be grazed after July 15, potentially reducing the amount of residual vegetation available the next breeding season.

Alternative 1 maintains a 35 percent utilization guideline. According to the range and watershed report [PRD 40], this alternative would maintain rangeland conditions, which includes the grassland habitats of the IBA.

Based on the above discussion of a deferment of grazing in the season and semipermanent wetlands from June 1 to July 15 and that a 35 percent utilization level would maintain rangeland condition, the Anderson Mesa and Mormon Lake IBAs would not be affected by implementing Alternative 1

Cumulative Effects for Alternative 1

The cumulative effects area is the Anderson Mesa IBA.

Cattle grazing occurs throughout the Anderson Mesa IBA with the exception of the Lake Mary Allotment, Mormon Lake, Long Lake north and other fenced wetlands across the mesa. Additionally, the Bar T Bar-Anderson Springs and Pickett Lake and Padre Canyon FEIS made decisions to implement additional wetland exclosures. These wetland exclosures would improve habitat conditions during nesting and fall migrations by providing additional cover and forage. Mormon Lake is the largest wetland in the IBAs, covering more than 3,500 acres. Because of the shallow water, wetland vegetation grows across the entire area of this lake, providing exceptional habitat for a wide variety of birds during the breeding and migration seasons. Mormon Lake is the

premiere natural wetland in Arizona and would not be affected by the actions proposed in this analysis.

As per Forest Plan direction, the utilization guideline for woody riparian vegetation is 20 percent. This utilization guideline is adequate to maintain current spring conditions.

According to range monitoring data for the grasslands of Anderson Mesa, the rangeland trends are stable to improving. Continued grazing of grasslands within the IBA is not likely to become detrimental to the grasslands of the IBA.

The Forest Service and Arizona Game and Fish Department have been active in restoring grasslands within the IBA. Grassland restoration includes thinning small trees that are invading grassland on Anderson Mesa. The grassland restoration efforts should increase and improve the amount and availability of grassland habitats within the IBA.

In consideration with other activities that affect IBAs, the cumulative effect of re-authorizing grazing under Alternatives 1 and 3 would not change the above determinations for each alternative.

Direct, Indirect and Cumulative Effects for Alternative 2

Alternative 2 is the no action alternative. There would be no direct, indirect or cumulative effects from cattle grazing.

Direct, Indirect, and Cumulative Effects for Alternative 3

Alternative 3 proposes seasonal and semipermanent wetland fencing which would provide protection all year and would provide residual vegetation during fall migration and for the next breeding season.

Alternatives 3 maintain a 35 percent utilization guideline, which should provide sufficient seed production. The effects of utilization are also the same as described under Alternative 1.

Based on permanent exclusion of grazing at Prime Lake, Fisher/Fry Lake, Youngs Lake and Lost and Dry tanks (except for lanes) and that the proposed utilization guidelines would maintain rangeland condition, the Anderson Mesa and Mormon Lake IBAs would not be affected, and may improve by implementing Alternative 3.

Cumulative effects are the same as those described for Alternative 1.

Economy

Although the contributions of grazing to local economies and county government is small in comparison to other businesses and funding sources, this section will discuss the effects and differences between each alternative based on jobs, national forest fees, and other revenues.

Domestic cattle grazing contributes to the livelihood of the Walnut Canyon permittee as well as to the economy of local communities and nearby counties. Individual allotments provide incremental contributions to local economies, so changes in several allotments could cumulatively impact the rural economy. The Walnut Canyon Allotment is in Coconino County. This allotment is currently permitted for 350 head of cattle, so the economic effect is relatively low for the local communities and nearby counties. The presence of cattle grazing does not limit hunting or recreational activities on lands contained within the allotment [PRD 56].

Income associated with cattle grazing represents a small percentage of the Flagstaff area economy. The nearest community to the allotment is Flagstaff. The Flagstaff economy is large and fairly diverse and grazing and associated revenues make up a very small portion of that economy. Permittees contribute a small percentage to county tax revenues. Cattle grazing permit revenues are a small percentage, but an important contributor, to the funds Coconino County receives from national forest grazing fees.

Cattle grazing operations make a larger contribution to the economy of rural landowners in the area. There are 40 acres of private land on the allotment, a portion of which is owned and operated by the permittee. Outside of the Walnut Canyon Allotment, some of the private land is owned and operated as ranches by different permittees.

The economy of Coconino County gains revenue from several sources: county sales taxes, state-shared sales taxes, highway user revenues (gasoline taxes), property taxes and national forest fees. The greatest revenues come from the county and state-shared sales taxes. National forest fees—which include payments from timber harvesting, mining, recreational uses, and cattle grazing—are an important part of county revenues, but provide only a fraction of available funds. Coconino County also receives fees from uses on the Kaibab and Apache-Sitgreaves National Forests. Coconino County uses national forest fees for highway maintenance and schools. The Walnut Canyon permittee directly contribute revenues to Coconino County through property taxes.

Environmental Consequences

Estimates of direct and indirect jobs and payments to Coconino County from Federal receipts provide a relative comparison of economic effects that could occur due to changes in cattle grazing. Table 24 estimates the effects expected on these indicators in Coconino County from implementing Alternatives 1 through 3 on the Walnut Canyon Allotment.

Quantifiable factors such as economic costs and outputs, along with projected animal months (AM) or animal unit months (AUM) have been used to help describe the economic effects of grazing on the Walnut Canyon Allotment. An economic analysis program called Quicksilver was used to calculate these factors [PRD 48].

Table 24. Economic effects for Coconino County by alternative

Economic Effects	Alt 1	Alt 2	Alt 3
Direct and Indirect Jobs* (#)	4	0	4
Federal Payments to Counties**	$687	0	$687

*About 1.14 jobs per 100 cattle

**The amount shown under the alternatives is a projection of 25 percent of all grazing fees to Coconino County at the 2006 grazing fee rate of $1.56. Not shown in this amount are the taxes that counties collect on range structural improvements. These taxes are based on a percentage of the assessed values of those improvements and the materials purchased for the construction of these improvments.

Table 25. Investment analysis by alternative

Investment Analysis	Alt. 1	Alt. 2	Alt. 3
Forest Service			
Present Value of Benefits[1]	$25,029	0	$25,029
Present Value of Costs[2]	($27,362)	($13,209)	($46,986)
Present Net Value[3]	($2,333)	($13,209)	($21,957)
Benefit/Cost Ratio[4]	0.91	0	0.53
Permittee			
Present Value of Benefits	$132,847	0	$132,847
Present Value of Costs	($53,047)	0	($79,656)
Present Net Value	$79,780	0	$53,191
Benefit/Cost Ratio	2.50	0	1.67
All Partners			
Present Value of Benefits	$157,876	0	$157,876
Present Value of Costs	($80,409)	($13,209)	($126,642)
Present Net Value	$77,466	($13,209)	($31,234)
Benefit/Cost Ratio	1.96	0	1.25

Note: Dollar figures in ( ) indicate a negative amount, or loss of money

[1]*Present value of benefits* represents the income generated from grazing on the Walnut Canyon Allotment by the permittee, along with the present value of the grazing fees collected by the Forest Service.

[2] *Present value of costs* represents the cost of maintenance and range improvements (for the permittee), along with the costs of range inspections, permit administration, monitoring and materials for range improvements (for the Forest Service).

[3] *Present net value* represents present value of benefits minus present value of costs.

[4] *Benefit/cost ratio* represents the present value of benefits divided by the present value of costs.

Although projections from the Quicksilver model are precise in measurement, they serve best as an indicator of change rather than a precise measurement. Additionally, identifying some of these effects is difficult, if not impossible, as economic effects tend to deal with personal issues.

The investment analysis anticipates the rate of return for the projected expenditures by the permittee and Forest Service on the Walnut Canyon Allotment. Measures used to conduct an investment analysis include: present value of benefits, present value of costs, present net value and the benefit/cost ratio. Table 25 displays the results of this investment analysis, by alternative, for the Walnut Canyon Allotment [PRD 48]. These figures have been rounded to the nearest dollar.

Effects to the Walnut Canyon Permittee for All Alternatives

Gross revenue estimates are created by estimating the amount of calves produced each year for each alternative. For calves, the following figures are used in the calculations, although these figures may vary, depending on current market prices: 90 percent cow to calf ratio, 500 pounds per calf at $0.80 per pound. The estimated gross annual revenue for Alternatives 1 and 3 is $126,000 per year. In Alternative 2, the estimated gross annual revenue is $0. These gross revenue figures are somewhat misleading because cattle do not graze on the Coconino National Forest yearlong. Cattle graze on the forest 6 months in Alternatives 1, and 3, and are on private or state lands the remainder of the year.

In Alternative 2, the permit for grazing cattle on this allotment would be cancelled. The permittee would lose future potential revenue derived from the sale of cattle that would have been produced on the Walnut Canyon Allotment. Private land owned by the permittee could also be affected. When the public land permit associated with the ranch operation is lost, the permittee's economic ability to maintain a ranching operation may be greatly diminished or eliminated. The Walnut Canyon Allotment represents approximately 50 percent of the land base for this cattle operation, all of their upper elevation rangeland. Without the public land permit, the base property controlled by the permittee would be greatly affected. Some of their land is located within the boundary of the Coconino National Forest. No complete projections were made for the permittee's actual costs, the ability to cover costs, or any supplemental income that may be available.

Effects to Local and Federal Economy for All Alternatives

In Alternative 2, the loss of the Walnut Canyon Allotment permits would eliminate $227 at the 2006 fee rate of $1.56/AUM for the current permit from the treasuries of Coconino County. This loss, by itself, is not substantial. The county would also lose revenues from taxes on structural improvements and the state would lose tax revenues based on the permittee's use of Federal lands. Since cattle grazing is not limiting recreational uses, we do not expect the local economy to be enhanced once cattle are removed.

Under Alternatives 1 and 3 ranching on the Walnut Canyon Allotment may help maintain current jobs within communities around this allotment and revenues for Coconino County and the state. If changes are made in the use of the Walnut Canyon Allotment in the future, contributions to state, county and local economies from fees, taxes and jobs associated with cattle grazing on this allotment would change accordingly.

The loss of direct and indirect jobs shown for Alternative 2 is also shown in Table 24. All jobs directly associated with the permit would be eliminated with this alternative. Some of the jobs indirectly associated with the permit (as outside businesses) would also be eliminated; however, some would still exist because other ranches and portions of communities that use ranching supplies and services on the Walnut Canyon Allotment also support these businesses.

Recreation, Scenery, and Social Environment

Recreation Opportunities

The aspect of cattle ranching that could affect recreation is fencing and whether or not these fences affect recreation access or enjoyment. The social aspect of whether or not people like to see cattle on the landscape is discussed under the Social Environment (Human Perceptions) subheading of this section. Currently the presence of cattle and the miles of fence on the

landscape allow for use and enjoyment of National Forest System lands. Crossing fence lines has not been a problem on this allotment as most forest system roads have cattle guards and gates, and the miles of fence is not access prohibitive. Levels of dispersed recreation are moderate to low across most of the allotment. Types of recreation activities on the allotment include hiking, biking, sightseeing, hunting, 4X4 driving, picnicking, fuel wood gathering and camping. These activities occur frequently on the allotment due to its close proximity to Flagstaff.

No wilderness areas exist on or near this allotment. There are 140 miles of forest roads within the allotment, with most only accessible by high clearance vehicle. Recreation opportunity settings that occur within the allotment include roaded natural, semi-primitive motorized and semi-primitive non-motorized. A portion of one Forest Service system trail, the Arizona Trail, passes through the area.

Environmental Consequences

The six miles of new fence proposed under Alternative 3 will not change recreation access opportunities. There is very little effect to access for recreation opportunities under any of the action alternatives. The effects are limited to the allotment itself and would have very little cumulative effect to other areas.

Road closures will be necessary at Youngs Lake and Prime Lake to maintain the integrity of the wetland exclosures. The roads at Prime Lake that would be closed include: #9479K (1.3 miles); 9479J (0.25); and 9479M (0.25 miles). Travel to Vail Lake would be routed around Prime Lake via road 129A. The roads at Youngs Lake proposed for closure include 9480Q (2.6 miles), 9480R (0.2 miles), and 9480S (0.75 miles). Alternative vehicle routes exist around these proposed closures. These road closures would be implemented when the fence is constructed at Prime Lake and Youngs Lake.

The closure of these forest roads will reduce access to an isolated portion of the allotment and Anderson Mesa. However; these roads were identified as high risk and recommended for closure during the Anderson Mesa Landscape Scale Assessment (USDA 2004). Reduced access could directly affect and thus cumulatively affect people wishing to drive to this area of the allotment. This reduced access with also provide an area where people can hike, walk, hunt and not have as many disturbances from motorized vehicles.

Due to the proposed fence at Prime Lake in Alternative 3, a walk-through access along the Arizona Trail for foot and mountain bike traffic would be built into the fence. Horse traffic would be routed to the east around Prime Lake. The rerouting of horse traffic would be done so swing gates would not be needed in the fence. The route around Prime Lake would add a short distance to the length of the trail, approximately 0.5 miles. There would be no direct, indirect or cumulative effects to foot and mountain bike traffic with the walk-through these recreationists will be able to continue along the main portion of the trail. There will be a direct effect to horseback riders, as they will have to travel approximately 0.5 miles around the exclosure.

Scenery

Scenic or visual resources are another aspect of the human environment. The majority of the Walnut Canyon Allotment is not immediately visible from busy road corridors. Most people see the allotment by driving on forest roads within the area.

People generally like to see grass-covered ranges with little bare dirt visible within the grass. In range management, this is measured as ground cover and consists of green grasses that have some seed heads and a healthy appearance; dead logs, sticks and needles that appear natural; full, green

shrubs; and wildflowers. Rangelands with good mixtures of these ground cover components tend to be healthy and healthy rangelands tend to be scenic. However, more wildflowers, considered scenic by most people, tend to grow in areas with poorer range conditions because many wildflowers are invader species (plants that out-compete grazed forage species).

Fences can decrease the beauty of areas. Although existing, older fences may be accepted as part of the scenery in some areas, new fences, especially across meadows, may not be. Other structures such as dirt tanks, water pipelines, cattle guards, drinkers and water storage tanks also affect visual aspects of landscapes. For example, a large metal trick tank located in the middle of a large opening may reduce scenic qualities in that opening. Most structures built in the past do not blend in with the natural landscape. However, these structures will remain on this allotment under any alternative.

Environmental Consequences

The majority of this allotment has vegetation that is scenic and this is expected to continue under all alternatives. All alternatives meet Forest Plan visual quality objectives (VQO) of *Retention*, *Partial Retention*, or *Modification* for MA 12 Riparian and Open Water (USDA 1987, pp. 172, 268) [PRD 38].

Some unsightly bare dirt patches occur around stock tanks, and bare dirt can naturally occur in closed basins when they are dry. These patches do not deter from the overall landscape view, but can affect people standing on or near the patch. The “Vegetation” section of this EA describes how each alternative will affect ground cover in these areas.

Alternative 1 would only maintain all current structures. Alternative 3 will maintain current structures and construct 6 miles of new fence. Exclosure fences would be constructed around the wetlands at Prime, Fisher/Fry, and Youngs Lakes, along with Dry and Lost Tanks. The majority (over 80 percent) of the proposed wetland fences will be built up in the tree lines, except for the lanes. This type of fence construction is preferable and will help meet the VQOs of *Retention* and *Partial Retention*. However, this option is not possible at all wetlands, either because of topography or lack of trees, and protection of the wetlands takes precedence over maintaining a VQO. In these instances, fencing around the wetland would meet the *Modification* VQO because it does not dominate the wide open, sweeping vistas characteristic of this area.

Alternatives 1 and 2 would have no direct, indirect, or cumulative effects to visual resources. The wetland fences proposed in Alternative 3 would only affect views at individual and separated sites. This is in addition to other wetland fences on adjacent allotments. However, Alternative 3 would have little overall cumulative effect to the scenic quality of Anderson Mesa.

Social Environment (Human Perceptions)

The current permittee of the Walnut Canyon Allotment are native to Arizona and ranching has been part of their lifestyle for a long time. Ranching makes up a good part of their income. The permittees contribute to the social structures of communities around this allotment by providing some direct and indirect jobs for residents of those communities and revenues for county, city, and federal governments. They also contribute to the lifestyle associated with ranching for their community, their employees, and other people associated with ranching in the area.

The number of people involved in ranching today in the Flagstaff area is very low compared to the rest of the population. There are 28 different permittees on the Coconino National Forest. Each of these permittees has a varying number of family members and ranch hands working with them.

Forest visitors vary widely in their reactions to seeing cattle on National Forests or other federal lands. Reactions depend on viewers' personal values, opinions and whether they are accustomed to seeing cattle. Tourists traveling through this allotment may stop to take pictures of a cow because to them this is a pleasant pastoral scene. But to wilderness buffs who dislike any kind of "unnatural" structures or animals on landscapes, the presence of cattle, which indicates the presence of humans, disrupts their perception of National Forests as truly wild places.

To campers or picnickers who like to go to the same places in which cattle may congregate, the presence or leavings of cattle in those areas may detract from their experiences or even cause them to move to different sites. This occurrence is rare on this allotment, because there is a low to moderate number of people camping here. The actual presence of cattle may not disturb horseback riders or hikers, but encountering several fences while traveling across an area may be inconvenient for them. Crossing fences has not been an issue raised on this allotment over the years. People traveling cross-country on foot generally climb over fences and horseback riders travel along fences until they find gates. The fence along the Arizona Trial at Prime Lake proposed in Alternative 3 will have a walk-through so they will not be inconvenienced as they walk, hike, or ride along this trail.

There are only a few small in-holdings of private land near the Walnut Canyon Allotment. Some of this property is owned by the permittee. Few complaints have been received over the years from cattle wandering onto private land. Arizona law requires landowners to fence their property if the presence of cattle is undesirable.

Environmental Consequences

Some forest visitors will not like livestock grazing near areas they choose for picnicking or dispersed camping, while other visitors may enjoy seeing livestock on the range. The number of cattle and amount of time cattle spend on the allotment would be the same under Alternatives 1 and 3. There would be no cattle present under Alternative 2 (No Action/No Grazing).

There may be more residents on private land over time if the land is developed. However, due to the small percentage of private land, conflicts should remain low. Not permitting cattle grazing on the Walnut Canyon Allotment (Alternative 2) may resolve direct conflicts between recreationists, homeowners, and grazing permittees and would satisfy the visual concerns of those who do not wish to see any cattle on the Coconino National Forest. However, for those who enjoy the pastoral scene and ambiance of the western lifestyle, removing cattle may detract from their experience and enjoyment of rural National Forest lands.

Those who believe cattle grazing are an appropriate use of public lands may not approve of removing cattle from this allotment. These people may not only express concerns about the impacts of not permitting cattle grazing on these allotment, but may also question the legitimacy of mutually beneficial land management goals. The uncertainty of short-term grazing permits may also be unacceptable to these people.

Alternative 2 would eliminate a source of income and possibly a way of life for the permittee of the Walnut Canyon Allotment and their employees. These changes may cause conflicts within the ranching community and could cause conflicts within the family of the permittee and their employees.

Alternatives 1 and 3 would keep the ranch operating, thereby maintaining the income of the permittees and their employees. As long as the ranch continues to operate, the permittee and their employees will help perpetuate the customs, traditions, and lifestyle long associated with cattle

grazing. This, in turn, will contribute to the rural sense of community in areas around this allotment.

These effects on the social environment are limited to the allotment and it is expected that any alternative would have little cumulative effect on adjacent allotments.

Cultural Resources

The cultural resources clearance report for this project documents the archeological inventory, results of consultations with tribes, and the determination of *no effect* in compliance with the National Historic Preservation Act (P.L. 89-665, as amended).

Numerous archeological surveys for other projects have been conducted throughout the years within the Walnut Canyon Allotment. As a result, about 28 percent (8,988 acres) of the allotment area has been intensively surveyed and 158 archeological sites have been located and recorded.

Archeological survey coverage and site types and densities for the Walnut Canyon Allotment are consistent with those of surrounding Anderson Mesa (Martine and Provencio 2004). Known heritage properties include a wide variety of features ranging from simple artifact scatters to historic cabin sites. As evidenced by 88 percent of known sites in the area, the major prehistoric occupation of the allotment was that of the Northern Sinagua (A.D. 700 to 1250). There is one Apache wickiup site dating to the early historic time period for the area (circa 1800). Euro-American use of the allotment is related to ranching, homesteading and railroad logging, with site dates ranging from the 1870s to the 1930s.

Archeological site distribution within the Walnut Canyon Allotment and on Anderson Mesa may be interpreted as a system of settlements designed to take advantage of various resources such as soil, water, and wild vegetation (Martine and Provencio 2004, Crossley 2005). Site density ranges from moderate to very high, and sites tend to cluster around springs, along seasonal wetlands, in canyons, and in the transition between ponderosa pine and pinyon-juniper vegetation zones.

Although Anderson Mesa is recognized by the Hopi as a traditional cultural property, its eligibility for the National Register has not yet been formally determined. There are no known specific plant gathering areas or traditional sacred sites within the Walnut Canyon Allotment. The tribes expressed no concerns regarding grazing and associated improvements within this allotment.

Environmental Consequences

Cattle grazing has occurred in the Southwest since European contact and has been a permitted activity on the Coconino National Forest since its inception in 1908 From the 1870s to the early 1920s, grazing of what would become the Walnut Canyon Allotment was heavy and unregulated. In addition, wild ungulates have ranged free, potentially in substantial numbers, throughout time. This resulted in a reduction of vegetative cover, which may have affected heritage resources through soil loss, erosion, and trampling. Subsequently, previous effects to cultural resources caused by historic cattle and wild ungulate grazing are considered status quo, or the existing condition. However, since the establishment of allotments and implementation of grazing management, the condition of known heritage resources inventoried are considered stable and, in many cases, are believed to have improved in condition, as vegetative cover has returned.

Impacts to heritage resources, especially archeological sites, can be generally defined as anything that results in the removal of, displacement of, or damage to artifacts, features, and/or stratigraphic deposits of cultural material. In the case of heritage resources considered eligible for

inclusion in the National Register of Historic Places, this can also include alterations of a property's setting or context. In the case of traditional cultural properties and sacred places, additional considerations may include alterations in the presence or availability of particular plant species.

Heritage resources, depending on their nature and composition, are subject to several different types of impacts from activities associated with grazing. Direct impacts from grazing are generally considered to be those resulting from concentrated cattle trampling or construction. Indirect impacts can include erosion and changes in vegetative composition and density that alter the setting and geographic context of sites.

Since site condition assessments for heritage resources are not available for any time prior to the introduction of European cattle species to the Southwest, some level of effect is assumed to have contributed to the current condition of all sites on the Walnut Canyon Allotment. Given the nonrenewable nature of heritage resources, particularly prehistoric and historic archeological sites, any portion of them that has been damaged or removed diminishes their cultural and scientific value permanently. Therefore, all effects to heritage resources are considered cumulative.

Based on a history of observation and consultation with the State Historic Preservation Officer (SHPO), managed grazing is not considered in and of itself to constitute an effect on heritage resources when the grazing strategy is designed to match herd size with capacity and distribute cattle as evenly as possible across the allotment in order to avoid localized concentrations of animals and the resultant impacts to soils and vegetation associated with intense trampling. Changes in grazing strategy are likewise not considered to have an effect provided that whatever new strategy is implemented does not alter these conditions.

Adverse effects can be foreseen if a proposed grazing strategy were to introduce cattle into an area not known to have been grazed historically. Adverse effects may also be expected when a grazing strategy proposes a shift to a more intensive system where higher permitted numbers or high intensity/short duration schedules would concentrate cattle into confined areas where either the absolute or relative stock density would cause a significant increase in surface disturbances due to trampling above existing levels. This could result in either direct or indirect adverse effects depending upon the degree of trampling resulting from localized concentration and upon the presence or absence of heritage resources in the concentration area, the nature of the resource and its resistance to such impacts, and the distance to other heritage sites.

Prehistoric rock shelters are an example of a site type vulnerable to concentrated use impacts because accessible shelters have the potential to be used by cattle to escape inclement weather or the sun. As a result, rock shelters can become an area where trampling occurs and dung deposits build. Because fragile, perishable archeological resources occur within these shelters, these sites need to be monitored not only for human use, but for impacts from cattle. If such impacts occur, these shelters should be isolated from grazing. There are four such shelters known to exist in the Walnut Canyon Allotment. Two of these rock shelters were fully excavated in the 1960s; one shelter is located in the South Newman pasture in an area that will not be grazed; and it is uncertain if the fourth shelter even represents a site since only one artifact was present, which would indicate, at the most, a single use camping site. The one possible rock shelter that is located in an area where grazing might be allowed, would continue to be monitored for impacts.

For the most part, areas where impacts are likely to occur due to ground disturbance tend to be associated with the construction of range improvements which are designed to provide water or to concentrate and hold stock for roundup or shipping. The greatest potential for direct adverse

effects to heritage resources is associated with the construction of range improvements. These areas should be surveyed and all archeological sites avoided prior to implementation.

Direct, Indirect and Cumulative Effects Common to All Alternatives

All of the alternatives other than the no action/no grazing alternative (Alternative 2) would keep cattle numbers static. In the present case, none of the alternatives proposed would constitute an effect on heritage resources within the Walnut Canyon Allotment.

Of the 154 previously recorded sites, four were previously determined eligible for, two were determined ineligible for, and one is listed on the National Register of Historic Places. All other sites are considered potentially eligible for the National Register of Historic Places and will be protected until testing or additional information is available that would allow formal determinations of eligibility to be made. Any proposed range improvements will be surveyed for cultural resources prior to implementation; located sites will be marked for avoidance and will be avoided during construction. If any new sites are discovered during construction activities, they are to be reported to the district or forest archeologist and ground-disturbing work would be halted. By avoiding archeological sites during construction and in areas of concentrated use, there should be no direct effects to cultural resources.

Consultation with the Arizona State Historic Preservation Office (SHPO) for this project's affects to heritage resources and compliance with Section 106 of the National Historic Preservation Act is underway. Consultation with 13 tribes resulted in no specific concerns about the effect of the Proposed Action or alternatives. Since there are no direct effects to cultural resources, there would be no indirect or cumulative effects to cultural resources based on other past, present, or reasonably foreseeable future actions.

Air Quality

The Walnut Canyon Allotment and adjacent lands are within the Little Colorado River Airshed [PRD 54]. There are no Class I Airsheds or PM_{10} Nonattainment Areas (particulate matter ≤ 10 microns) within or adjacent to the allotment. The closest Class I Airshed occurs in the Sycamore Canyon Wilderness, which is approximately 20 miles west (and upwind) of the Walnut Canyon Allotment. The closest PM_{10} Nonattainment Area is located in Payson, Arizona, about 60 miles south of the Walnut Canyon Allotment. Both of these sensitive airsheds are outside the Little Colorado River Airshed.

Particulate matter is a collective term describing very small solid or liquid particles that vary considerably in size, geometry, chemical composition and physical properties (ADEQ 2004). Produced by both natural processes (pollen and wind erosion) and human activity (soot, fly ash, and dust from paved and unpaved roads) particulates can contribute to reduced visibility and chronic human respiratory problems.

Environmental Consequences

Under the action alternatives, short-term, isolated effects to the air quality on the Walnut Canyon Allotment may occur from dust generated by cattle as they are herded and transported, or from odor in the immediate vicinity of the animals. Driving on unpaved roads can also generate dust. No burning is proposed under any alternative, so there would be no smoke emissions.

This part of Arizona is windy most of the year and much dust is generated naturally when conditions are dry. On the other hand, consistently windy conditions also keep the area well ventilated, preventing particulate matter from collecting or lingering in the area. Because direct

effects from cattle grazing on the Walnut Canyon Allotment are of short duration and not measurable, there are no effects to accumulate with grazing activities and driving on unpaved roads in adjacent allotments (also short-term and isolated). Therefore, cattle grazing on the Walnut Canyon Allotment would not have a measurable cumulative effect on overall air quality.

Other Required Disclosures

NEPA at 40 CFR 1502.25(b) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with…other environmental review laws and executive orders."

Consultation with the U.S. Fish and Wildlife Service and the Arizona State Historic Preservation Office has been initiated, as required under the following acts and laws:

- Fish and Wildlife Service, under the Endangered Species Act regulations, for projects with threatened or endangered species and habitat.
- State Historic Preservation Office under the National Historic Preservation Act for causing ground-disturbing actions in historical places.

The Forest Service does not need to consult with the National Marine Fisheries Service because there are no threatened or endangered marine mammals or anadromous fish species within the project area. The Forest Service does not need to consult the USFWS under the Fish and Wildlife Coordination Act because no water is proposed to be impounded or diverted.

See Chapter 1, "Applicable Laws and Regulations" for a list of other Federal laws and executive orders pertaining to this project-specific environmental analysis.

Environmental Justice

Executive Order No. 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" requires agencies to address environmental justice concerns within the context of existing laws, including NEPA. One goal of environmental justice is not to shift risks among populations, but to identify potential disproportionately high and adverse effects and to identify alternatives that may mitigate these impacts.

After considering the environmental, economic, and social impacts of this project, the Forest Service determined that none of the alternatives considered in this analysis would have a disproportionate impact on any minority or low-income population in the immediate area, within surrounding counties, or in the northern Arizona region.

Authorizing cattle grazing and fencing wetlands would not prevent access into the Walnut Canyon Allotment nor prevent minority or low-income individuals from collecting firewood or other special forest products within the area. Conversely, not authorizing cattle grazing or constructing fences within the allotment would not alter this access. Alternative 2 (No Grazing) would negatively affect the permittee and family and providers of goods and services used for the ranching business. However, this would only affect a few individuals and would not disproportionately affect the greater population.

Unavoidable Adverse Effects

Implementing any alternative would result in some degree of environmental effects. The design features and mitigation measures (described in Chapter 2) are intended to lessen adverse effects. Adjusting the season of cattle grazing and installing exclosure fences are examples of mitigation

measures built into the design of some alternatives. However, mitigation cannot eliminate all negative effects and implementing any of the alternatives would still result in some unavoidable adverse effects.

Alternatives 1 and 3 would result in the following adverse effects:

- cattle grazing would temporarily reduce upland plant height and canopy cover of vegetation. This effect is short term in nature, as plants would re-grow once cattle move to different areas and/or after the grazing season;
- cattle grazing would temporarily reduce wetland plant height and cover in unfenced wetlands. This effect is short term in nature, as plants would re-grow once moisture returns to the wetland and cattle would be moved out of the pasture;
- cattle grazing could remove up to 70 to 90 percent of the vegetation within the three proposed lanes and one waterlot annually. If growing conditions are favorable, vegetation abundance and diversity in these lanes would recover within 1 year. If growing conditions are not favorable, recovery of the lanes would occur within 2 to 3 years;
- reduction in residual wetland vegetation cover may indirectly affect cinnamon teal nesting cover in the following nesting season. This effect to nesting cover would only occur within the lanes in fenced wetlands or unfenced wetlands if water is present after July 15. This effect is short term in nature, as plants would re-grow once moisture returns to the wetland;
- cattle could temporarily create additional turbidity to wetlands. This effect is short term and limited and would primarily be generated within the lanes of fenced wetlands or the perimeter of unfenced wetlands if water is present after July 15;
- cattle would trample microphytic soil crusts when they are present in specified areas. The effect to soil condition from the loss of microphytic plants would be offset by an increase in vascular plants and onsite litter;
- stock tank maintenance (outside of wetlands) can have a short-term negative effect on water quality for tanks located in drainages, due to the potential for movement of sediments downstream if a large rain event occurred within the first growing season. The likelihood of this happening and affecting water quality is extremely limited; and
- cattle could consume all residual water in wetlands during dry conditions, leaving little to no water for wildlife or vegetation. This effect is short term in nature, as wetlands would refill after measurable precipitation. Wildlife that need open water would move to other open water sources in the area.

Alternative 2 (No Grazing) would affect the permittee’s ranching business, the permittee’s and Forest Service’s access to water claims, and direct jobs associated with the permit.

All of these adverse effects are considered to be short-term (less than one year) and would not result in impaired long-term productivity, as outlined in the next section.

The Forest Service has had ample experience implementing similar types of projects. Monitoring described for this project would add to our knowledge of possible effects and the level of these effects. Moreover, management of the Walnut Canyon Allotment under any alternative does not set a precedent for adjacent allotments.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). Short-term use of the land includes the day-to-day and year-to-year activities that the permittee, Forest Service land managers, and even visitors engage in on the Walnut Canyon Allotment. This includes activities that remove resources from the land, such as cattle grazing or firewood gathering, as well as activities that do not, such as hiking and wildlife viewing. Short-term actions also include management activities such as vegetation management, structural improvements, and road maintenance. Long-term productivity refers to the land's continuing ability to produce commodities, such as plant products, wildlife, or recreation opportunities, for future generations. This includes management practices and uses that do not impair soil productivity and water quality, provide habitat without altering the natural landscape to recover, or impair geologic features to the extent they lose identity.

In summary, the action alternatives would result in the following short-term uses and effects to long-term productivity:

- cattle grazing effects to upland plant height and cover is not expected to change the overall static to upward trend in rangeland condition;
- cattle consumption of wetland water, reduction in wetland plant height and cover, and effects within lanes to wetland stock tanks is not expected to change the overall function of wetlands. Wetland function and wetland vegetation would improve or remain static at sites that are fenced under Alternative 3;
- cattle would add to the turbidity of water in the wetlands, but this addition would not be measurable and would not affect overall watershed condition. Sedimentation from stock tank maintenance (outside of wetlands) would also result in a non-measurable effect to watershed condition;
- unsatisfactory and impaired soil conditions are expected to remain the same under Alternative 1 or improve under Alternative 3;
- cattle effects to wetland nesting cover would not change the forest-wide habitat trend for cinnamon teal. Implementing Alternative 3 may improve forest-wide habitat trend for cinnamon teal; and
- the effects of grazing from this project would not change the habitat trend for grasslands, meadows, open pinyon-juniper, or the population trends for pronghorn antelope on the forest.

Although some environmental effects would occur as a result of implementing the action alternatives, the effects analysis provides evidence that these impacts are short term in nature and would not result in adverse effects to long-term productivity.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

The interdisciplinary approach used to identify specific practices was designed to eliminate or lessen adverse consequences. The application of Forest Plan standards and guidelines, best management practices, project-specific mitigation measures, and monitoring are all intended to

further limit the extent, severity, and duration of potential effects. The Walnut Canyon Allotment, a renewable resource, is managed in such a way they would be available for future generations. There are no irreversible commitments associated with this project. There are some irretrievable commitments of resources associated with wetland fencing.

This page intentionally left blank

Chapter 4. Monitoring

Monitoring would occur under all action alternatives during the permit term and includes the following activities: permit compliance, allotment inspections, range readiness, forage production, rangeland utilization, condition and trend, soil condition, noxious weeds, and threatened and endangered species. Under Alternative 2 (No Grazing), condition and trend and wildlife utilization would continue to be monitored, if funding is available. Monitoring frequency varies by each activity and may be accomplished by either the permittee and/or Forest Service personnel.

Permit Compliance: Throughout each grazing season Forest Service personnel would monitor to determine accomplishments of the permit terms and conditions, the AMP, and the AOI.

Allotment Inspections: Allotment inspections are a written summary completed each fall by Forest Service personnel to document compliance monitoring and to provide an overall history of that year's grazing. This document may include weather history, the year's success, problems, improvement suggestions for the future, and a monitoring summary.

Range Readiness: Each spring, Forest Service personnel and/or the grazing permittee would assess range readiness prior to cattle coming on the allotment to determine if vegetative conditions are ready for cattle grazing. The range is generally ready for grazing when cool season grasses are leafed out, forbs are in bloom, and brush and aspen are leafed out. These characteristics indicate the growing season has progressed far enough to replenish root reserves so that grazing will not seriously impact these forage plants.

Forage Production: Production surveys for this allotment would be done every 9 to 13 years. Methods used for these surveys would use the best available methods at that time. These values would be used as tools to manage this allotment, but will not be the sole measurement to establish carrying capacity. The most recent forage production surveys were done as part of this analysis in 1999. The next survey is scheduled to occur after 2009.

Rangeland Utilization: Long-term condition and trend monitoring is the primary standard for monitoring of this cattle grazing management system. Utilization is used as a tool to understand and achieve the goals of long-term management. Utilization guidelines are intended to indicate a level of use or desired stocking rates to be achieved over a period of years.

The definition of utilization and seasonal utilization come from standard protocols established by the Society of Rangeland Management and the new guidelines established by Region 3 Regional Forester (Smith et al. 2005). The following definitions and procedures for utilization were taken and adapted to fit this project.

Utilization is the proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). It is a comparison of the amount of herbage left compared with the amount of herbage produced during the year. Utilization is measured at the end of the growing season when the total annual production can be accounted for and the effects of grazing in the whole management unit can be assessed. Utilization guidelines are intended to indicate a level of use or desired stocking rate to be achieved over a period of years.

Utilization measurements will be taken in one key area at a minimum which will reflect grazing effects within the allotment. One key area would be established in the allotment, at existing long-term monitoring sites if possible, to represent overall allotment utilization. Utilization guidelines are not intended as inflexible limits. Utilization measurements can indicate the need for management changes prior to this need being identified through long term monitoring. Utilization data would not be used alone, but would be used along with climate and condition/trend data, to set stocking levels and pasture rotations for future years.

Cattle would move when seasonal utilization in a pasture approaches a “moderate” level. For Alternatives 1 and 3 (35 percent utilization guideline), moderate seasonal utilization would be approximately 21-50 percent. Moderate seasonal utilization is an approximate value because it takes into account any additional growth which might occur later that year and considers season of use, wildlife use, weather conditions, availability of forage, and water in pastures. This moderate seasonal utilization level leaves residual cover for wildlife and soils and provides for long term health of the grazed plants.

If monitoring shows utilization rates exceed the utilization guideline in a given year, the grazing schedule and/or cattle numbers would be adjusted the following year so utilization guidelines are not exceeded again. If utilization is exceeded after these adjustments are made, then the grazing management system would be changed to ensure this does not happen in the future.

Condition and Trend: Watershed and vegetative condition and trend monitoring will help determine the effectiveness of the allotment management plan, and long-term range and watershed trends.

Parker Three-Step and paced transect monitoring points were established throughout this allotment in the 1950-1960s. These transects are one of the best historic records of range condition and trend. The photo points and vegetative ground cover data show how the site has changed over time. Canopy cover and frequency plots were placed with the Parker Three-Step transects in 1999 to add to this historic data.

Ocular plant canopy cover 0.10-acre plots were used to compare existing conditions with potential and desired vegetative community conditions. Over time, these plots will show how canopy cover changes. Canopy cover will provide an indication of how plants are growing, assuming that if they are getting bigger and occupying more space, then they are doing well and can be a relative gauge of vigor.

Frequency and ground cover data were collected using the widely accepted plant frequency method (Ruyle 1997). These plots will monitor trends in plant species abundance, plant species distribution, and ground cover. This will provide information on plant composition and additional information on regeneration.

These transects will be read at least every 10 years by Forest Service personnel. These plots will help determine the effectiveness of current management.

A new frequency and cover plot will be added near the Walnut National Monument boundary as a comparison to new plots to be established by the National Park Service within the Monument. Over the long term, these plots will show the effects of cattle grazing compared to cattle grazing exclusion for general range data.

Precipitation: Precipitation is currently recorded at the Flagstaff National Weather Service Office at Bellemont. Precipitation data may be recorded within or near the allotments for more localized information. Precipitation data may be recorded throughout the year and summarized in the annual inspection. This data assists managers with forage utilization and production data collection.

Soil and Riparian Condition: The intergovernmental agreement between the Forest Service and State of Arizona that controls water quality and the Clean Water Act requires implementation and effectiveness monitoring. The objectives of monitoring are to: (1) collect data sufficient to evaluate effects of management activities on soil and water resources; and (2) support changes in management activities to protect soil and water quality. Monitoring will help determine how successfully managers are implementing guidance practices and how effectively those practices

are protecting soil and water quality. The current and proposed cattle grazing system incorporates best management practices (BMP) and grazing practices and constitutes compliance with Arizona State and Federal Water Quality Standards. Arizona Department of Water Quality (ADEQ) will continue to monitor water quality in the area.

Watershed condition can be assessed using information from the monitoring schemes above. Monitoring of plant abundance, ground cover, species diversity, and estimates of overall soil condition (using the methods described throughout this monitoring section) will indicate whether or not management practices are effectively meeting management goals. Trends toward improvements in species abundance and diversity should indicate that management practices are effectively improving soil condition and, by inference, maintaining or improving downstream water quality and complying with water quality standards. Conversely, decreases in plant abundance and species diversity may indicate that management practices are not effective and need to be changed. Environmental factors, especially precipitation, will be considered when evaluating monitoring results.

Condition and trend monitoring was established at the following wetlands using photo point and plant inventories in the fall of 2003: Marshall, Little Dry, Prime, Fisher/Fry, Youngs, Dry and Lost. Additional monitoring of these plots may occur in the next 10 years if funding is available. Canopy cover, frequency and composition plots were also established at these wetlands. Additional monitoring of these plots may occur in the next 10 years if funding is available.

If Babbitt Spring is grazed by cattle before the exclosure fence is constructed woody species will be monitored to ensure use is less than 20 percent. Cattle would be removed from the area before 20 percent utilization is reached.

Noxious Weeds: State-listed noxious weeds located in these allotments would be treated as necessary. The permittee and Forest Service would coordinate the weed inventory and treatment with responsibilities identified through the AOI. Noxious weed monitoring is carried out at the same time allotment inspections are conducted. As noxious weed populations are found they are mapped, monitored, and in some areas, manually removed. Other treatment methods will follow guidelines established in the “Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds” (USDA 2005b).

Threatened and Endangered Species: Threatened and endangered species are monitored in compliance and consultation with the USFWS. A vegetation monitoring point (key area) have been established on the allotment and is monitored according to consultation requirements.

This key area would normally be one-quarter to 1 mile from water, located on productive soils on level to intermediate slopes, and be readily accessible for grazing. Size of the key forage monitoring area could be 20 to 500 acres. Within key a forage monitoring area, select appropriate key species to monitor average allowable use (USDA 1987, p. 66-1).

One key area plot is already established on the Walnut Canyon Allotment and monitored annually:

- Management Area: ponderosa pine
- Pasture: Observatory
- Location: 0.5 mile southeast of Prime Lake
- Key Species: wheat grass, blue grama

This page intentionally left blank

Chapter 5. Consultation and Coordination

Preparers and Contributors

Forest Service Interdisciplinary Team and Consulting Members

Angela Crossley, Archeologist, Peaks and Mormon Lake Districts

Contribution:	Cultural Resources Clearance Report
Education:	B.S. Anthropology, Pennsylvania State, 1992 M.A. Anthropology, Northern Arizona University, 2001
Experience:	14 years of archeology experience for the Forest Service, private contracts, and museums

Mike Hannemann, Range Staff, Peaks and Mormon Lake Districts

Contribution:	Range Specialist, Writer/Editor
Education:	B.S. Wildlife Biology, Colorado State University, 1986 M.S. Forestry, Northern Arizona University, 1991
Experience:	19 years of range conservation for the Coconino National Forest

Jeff Hink, Hydrologist, Peaks and Mormon Lake Districts

Contribution:	Watershed Specialist, Wetland Inventory, Wetland Stock Tank Review
Education:	B.S. Natural Resource Management, Humboldt State University, 1975
Experience:	18 years of hydrology experience for the Coconino National Forest

John Nelson, Recreation and Engineering Staff, Peaks and Mormon Lake Districts

Contribution:	Recreation, Inventoried Roadless Area, and Social Effects
Education:	B.S. Environmental Science and Geology, Northern Arizona Univ., 1979
Experience:	33 years of engineering and recreation management with the Forest Service

Heather Provencio, Archaeologist, Peaks and Mormon Lake Districts

Contribution:	Heritage Specialist, Tribal Consultation
Education:	B.A. Anthropology, Northern Arizona University, 1984 M.A. Anthropology, Northern Arizona University, 2000
Experience:	20 years archeology experience with the Forest Service and private contracting

Henry Provencio, Wildlife Biologist, Peaks and Mormon Lake Districts

Contribution:	Wildlife Specialist, Biological Assessment and Evaluation
Education:	B.S. Wildlife Conservation Biology, Arizona State University, 1997
Experience:	6 years wildlife experience with the Forest Service

Katherine Sánchez Meador, Range Specialist, Peaks and Mormon Lake Districts

Contribution:	NEPA Team Leader, Range Specialist, Economic Effects
Education:	B.S. Education, New Mexico State University, 1992 M.A. Agricultural and Extension Education, Minor in Rangeland Management, New Mexico State University, 1997
Experience:	Over 5 years experience in range management for the Forest Service and 10 years ranch planning/development and management

Skye Sieber, NEPA Specialist, Peaks and Mormon Lake Districts

Contribution:	Writer/Editor
Education:	B.S. Recreation and Leaure Studies, University of Utah, 1995 Masters Community and Regional Planning, University of Oregon, 2002
Experience:	8 years planning experience for the Forest Service, rural communities, and non-governmental organizations

Rory Steinke, Forest Watershed Specialist/Program Manager, Coconino National Forest

Contribution:	Soil Scientist, Soil Condition Assessment, Wetland Inventory
Education:	B.S. Soil Science, University of Wisconsin Stevens Point, 1981 CPSSc Certified Professional Soil Scientist (ARCPACS) since 1994
Experience:	22 years soils and watershed experience for the Forest Service and in Montana

Frank Thomas, Resource Information Specialist, Peaks and Mormon Lake Districts

Contribution:	GIS Maps and Analysis
Education:	B.S. Forestry, Northern Arizona University, 1994
Experience:	Over 7 years of GIS experience for the Forest Service

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during development of this draft environmental assessment:

Local, State, and Federal Agencies

Arizona Department of Environmental Quality
Arizona Game and Fish Department
Arizona State Historic Preservation Office
Arizona State Land Department
Coconino County Board of Supervisors
Coconino County Public Works
National Park Service, Flagstaff Area Monuments
USDA Natural Resource Conservation Service
USDA Forest Service, Rocky Mountain Research Station
U.S. Fish and Wildlife Service

Tribes

Dine' Medicine Man's Association
Fort McDowell Yavapai Nation
Havasupai Tribe
Hopi Tribe
Hualapai Tribe
Navajo Nation
Pueblo of Acoma
Pueblo of Zuni
San Carlos Apache Tribe
San Juan Southern Paiute Council
Tonto Apache Tribe
White Mountain Apache Tribe

Yavapai-Apache Nation
Yavapai-Prescott Indian Tribe

Organizations and Individuals

Arizona Antelope Foundation
Arizona Cattlemen's Association
Arizona Wildlife Federation
Arizona Trail Association
Barbara Blackman
Center for Biological Diversity
Colorado State University Libraries
Flagstaff Biking Organization
Forest Guardians
Forest Conservation Council
Foster Ranch
Grand Canyon Trust
Greater Flagstaff Forests Partnership
Greg Preston
Center for Biological Diversity
Hitchin Post Stables
Hopi Three Canyon Ranch LLC
Jeff Burgess
Jim Shiew
John Amoroso
Kentucky Wolf Information Center
Muleshoe X Cattle Company
National Wildlife Federation
Nature Conservancy
New River Sod Company of Arizona
Rachel Thomas
Red Creek LLC
Phelps Dodge, Land and Water
Sierra Club, Plateau Group
Sue Krentz
University of Arizona, College of Agriculture
University of Arizona, Cooperative Extension
Walking Cane Ranch
Wildlife Society, Arizona Chapter

Glossary

A

Adaptive Management: The alternatives are designed to provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired conditions are not being achieved, management will be modified in cooperation with the permittee. Changes may include administrative decisions such as the specific number of cattle authorized annually; specific dates of grazing, class of animal or modifications in pasture rotations, but such change will not exceed the limits for timing, intensity, duration and frequency defined for the alternatives.

Allotment Management Plan (AMP): A plan cooperatively developed by the range permittee and Forest Service that lists management practices, cattle numbers, improvement needs, salting practices, and administrative policies.

Annual Operating Instructions (AOI): A set of instructions cooperatively developed by the Forest Service and range permittee on an annual basis that explains the specific pastures to be used and adjustments to the allotment management plan for the current year.

Animal Unit (AU): Considered to be one mature (1,000 pound) cow or the equivalent based on daily forage consumption of 26 pounds dry matter per day

Animal Unit Month (AUM): A calculation to get the amount of feed or forage required by an animal unit for 1 month. Not synonymous with head month.

B

Best Management Practices (BMP): A combination of practices that are the most effective and practical means of achieving resource protection objectives (primarily water quality protection) during resource management activities.

Browse: Twigs, leaves, and young shoots of trees and shrubs on which animals feed. The shrubs used by big game animals for food.

C

Carrying Capacity: The average number of cattle and/or wildlife which may be sustained on a management unit compatible with management objectives for the unit. In addition to site characteristics, it is a function of management goals and management intensity. Capacity classifications are described as follows:

Full Capacity - Lands which can be used by grazing animals under proper management without long term damage to the soil resource or plant communities. The land is stable and vegetative ground cover is maintaining site productivity and producing a minimum of 100 pounds of forage per acre.

Potential Capacity - Lands not undergoing accelerated erosion but requiring access, water developments, or other improvements to bring them up to full capacity.

No Capacity - Lands that are incapable of being grazed by domestic cattle under reasonable management goals. Examples include areas where slopes are over 40 percent, where forage production is less than 100 pounds per acre, and in the wetlands. These no capacity areas mainly occur on the sides of the canyons of the Anderson Mesa Rim,

wetland bottoms, and in dense juniper stands. Cattle do not usually graze the sides of canyons or dense juniper stands due to the slope and lack of vegetation. Wetland bottoms are grazed by cattle but this use is not included in capacity.

Closed Basin: Closed basins are shallow water pools responding to precipitation. Closed basins do not have adequate residence time of water to create hydric soils or hydrophytic plants and, as such, do not have wetland characteristics and are not true wetlands.

Condition: As evaluated and ranked by the Forest Service, is a subjective expression of the status or health of the vegetation and soil relative to their combined potential to produce a sound and stable biotic community. Soundness and stability are evaluated relative to a standard that encompasses the composition, density, and vigor of the vegetation and the physical characteristics of the soil.

Corral: A range improvement that generally is made of logs or boards and is used to hold, load, or unload cattle.

Critical Habitat: That portion of a wild animal's habitat that is critical for the continued survival of the species ("Critical" is a formal designation under the Endangered Species Act.)

Cumulative Effects: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR § 1508.7).

D

Decision Notice: A decision document prepared for an environmental assessment that explains the rationale for the decision.

Developed Recreation: Recreation that requires facilities that result in concentrated use of an area. Examples are campgrounds and ski areas. Facilities might include roads, parking lots, picnic tables, toilets, water systems, ski lifts, and buildings.

Direct Effects: The effects caused by the action and occur at the same time and place (40 CFR § 1508.8).

Dispersed Recreation: Recreation use that occurs outside of developed sites and requires few, if any, improvements other than roads and trails. Representative activities are hiking, backpacking, driving for pleasure, viewing scenery, snowmobiling, cross-country skiing, hunting, off-road vehicle use, and berry picking.

E

Ecosystem Management: The use of an ecological approach that blends social, physical, economic, and biological needs and values to assure productive, healthy ecosystems.

Effects: The results expected to be achieved from implementation of actions relative to physical, biological, and social (cultural and economic) factors resulting from the achievement of outputs. Examples of effects are tons of sediment, pounds of forage, person-years or

employment, and income. There are direct effects, indirect effects, and cumulative effects.

Emergent Vegetation: Plants rooted underwater that grow above the surface of the water.

Ephemeral Wetland: Shallow water pool responding directly to precipitation with a 2- to 6-week flooding regime. No prevalence of hydrophytic vegetation is present but upland species exist like annuals, grass and forb species, and bare soil.

Environmental Assessment (EA): A "concise public document [that] briefly provides sufficient evidence and analysis for determining whether to prepare an EIS or a finding of no significant impact…and shall include brief discussions of the need for the proposal…alternatives…the environmental impacts of the proposed action and alternatives…[and] a listing of agencies and persons consulted." (40 CFR 1508.9).

F

Finding of No Significant Impact (FONSI): A document briefly presenting the reasons why an action will not have a significant effect on the human environment and for which an environmental impact statement will not be prepared (40 CFR 1508.13).

Forage: All non woody plants (grass, grass-like plants, and forbs) and portions of woody plants (browse) available to domestic cattle and wildlife for food. Only a portion of a plant is available for forage if the plant is to remain healthy.

Forage Production: The weight of forage produced within a designated period of time on a given area.

G

Game Species: Any species of wildlife or fish for which seasons and bag limits have been prescribed and which are normally harvested by hunters, trappers, and fishermen under State or Federal laws, codes, and regulations.

Grasslands: Lands where the vegetation is dominated by grasses, grass-like plants, and/or forbs. Nonforest land is classified as grassland when herbaceous vegetation provides at least 80 percent of the canopy cover excluding trees.

H

Head Month (HM): One month's use and occupancy of range by one weaned or adult animal cow, bull, steer, heifer, horse, burro, mule or five sheep or goats.

Herding: A strategy for managing cattle that maintains the animals in a "herd" and moves them from area to area.

Hydrophytic Plant: A perennial vascular aquatic plant having its over-wintering buds under water.

I

Impaired Soil Condition: Indicators signify a reduction in soil quality. The ability of the soil to function properly has been reduced and/or there exists an increased vulnerability to irreversible degradation. An impaired category should signal land managers that there is a need to investigate the ecosystem further to determine the cause and degree of decline in soil functions. Changes in management practices or other preventative actions may be appropriate.

Important Bird Area (IBA): an internationally recognized place on the landscape that provides exceptionally valuable or essential habitat for one or more species of birds, including breeding, wintering or migratory habitat.

Indirect Effects: Effects caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR § 1508.8).

Interdisciplinary Team (IDT): A group of individuals with skills from different disciplines. An interdisciplinary team is assembled because no single scientific discipline is sufficient to adequately identify, analyze, and resolve issues or problems.

Issue: A subject, question, or conflict of widespread public discussion or interest regarding management of National Forest System lands.

K

Key Area: Areas of land or water that the responsible official and resource specialist determine to be important to wildlife or fish productivity. Other uses in key areas could result in negative effects to the wildlife or fish.

L

Lane: A fenced pathway that allows cattle access, typically to a water source.

M

Management Area (MA): As defined in the “Coconino National Forest Plan.” An area that has common direction throughout and that differs from neighboring areas. The entire forest is divided into management areas where common standards and guidelines apply.

Management Indicator Species: Any species, group of species, or species habitat element selected to focus management attention for the purpose of resource production, population recovery, maintenance of population viability, or ecosystem diversity (FSM 2605).

Microphytic Soil Crust: Formed when all or some of a diverse array of photosynthetic blue-green algae, fungi, bacteria, lichens, and mosses bind together with inorganic particles in the first few millimeters of a soil (also called cryptogamic crust).

Mitigation Measures: Actions that are taken to lessen the severity of effects of other actions.

N

Nongame Species: Animal species that are not usually hunted.

O

Old-Growth: Stand of timber that is past full maturity and well into old age and is the last stage in forest succession.

Overstory: That portion of trees, in a stand of trees of more than one story, forming the upper or uppermost canopy layer.

P

Permittee: An individual who has been granted a Federal permit to graze cattle for a specific period of time on a range allotment.

Prescribed Fire: Fires set under conditions specified in an approved plan to dispose of fuels, control unwanted vegetation, stimulate growth of desired vegetation, and change successional stages to meet range, wildlife, recreation, wilderness, watershed, or timber management objectives.

Present Net Benefit: Future benefits "discounted" to the present by an interest rate that reflects the changing value of a dollar over time. The assumption is that dollars today are more valuable dollars in the future.

Present Net Cost: Future costs "discounted" to the present by an interest rate that reflects the changing value of a dollar over time. The assumption is that dollars today are more valuable dollars in the future.

Present Net Value: "The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area." (36 CFR 219.3)

Proper Functioning Condition (PFC): A methodology for assessing the physical functioning of riparian and wetland areas. The term PFC is used to describe both the assessment process, and a defined, on-the-ground condition of a riparian-wetland area. In either case, PFC defines a minimum or starting point. The PFC assessment provides a consistent approach0 for assessing the physical functioning of riparian-wetland areas through consideration of hydrology, vegetation, and soil/landform attributes. The PFC assessment synthesizes information that is foundational to determining the overall health of a riparian-wetland area. The on-the-ground condition termed PFC refers to *how well* the physical processes are functioning. PFC is a state of resiliency that will allow a riparian-wetland system to hold together during a 25- to 30-year flow event, sustaining that system's ability to produce values related to both physical and biological attributes.

Proposed Action (PA): In terms of the National Environmental Policy Act, the project, activity, or action that a Federal agency proposes to implement or undertake. The PA is sent to the public and interested agencies for their review and comment.

Protected Activity Center (PAC): An area established around a Mexican spotted owl nest or roost site, for the purpose of protecting the area. Management of these areas is largely restricted to managing for forest health objectives.

R

Range Allotment: An area operated under one plan of management designated for the use of a prescribed number of cattle owned by one or more permittees.

Rangeland (Range): Land that supports vegetation useful for grazing; vegetation is routinely managed through manipulation of grazing rather than cultural practices.

Raptor: Any predatory bird such as a falcon, hawk, eagle, or owl.

Reservoir Wetland: Human-made deep perennial water pool most years, no significant hydrophytic vegetation (except for submergents) because of deep pool and/or fluctuations of pool level.

Revegetation: Re-establishing and developing plant cover. This may take place naturally through the reproductive processes of existing flora or artificially by planting.

Riparian Area: Riparian ecosystems are distinguished by the presence of free water within the common rooting depth of native perennial plants during at least a portion of the growing season. Riparian ecosystems are normally associated with seeps, springs, streams, marshes, ponds, or lakes. The potential vegetation of these areas commonly includes a mixture of water (aquatic) and land (phreatic) ecosystems.

S

Satisfactory Soil Condition: Indicators signify that soil quality is being sustained and the soil is functioning properly and normally. Ability of the soil to maintain resource values, sustain outputs and recover from impacts is high.

Seasonal Utilization: The percentage of the forage produced in the current season, to date of measurement, removed by grazing. This percentage is different from utilization because it does not account for subsequent growth of either the ungrazed or grazed plants.

Seasonal Wetland: Shallow water pool responding directly to precipitation with a 3- to 6-month flooding regime. Hydrophytic vegetation prevalence (spikerush, carex, juncus) and hydric soils present.

Section 7 Consultation: A formal process for consultation on the potential effects on threatened, endangered, or proposed species that occurs between the agency proposing an action (U.S. Forest Service) and the regulating agency (U.S. Fish and Wildlife Service).

Sediment: Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice, and has come to rest on the earth’s surface either above or below sea level.

Semipermanent Wetland: Shallow water pool responding directly to precipitation with a 6- to 12-month flooding regime. Hydrophytic vegetation prevalence (hardstem bulrush, cattail, submerged aquatics) and hydric soils present.

Sensitive Species: Plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (FSM 2670.5(19)).

Seral: One stage in a series of steps in the process of ecological succession.

Snag: Standing dead tree from which the leaves or needles have fallen.

Stand: A plant community sufficiently uniform in cover type, age class, risk class, vigor, size class, and stocking class to be distinguishable from adjacent communities thus forming an individual management or silviculture unit. Most commonly used when referring to forested areas.

Stock Tank: An earthen tank for providing water for cattle and wildlife.

Structural Improvement (Range and Wildlife): Any type of range or wildlife improvement that is human-made such as fences, water developments, corrals, and waterfowl islands.

Succession: An orderly process of biotic community development that involves changes in species, structure, and community processes with time.

Suitability: "The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices." (36 CFR 219.3)

T

Temporary Wetland: Shallow water pool responding directly to precipitation with a 1- to 2-month flooding regime. No prevalence of hydrophytic vegetation present but upland species like foxtail barley and western wheatgrass exist.

Threatened and Endangered Species (TES): Species identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act, as amended.

Threatened Species - Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Endangered Species - Any species that is in danger of extinction throughout all or a significant portion of its range.

Proposed Species - Any species of fish, wildlife, or plant that is proposed in the Federal Register to be listed under Section 4 of the Endangered Species Act (50 CFR 402.02).

Transition Zone: As used for forest planning purposes, is the area of transition between ponderosa pine and pinyon-juniper. Includes the area where alligator juniper commonly occurs.

Trend: Expresses the direction of change (if any) in condition, in response to past and existing cattle management practices, or land use activities combined with other environmental factors.

U

Understory: The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portion of adjacent trees and other woody growth.

Unsatisfactory Soil Condition: Indicators signify that degradation of soil quality has occurred. Impairment of vital soil functions results in inability of the soil to maintain resource values, sustain outputs and recover from impacts. Soils rated in the unsatisfactory category are candidates for improved management practices or restoration designed to recover soil functions.

Utilization Guidelines: Utilization is the proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects). It is a comparison of the amount of herbage left compared with the amount of herbage produced during the year. Utilization is measured at the end of the growing season when the total annual production can be accounted for and the effects of grazing in the whole management unit can be assessed. Utilization guidelines are intended to indicate a level of use or desired stocking rate to be achieved over a period of years.

V

Viable Populations: A wildlife or fish population of sufficient size to maintain its existence over time in spite of normal fluctuations in population levels.

W

Waterlot: A range improvement usually constructed of fencing materials that enclose a watering structure that is used to hold cattle or to close the water off to cattle.

Watershed: An entire area that contributes water to a drainage or stream.

Wetlands: Areas with shallow standing water or seasonal to yearlong saturated soils including bogs, marshes, and wet meadows. Wetlands must have the following three attributes to be considered wetlands: (1) hydric soils, (2) hydrophytic vegetation, and (3) evidence of frequent inundation.

Wild and Scenic Rivers (WSR): Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted (Wild and Scenic Rivers Act usage).

Wildfire: Any wildland fire that requires a suppression action. This includes all fires not meeting the requirements of a prescribed fire.

Woodland: Plant communities with a variety of stocking comprised of various species of pinyon pine and juniper, typically growing on drier sites.

References

Alldredge, A. W., R. D. Deblinger and J. Peterson. 1991. Birth and fawn bed site selection by pronghorns in a sagebrush-steppe community. *Journal of Wildlife Management* 55(2):222-227.

Arizona Department of Environmental Quality (ADEQ) and USDA Forest Service. 1990. Intergovernmental Agreement between the State of Arizona and USDA Forest Service Southwestern Region. ADEQ Contract No. HH-1037; 16-R3-91-033. 7 pp.

Arizona Department of Environmental Quality. 2004. Air Quality Annual Report (A.R.S. §49-424.10).

Arizona Department of Environmental Quality. 2005. The Status of Water Quality in Arizona -- 2004; Arizona's Integrated 305(b) Assessment and 303(d) Listing Report.

Arizona Game and Fish Department. 2000. Draft conservation assessment and strategy for the baled eagle in Arizona. Technical Report 173. Non-game and Endangered Wildlife Program, Arizona Game and Fish department, Phoenix.

Arizona Game and Fish Department. 2002. Anderson Mesa Pronghorn Plan. 45 pp.

Arizona Game and Fish Department. 2003. Anderson Mesa Pronghorn Plan Accomplishments and Planned Activities, Revised 1/29/05. 40 pp.

Bailowitz, R. A. and J. P. Brock. 1991. Butterflies of southeastern Arizona. Sonoran Arthropod Studies, Inc. Tucson, AZ. 342 pp.

Barrett, M. W. 1981. Environmental characteristics and functional significance of pronghorn fawn bedding sites in Alberta. *Journal of Wildlife Management*, 45:120-131.

Bender, D. J., Flather C. H., Wilson K. R., Reese G. C. 2005. Regional data to support biodiversity assessments: terrestrial vertebrate and butterfly data from the Southwest. Gen. Tech. Rep. RMRS-GTR-152. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain research Station. 42 pp. + DVD.

Borror, D. J. and R. E. White. 1970. A Field Guide to the Insects of America North of Mexico. Houghton Mifflin Company, Boston, MA.

Boucher, P. 1986. Field Survey Report for *Chrysothamnus molestus* Blake. Unpublished document on file at Coconino National Forest Supervisor's Office, Flagstaff, AZ.

Brewer, David G. 1999. Potential for microbiotic soil crust development within Kanab Creek, central winter/summer, and Kane Ranch Allotment. Internal Forest Service document.

Brown, D. E., W. F. Fagan, R. Lee, H. G. Shaw, and B. Turner. 2002. Winter precipitation and pronghorn fawn survival in the Southwest. Pronghorn Workshop Proc. 20:115-122.

Canon, S. K. and F. C. Bryant. 1997. Bed-site characteristics of pronghorn fawns. *Journal of Wildlife Management*, 61:1134-1141.

Center for Plant Conservation (CPC). 2003. CPC National Collection Plant Profile, *Chrysothamnus Molestus* at http://www.centerforplantconservation.org/ASP/CPC_ViewProfile.asp?CPCNum=939. Accessed: 9/10/2003.

Clary, W. P. and D. E. Medin. 1990. Differences in vegetation biomass and structure due to cattle grazing in a northern Nevada riparian ecosystem. USDA Forest Service Research Paper INT-427.

Cockrum, E. L. 1960. The Recent Mammals of Arizona: Their Taxonomy and Distribution. University of Arizona Press, Tucson, AZ. 276 pp.

Corman, T. E. and C. Wise-Gervais. 2005. Arizona Breeding Bird Atlas. University of New Mexico Press. Albuquerque, NM.

Crisp, D. 1997. Prescribed Fire Effects on Flagstaff Pennyroyal *Hedeoma Diffusum* Greene. Unpublished independent study for Northern Arizona University. Flagstaff AZ. 25 pp.

Dunbar, Mike. 2003. Personal communication. Researcher, USDI Hart Mountain Refuge. Phone conversation with Henry Provencio on December 8, 2003.

Ellison, Lincoln, 1960. Influence of Grazing on Plant Succession of Rangelands. The Botanical Review, 26(1):1-78.

Ferris, C. D. and F. M. Brown (eds.). 1981. Butterflies of the Rocky Mountain States. University of Oklahoma Press, Norman, OK.

Fleishman, Richard. 2005. Personal communication. Soil and Water Specialist and Wetland Inventory, Mogollon Rim Ranger District.

Fredrickson, L. H. and B. D. Dugger. 1993. Management of High Altitude Wetlands in the Southwest, USDA Forest Service Southwestern Region 3. 71 pp.

Galt, D., F. Molinar, J. Navarro, J. Joseph, and J. Holecheck. 2000. Grazing Capacity and Stocking Rate. *Rangelands*, 22(6):6-11.

Gammonley, J. H. 1996. Seasonal use of montane wetlands by waterbirds on the rim of the Colorado Plateau. Ph.D. Dissertation, University of Missouri. 142 pp.

Green, D. M. and J. B. Kauffman. 1995. Succession and cattle grazing in a northeast Oregon riparian ecosystem. *Journal of Range Management*, 48:307-313.

Green, Heather. 1999. Unpublished *Astragalus rusbyi* field trip notes. Located in Mormon Lake Ranger District files, Coconino National Forest. 2 pp.

Heitschmidt, R. K, S. L. Dowhower, and J. W. Walker. 1997. Some Effects of Rotational Grazing Treatment on Quantity and Quality of Available Forage and Amount of Ground Litter. *Journal of Range Management,* 40(4): 318-321.

Hoffmeister, D. 1986. Mammals of Arizona. University of Arizona Press, Tucson, AZ. 602 pp.

Hoff, Theresa Marie. 1993. Effects of Cattle Grazing on Waterfowl Nesting Cover in Arizona Montane Wetlands. Masters Thesis, Northern Arizona University.

Kearney, T. H. and R. H. Peebles. 1951. Arizona Flora. University of California Press, Berkeley, CA. 1,085 pp.

Latta, M. J., C. J. Beardmore, and T. E. Corman. 1999. Arizona Partners in Flight Bird Conservation Plan, Version 1.0. Nongame and Endangered Wildlife Program Technical Report 142. Arizona Game and Fish Department, Phoenix, AZ. 331 pp.

Lee, R. L., J. D. Yoakum, B. W. O'Gara, T. M. Pojar and R.A. Ockenfels (eds.). 1998. Pronghorn Management Guidelines. 18th Pronghorn Antelope Workshop, Prescott, AZ. 110 pp.

Loeser, Matt R., T. D. Sisk and T. E. Crews. 2001. Plant Community Responses to Cattle Grazing: an Assessment of Alternative Management Practices in Semi-Arid Grassland *in*

USDA Forest Service Proceedings RMRS-P22, Ponderosa pine ecosystems restoration and conservation: steps toward stewardship. Ogden, UT. pp. 80-87.

Loeser, Matt R., T. D. Sisk, and T. E. Crews. 2004. Defoliation increased above-ground productivity in a semi-arid grassland. *Journal of Range Management*, 57(5):442-447.

Martine, Kristen and Heather Provencio. 2004. The Anderson Mesa Landscape Scale Assessment Heritage Resource Report (CNF Project 2003-11). On file at the Coconino National Forest Supervisor's Office, Flagstaff, AZ.

Marzluff, J. M. and R. P. Balda. 1992. The Pinyon Jay: Behavioral ecology of a colonial and cooperative corvid. T&AD Poser, London, England.

McNaughton, S. J. 1983. Compensatory plant growth as a response to herbivores. Oikos 40:329-336.

Mezulis, Sharon D. 2003. Landscape Scale Assessment of Pronghorn Fawn Hiding Cover on Anderson Mesa, Arizona. Unpublished report prepared for the Coconino National Forest.

Morrall, Elaine and J. Coons. 1996. Checklist of the birds of Mormon Lake, Arizona and nearby areas (Lakes Mary and Ashurst, Anderson Mesa). 2 pp.

Myers, Terry L. 1982. Ecology of Nesting Waterfowl on Anderson Mesa, in North Central Arizona. Masters Thesis, University of Arizona, 78 pp.

National Oceanic and Atmospheric Administration (NOAA). 1975-1993. Annual Climatological Summary for the Flagstaff Pulliam Airport weather station for the years 1975-1993.

NatureServe. 2006. An Internet source for information about rare and endangered species and threatened ecosystems at http://www.natureserve.org. Accessed 4/19/2006.

Neff, Don J. 1986. Pronghorn Habitat Description and Evaluation. Federal Aid in Wildlife Restoration Project W-78-R. 17 pp.

Nelson, John. 2005. Personal communication. Recreation, Wilderness, Trails, and Engineering Staff for the Peaks and Mormon Lake Ranger Districts.

O'Gara, B. W. and J. D. Yoakum 2004. Pronghorn Ecology and Management. University Press of Colorado. Boulder, CO. 903 pp.

Ockenfels, R. A. et al. 1996. Statewide Evaluation of Pronghorn Habitat in Arizona. Arizona Game and Fish Department, Federal Aid Wildlife Restoration Project, W-78-R Draft Report, Phoenix, AZ. 296 pp.

Opler, P. A. and A. B. Wright. 1999. Western Butterflies. Houghton Mifflin Company, Boston, MA. 540 pp.

Phillips, A., J. Marshall, and G. Monson. 1964. The Birds of Arizona. Tucson: University of Arizona Press, Tuscon, AZ.

Prichard, D., C. Bridges, S. Leonard, R. Krapf, and W. Hagenbuck. 1998. Riparian area management. Process for assessing proper functioning condition for lentic riparian-wetland areas. USDI Bureau of Land Management. TR 1737-11. BLM/SC/ST-94/008+1737+REV98. 37 pp.

Provencio, Henry. 2005. Monitoring visit to MSO restricted habitat on the Deep Lake Grazing Allotment. Unpublished notes. 2 pp.

Pyle, R. M. 1981. The Audubon Society Field Guide to North American Butterflies. A. A. Knopf, New York, NY.

Ricketson, Jon. 1990. Aquatic and Wetland Vascular Plants of Coconino National Forest, Arizona. Masters Thesis, Northern Arizona University. 691 pp.

Ruyle, George (ed.). 1997. Some Methods for Monitoring Rangelands and Other Natural Area Vegetation. University of Arizona, College of Agriculture, Cooperative Extension Report 9043.

Savory, A. 1988. Holistic Resource Management. Island Press, Washington, DC.

Scott, J. S. 1986. The Butterflies of North America. Stanford University Press, Stanford, CA 583 pp.

Skovlin, J. M. 1984. Impacts of grazing on wetlands and riparian habitat review: a review of our knowledge, in *Developing Strategies for Rangeland Management*, Westview Press, Boulder, CO. pp 1001-1103.

Smith, Lamar et al. 2005. Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands. University of Arizona. College of Agriculture and Life Sciences. Tucson, AZ. Cooperative Extension Report 1375.

Society of Rangeland Management (SRM) 2006. Climate and Rangeland Workshop: Assessing Climate Change/Variability and Ecosystem Impacts/Responses in Southwest Rangelands. SRM Arizona Chapter Annual Meeting, January 25-26, 2006. San Carlos, AZ.

Steinke, Rory. 2005. Personal communication. Watershed Specialist for the Coconino National Forest.

Terres, J. K. 1991. The Audubon Society Encyclopedia of North American Birds. Wings Books, New York, NY. 1109 pp.

Ticer, C. L., and W. H. Miller. 1994. Pronghorn fawn bed site selection in a semi desert grassland community of central Arizona. Proceedings of the Biennial Pronghorn Antelope Workshop. 16:86-103.

Ticer, C. L. 1998. Pronghorn fawn bed site selection in a short grass prairie of central Arizona. Masters Thesis, Arizona State University.

Tucker, R. D., and G. W. Garner. 1983. Habitat selection and vegetational characteristics of antelope fawn bed sites in West Texas. *Journal of Range Management*, 36:110-113.

USDA Forest Service. Forest Service Manual 2200: Range Management.

USDA Forest Service. Forest Service Handbook 2200.13: Grazing Permit Administration Handbook

USDA Forest Service. Forest Service Manual 2500: Watershed and Air Management.

USDA Forest Service. Forest Service Manual 2600: Wildlife, Fish, and Sensitive Plant Habitat Management.

USDA Forest Service. 1982. Analysis of the Management Situation, Coconino National Forest. Southwestern Region.

USDA Forest Service. 1985. *Hedeoma diffusum* Management Plan. Coconino National Forest. Flagstaff, AZ. 5 pp.

USDA Forest Service. 1987. Coconino National Forest Land Management Plan, and all subsequent amendments.

USDA Forest Service. 1995. Terrestrial Ecosystems Survey of the Coconino National Forest, Region 3. 405 pp.

USDA Forest Service. 2000a. Unpublished meeting notes on *Polygala rusbyi*, *Eriogonum ericifolium ericifolium*, *Penstemon nudiflorus* and *Helenium arizonicum*. Located in Mormon Lake Ranger District files, Coconino National Forest.

USDA Forest Service. 2000b. Survey Report for Pickett Allotment. 3 pp.

USDA Forest Service. 2001. Biological Assessment and Evaluation for the Pickett Lake Agra-Axe Project. 3 pp.

USDA Forest Service. 2002a. A list of closure orders on the Coconino National Forest that protect riparian habitat. Located at the Mormon Lake Ranger District, Coconino National Forest. 18 pp.

USDA Forest Service. 2002b. Improvements on lakes, wetlands, springs and streams on the Coconino National Forest. Compiled by Heather Green. 23 pp.

USDA Forest Service. 2002c. Management Indicator Species Status Report for the Coconino National Forest. Working Draft. 94 pp.

USDA Forest Service. 2002d. Guidance Criteria for Determining the Effects of On-Going Grazing and Issuing Term Grazing Permits on Selected Threatened and Endangered Species, and Species Proposed for Listing and Proposed and Designated Critical Habitat. Region 3, Wildlife, Fisheries, and Rare Plants. 92 pp.

USDA Forest Service. 2004. Anderson Mesa Landscape Scale Assessment Draft Report. Coconino National Forest. 96 pp.

USDA Forest Service. 2005a. Framework for Streamlining Informal Consultation for Cattle Grazing Activities. Southwestern Region. 112 pp.

USDA Forest Service, 2005b. Draft Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds. Southwestern Region. 589 pp.

USDI Fish and Wildlife Service. 1995. Recovery Plan for the Mexican Spotted Owl: Vol. 1. Albuquerque, NM. 172 pp.

USDI Fish and Wildlife Service. 1999. Draft rule to remove the American peregrine falcon from the Federal list of endangered and threatened wildlife and to remove the similarity of appearance provision for free-flying peregrines in the conterminous United States. Federal Register 64, No. 164. pp. 46542-440875.

Wallesz, Dave. 1999. Distribution of sensitive insects in Arizona. Arizona Zone Entomology and Pathology. Unpublished report prepared for the Coconino National Forest. USDA Forest Service. 5 pp.

Weller, M. W. 1996. Birds of rangeland wetlands *in* P.R. Krausman (ed.) Rangeland Wildlife. The Society of Range Management, Denver, CO. pp. 71-82.

Western Regional Climate Center. 2005. Historical climate information; Average pan evaporation data by state, found at http://www.wrcc.dri.edu/htmlfiles/westevap.Draft.html.

Yoakum, J. 2002. Field data sheets of lentic wetland inventory for Anderson Mesa. USDA Forest Service, Southwestern Region, Coconino National Forest, Mogollon Rime Ranger District. Data sheets available at the Mogollon Rim Ranger District Soil and Water section.

Appendix A: Wetlands and Springs Within the Cumulative Effects Area

Table 26 displays the wetlands by wetland type, the acres of these wetlands, the current/planned grazing scheme, the proper functioning condition (PFC) and the number of stock tanks within the wetland basin. The PFC rating is an indication of the residual amount of biomass left after grazing that will occur after July 15. If enough residual vegetation is left to promote nutrient cycling, then the site would be rated at PFC. If the site is heavily grazed with little or no residual vegetation left onsite, then the site is functional at-risk due to lack of nutrient cycling. No wetlands in this analysis area have been rated at risk for any alternative because the wetlands recover from the proposed grazing quickly, with no intensive erosion in the wetlands as a result. Stock tanks do not put these wetlands into the functional at-risk category.

Depending on how a particular wetland is grazed during the year, some wetlands may have either a PFC or functional at-risk rating. These wetlands have recovered from past grazing to PFC based on favorable climate conditions. No wetlands in the analysis area have been rated at risk because the areas regrow quickly from cattle grazing, with no intensive erosion. Stock tanks did not put these wetlands into the functional at-risk category.

Table 26. Wetlands and springs within the cumulative effects area

Name	Acres	Wetland Type	Grazing Status	PFC Class	Stock Tank
Driveway	5	Ephemeral	Grazed by cattle within Lakes pasture (Bar T Bar).	PFC	1
Gonzalo	18	Ephemeral	Grazed by cattle within the Anderson Springs Allotment.	PFC	1
Unnamed_16_11_28	5	Ephemeral	Grazed by cattle within West Melatone pasture (Bar T Bar).	PFC	
Total Acres of Ephemeral Wetland — 28					
Crater Lake	22	Temporary	Grazed by cattle in Broomy pasture (Bar T Bar).	PFC	1
Daze Lake	44	Temporary	Grazed by cattle in West Melatone pasture (Bar T Bar).	PFC	
Horse Tank (Pickett Allotment)	8	Temporary	Grazed by cattle within Ashurst pasture (Pickett/Padre).	Functional at-risk/PFC	1
McDermott Lake	72	Temporary	Grazed by cattle within Boot pasture (Pickett/Padre). This pasture rested 1999-2004.	Functional at-risk/PFC	1
Pollino	8	Temporary	Grazed by cattle, North Yeager pasture (Anderson Mesa).	Functional at-risk/PFC	2
Total Acres of Temporary Wetland — 154					

Name	Acres	Wetland Type	Grazing Status	PFC Class	Stock Tank
Al's Lake	40	Seasonal	Grazed by cattle within Ashurst pasture (Pickett/Padre) after July 15.	Functional at-risk/PFC	1
Antelope North	5	Seasonal	Grazed by cattle within Ashurst pasture (Pickett/Padre) after July 15.	PFC	
Antelope Tank	8	Seasonal	Grazed by cattle within Ashurst pasture (Pickett/Padre) after July 15.	Functional at-risk	1
Boot Lake	70	Seasonal	Lane constructed to tanks, protection of wetland from cattle grazing outside of lane on Anderson Springs and Pickett/Padre Allotment.	PFC	1
Breezy	33	Seasonal	Grazed by cattle within Breezy pasture (Pickett/Padre) after July 15. This pasture rested 2000-2002. Possible cattle exclosure to be built in 2006-2007.	PFC	4
Camillo Tank	46	Seasonal	West half grazed in Mud/Tinney Allotment after July 15. Excluded from cattle by exclosure on east half on Anderson Springs Allotment.	PFC	3
Corner Lake	38	Seasonal	Lane constructed to tanks, protection of wetland from cattle grazing outside of lane on Anderson Springs.	PFC	2
Corral Tank	11	Seasonal	Grazed by cattle within East Mud Lake pasture (Anderson Springs).	PFC	1
Cow Lake	30	Seasonal	Total exclosure from cattle grazing within North Grapevine pasture (Bar T Bar).	PFC	1
Dry Tank	11	Seasonal	Planned for protection with exclosure and lane to tank site in Youngs pasture (Walnut).	Functional at-risk/PFC	1

Name	Acres	Wetland Type	Grazing Status	PFC Class	Stock Tank
Ducknest	42	Seasonal	Exclosure from grazing by cattle within Ducknest pasture (Pickett/Padre).	PFC	1
Grass	86	Seasonal	Grazed by cattle after July 15 within the Holding pasture.	PFC	1
Hay Lake	459	Seasonal	NRCS wetland easement, no cattle grazing.	PFC	1
Horse Tank	10	Seasonal	Grazed by cattle after July 15 within the Walnut Canyon Allotment.	Functional at-risk/PFC	1
Indian Lake	25	Seasonal	Grazed by cattle within Breezy pasture (Pickett/Padre). Possible exclosure with lane to stock tank. Grazed after July 15 until exclosure built.	Functional at-risk/PFC	1
Indian Tank	13	Seasonal	Grazed by cattle within Ducknest pasture (Pickett/Padre) at lane only. Exclosure planned, grazed after July 15 until exclosure built.	Functional at-risk/PFC	1
Long Lake (D-5)	367	Seasonal	Excluded from cattle grazing in early 1990s. New fence constructed in 2003-2004.	PFC	1
Lost Tank	13	Seasonal	Planned for protection with exclosure and lane to tank site in Youngs pasture (Walnut).	Functional at-risk/PFC	1
Melatone Lake	12	Seasonal	Protected with only lane grazed in East Melatone pasture (Bar T Bar).	PFC	1
Deep Lake	11	Seasonal	Grazed by cattle within Ashurst pasture (Pickett/Padre) after July 15.	Functional at-risk/PFC	1
Pine Lake	53	Seasonal	Completely protected with exclosure (Anderson Springs).	PFC	2
Potato Lake	89	Seasonal	Grazed by cattle within Ashurst pasture (Pickett/Padre) after July 15.	Functional at-risk/PFC	1

Name	Acres	Wetland Type	Grazing Status	PFC Class	Stock Tank
Tony's Tank	9	Seasonal	Protected with exclosure with lane to tank in West Mud Lake pasture (Anderson Springs).	PFC	1
Wallace Lake	9	Seasonal	Grazed by cattle within North Tinny pasture (Mud-Tinny) after July 15.	Functional at-risk	1
West Breezy	5	Seasonal	Grazed by cattle within Breezy pasture (Pickett/Padre) after July 15. Possible exclosure site in the future.	Functional at-risk/PFC	1
Yeager Lake	87	Seasonal	Protected with exclosure with three lanes in Anderson Springs.	PFC	4
Youngs Lake	23	Seasonal	Planned for protection with exclosure and lane to tank site in Youngs pasture (Walnut).	Functional at-risk/PFC	1
Total Acres of Seasonal Wetland — 1,605					
Deep Lake	61 (48 Deep, 13 Pickett)	Semipermanent	Grazed by cattle within Walnut Canyon Allotment after July 15, proposed for exclosure with lane in future.	Functional at-risk/PFC	1
Fisher/Fry Lake	18	Semipermanent	Planned for protection with exclosure and lane to tank site in Observatory/Youngs pasture (Walnut).	PFC	1
Horse Lake	61	Semipermanent	Cattle exclosure present (Deep Lake).	PFC	1
Little Dry Lake	9	Semipermanent	Grazed by cattle within Marshall Lake Riparian pasture (Walnut) after July 15.	PFC	1
Marshall Lake	132	Semipermanent	Grazed by cattle within Marshall Lake Riparian pasture (Walnut) after July 15.	PFC	1
Mormon Lake	5,229	Semipermanent	Grazed by cattle within the Mormon Lake Riparian pasture (Tinny) after July 15.	PFC	3
Perry Lake	27 (25 Deep, 2 Anderson Springs)	Semipermanent	Exclosure to be built with two lanes, Pickett/Padre and Anderson Springs Allotment.	PFC	3

Name	Acres	Wetland Type	Grazing Status	PFC Class	Stock Tank
Post Lake	27	Semipermanent	Exclosure with no lane within Ashurst pasture (Pickett/Padre). Bulrush located on far north end of area.	PFC	
Prime Lake	13	Semipermanent	Exclosure planned within Observatory pasture, Walnut Allotment.	PFC	
Vail Lake	71	Semipermanent	Cattle exclosure (Walnut).	PFC	1
Lower Lake Mary	146	Semipermanent	Excluded from cattle grazing	PFC	0
Total Acres of Semipermanent Wetland — 5,794					
Ashurst Lake	199	Reservoir	Excluded from cattle grazing except for north end of lake, which is rocky.	Functional at-risk	
Coconino Dam	10	Reservoir	Grazed by cattle within Ducknest pasture (Pickett/Padre). Mid-summer grazing only 2002-04.	PFC	
Kinnikinick Lake	123	Reservoir	Excluded from cattle grazing (Anderson Springs/Bar T Bar).	PFC	
Long Lake	367	Reservoir	Grazed by cattle within Lakes pasture (Bar T Bar).	PFC	
Lower Lake Mary	146	Reservoir	Excluded from cattle grazing	PFC	
Morton Lake	27	Reservoir	Grazed by cattle within North Grapevine pasture (Bar T Bar).	PFC	
Mud Lake	73	Reservoir	Grazed by cattle within East Mud Lake pasture (Anderson Springs).	PFC	
Soldier Annex	123	Reservoir	Grazed by cattle within Lakes pasture (Bar T Bar).	PFC	
Soldier Lake	32	Reservoir	Grazed by cattle within Trap pasture (Bar T Bar).	PFC	
Tremaine Lake	517	Reservoir	Grazed within (Bar T Bar).	PFC	
Upper Lake Mary	661	Reservoir	Excluded from cattle grazing.	PFC	
Total Acres of Reservoir — 2,278					

Name	Acres	Wetland Type	Grazing Status	PFC Class	Stock Tank
Total of all Wetland Acres — 9,859					
Boot Spring	1*	Spring	Grazed by cattle within Boot pasture (Pickett/Padre). This pasture rested 1999-2004.		
Ashurst Spring	1	Spring	Fenced with an 8-foot fence		
Billy Back Springs	1	Spring	Grazed by cattle within Elliot Driveway (Pickett/Padre).		
Youngs Spring and Tank	1	Spring	Excluded from cattle within Youngs pasture (Walnut).		1
Elk Spring	0	Spring	Historic spring that is currently dry (2002-2005) (Deep Lake).		
Mormon Canyon Spring	1	Spring	Grazed by cattle in Ashurst pasture (Pickett/Padre).		
Yellow Jacket Spring	1	Spring	Spring is in rocky outcrop, inaccessible to cattle.		
Elliot Spring	1	Spring	Grazed by cattle in Pickett/Padre in Woodland pasture. Spring is in canyon and access is poor.		
Unnamed	1	Spring	Is inaccessible to cattle in Anderson Springs, North Burro pasture.		
Anderson Springs	1	Spring	Grazed by cattle in Anderson Springs, North Burro Allotment.		
Kinnikinick Springs	1	Spring	Grazed by cattle in Anderson Springs, South Yeager pasture.		
Dove Spring	1	Spring	Elk exclosure, Bar T Bar, Broomy pasture.		
Grapevine Spring	1	Spring	Grazed by cattle in Bar T Bar in Broomy pasture.		
Turkey Seep	1	Spring	Poor access in canyon, grazed by cattle in Bar T Bar in East Melatone pasture.		
Little Moqui	1	Spring	Grazed by cattle in Bar T Bar		

Name	Acres	Wetland Type	Grazing Status	PFC Class	Stock Tank
			in Moqui.		
Big Moqui	1	Spring	Grazed by cattle in Bar T Bar in Moqui.		
Hunter	1	Spring	Elk exclosure, Bar T Bar, Moqui pasture.		
Total Acres of Springs — 16					

*Spring sites are all arbitrarily given a 1-acre size. There are no stock tanks located at springs and PFC class does not apply.

Appendix B: Projects Considered in Cumulative Effects Analyses

Tables 27-29 identify past, present and reasonably foreseeable activities and natural events that could be considered in a cumulative effects analysis. Foreseeable future projects are listed if there is currently a proposed action available or other document or map that outlines the activity, even if the plan is only conceptual. Table 30 lists active grazing allotments adjacent to the Walnut Canyon Allotment or within Anderson Mesa. Information from these lists of activities and/or natural events are carried forward into each resource cumulative effects analysis based on that resource's spatial and temporal parameters. Not all of these activities or events are applicable to each resource cumulative effects analysis.

Monitoring and research activities are not listed if they do not directly affect the resource. Actual monitoring exclosures are listed because they represent small areas of different grazing use.

The tables were created by reviewing the latest Schedule of Proposed Actions (SOPA), the Flagstaff Center Decision Records Index, the Record of Decisions for Anderson Springs/Bar T Bar Allotments and Pickett Lake/Padre Canyon Allotments, district out year plans, Arizona Game and Fish Department's Pronghorn Plan, and the Coconino County Capital Improvement Plan (2002-2006 Work Plan).

Table 27. Past projects and/or natural events

Project Name	Location	Description/Effects	Status
Cabin Draw Fuelwood	Padre Canyon Allotment	Thin trees on 56 acres so that more grass and forbs can grow, stabilizing eroded areas.	Completed 2001
Arizona Trail: Lakeview Campground to Pinegrove TH	Pickett Lake Allotment	Construct some portions of this route and designate trail on existing roads and social trails, to add a linkage to the state-wide Arizona Trail.	Completed 2001
Arizona Trail: Railroad Springs to Pinegrove TH	Within Walnut Creek 5th code watershed	Construct a segment of the Arizona Trail beginning 3 mi. south of Mormon Lake, traveling north to Pinegrove trailhead along west side of lake.	Completed 2002
Pinegrove Campground Construction	Pickett Lake Allotment	Replace existing facilities and construct a new amphitheatre. Improved developed recreation management.	Completed 2002
Campbell Mesa Road Obliteration	Within San Francisco Wash and Walnut Creek (5th code) watersheds	Close and obliterate 40 mi. of road on Campbell Mesa (generally the area south of I-40, north of FR303 and Walnut Canyon National Monument, east of Country Club (Flagstaff) and west of the Nat'l Monument entrance road	Completed 2002
Pickett Agra-Axe	West of Ashurst Lake (Pickett Lake Allotment)	205 acres of small junipers (mostly less than 12 inches) were removed on the Pickett Lake Allotment connecting existing openings and wetlands.	Completed 2002
Lake Mary Watershed Maintenance	NW and SW of Elk Park Meadows (Walnut Creek watershed)	Thin encroaching ponderosa pine in 3 meadows, across 70 acres, to restore condition and function of meadows.	Completed 2002 - 2003

Project Name	Location	Description/Effects	Status
Ashurst Agra-Axe	Southeast of Ashurst Lake (Pickett Lake Allotment)	325 acres of grassland maintenance to improve understory vegetation for pronghorn antelope.	Completed 2003
Hay Lake Wildlife Corridor	Bar T Bar Allotment	Two corridors were opened, totaling 400 acres. First Corridor runs from Daze Lake to Hay Lake and the second corridor runs from Tremaine Lake Basin to Hay Lake.	Completed 2003
Long Lake Boat Ramp, Parking and Toilets	Bar T Bar Allotment	Improve the existing facilities at Long Lake to provide for use while protecting resources.	Completed 2003
Ashurst Road Asphalt Patching and Scrub Seal	Pickett Lake Allotment	Repair existing asphalt surfacing of Forest Service Road 82E (Level 4 road prism) access to Ashurst Lake and Forked Pine Campground	Completed 2003
Wetland Monitoring Cattle/Elk Exclosures	Pickett Lake Allotment Anderson Springs Allotment	Small (10 x 40 ft.) wetland monitoring exclosures built to gather baseline data and future year trend information at Boot, Breezy, Ducknest, and Post Lakes (Pickett Lake Allotment) and Dry, Corner, and Yeager Lakes (Anderson Springs Allotment). These will remain in place after new authorized wetland exclosures are built in order to continue monitoring elk use in wetlands.	Completed 2002-2003
Long Lake Fence	Pickett Lake Allotment	Rebuilt the Long Lake (north) cattle exclosure fence.	Completed 2003
Fencing modifications	Raymond Ranch Wildlife Area	Meet or exceed 18" smooth bottom wire standard on all fences to improve antelope and wildlife passage.	Completed 2003
Prescribed burning (as part of the AZ Game and Fish Pronghorn Plan)	Anderson Mesa	Three test burns on 700 acres of the Mogollon District. As a result of the test, it was recommended that fire not be considered a primary tool for grassland or savanna restoration; mechanically reducing or removing existing woody cover to promote herbaceous production may best achieve restoration of grasslands and savannas on Anderson Mesa.	Completed 2003
Hoxworth Meadow Restoration	SW of Elk Park Meadows (Walnut Creek watershed)	Remove encroaching ponderosa pine on 27 acres to restore meadow habitat.	Completed 2004
Bear Park Urban Fuels Reduction	Southern section of Walnut Creek 5th code watershed	Thin unhealthy ponderosa pine that are densely spaced, dead top or otherwise considered a fire threat across 55 acres immediately adjacent to private land.	Completed 2004
Horse Lake Fence	Walnut Canyon Allotment	Fence repaired; wetlands permanently excluded from cattle grazing.	Completed 2004

Project Name	Location	Description/Effects	Status
Chavez Pass	Bar T Bar Allotment	About 500 acres of pinyon-juniper cut where radio tracking indicated heavy pronghorn use on Forest Service land near Chavez Pass.	Completed 2004
Wilkins Wildlife Habitat Project	Bar T Bar Allotment	AZGFD contractors and CREC crews also cut about 400 acres of heavy juniper and browse on the rim of Anderson Canyon. Primarily will benefit mule deer habitat.	Completed 2004
Lake Mary Watershed Stream Channel Restoration	Priest and Howard Draws (Walnut Creek watershed)	Restore stream channel gradient and re-vegetate to control erosion; obliterate 3.2 mi. of forest system road and improve FR235 to trailhead; construct 2 mi. trail along Priest Draw; remove stunted seedling trees from meadow areas.	Completed 2004
Wildfires	Walnut Canyon Allotment and within San Francisco Wash (5th code) watershed	There are short-term effects of reducing ground cover and increasing lower successional species. Long-term effects result in improved grass and forb vegetation. General plant health has improved with most fires after sufficient moisture is received for plant growth.	2003 Lizard Fire (5,127 acres); 2003 Mormon Fire (2,719 acres); 2004 Jacket Fire (17,219 acres).
Removal of Little Boot Lake stock tank	Anderson Springs Allotment	The stock tank in Little Boot Lake was filled in. Expect improvement to vegetation and soil conditions in Little Boot Lake.	Completed 2004
Invasive weed treatment	Jacket Fire area (Pickett Lake and Walnut Canyon Allotments)	20 acres of treatment total. Includes 4.5 acres of cheatgrass treatment using herbicides and 5 acres of scotch thistle removed by hand.	Completed 2004
South Boot/North Yeager Juniper Maintenance Cut	Near Yeager Lake (Anderson Springs Allotment)	Cut 1,982 acres of juniper trees. Revisited 1,200 acres in 2004, cutting juniper sprouts, seedlings, and branches that were missed.	Project completed between 2002-2004; 300 acres maintained in 2005
Ashurst Lake roadside stock tank	Upland drainage SW of Ashurst Lake	A roadside stock tank (1-acre area) built as mitigation for the Ashurst Lake exclosure fence. Cattle have access to water in the southern part of Ashurst pasture and are better distributed in this pasture.	Constructed spring 2005
Jacket Fire Grass Seeding	Padre Canyon Allotment	A total of 100 acres of deep soils that had not recovered naturally from the burn and did not have an adjacent native grass seed source was reseeded with native grasses to speed recovery.	Completed spring 2005
Other pinyon-juniper	Anderson Mesa	300 acres east of Kinnikinick Lake; 1,220 acres in Apache Maid. Other improvements	Completed 2005

Project Name	Location	Description/Effects	Status
thinning/grassland improvement		listed under specific project names in Table 27.	
Padre Canyon IRA and adjacent area road management	Padre Canyon and Walnut Canyon Allotments	Closure and obliteration of 8.5 miles of Forest System roads and 17.5 miles of illegal user-created roads within and immediately adjacent and leading to the Padre Canyon Inventoried Roadless Area.	Completed 2005
Lake Mary Meadows II Fuel Reduction	NW of Elk Park Meadows (Walnut Creek watershed)	Thin encroaching ponderosa pine in 3 meadows, across 300 acres, to restore meadows, reduce fuel condition class, and reduce yellow pine competition.	Completed 2005
Skunk Hollow Thinning Project	Northern section of Walnut Creek 5th code watershed	Thin trees on 831 acres; includes piling slash and burning piles.	Completed 2005
Priest Draw Aspen Protection	Central section of Walnut Creek 5th code watershed	Fence 10 acres of aspen (3 separate enclosures) and thin encroaching pine within these areas.	Completed 2005

Table 28. Current projects and ongoing activities

Project Name	Location	Description/Effects	Status
Climate (drought)	Regionwide	Insufficient precipitation for normal plant growth and for providing natural water sources for wildlife and/or cattle. Vegetation is negatively affected in general. Wetlands or other riparian areas can be dry and emergent vegetation may not be present.	Future precipitation depends on weather patterns.
Fencing Modifications	Anderson Mesa	Volunteers, AZGFD, and forest employees install goat bars to fences in order to facilitate wildlife movement. Replace the bottom wires of existing fences to smooth wire, 18" off the ground for antelope and other wildlife and remove old/unneeded fence.	Ongoing; 86 miles of goat bars installed since 2001. 103 miles of 18" smooth wire fence completed since 2002.
Dispersed recreation	San Francisco Wash (5th code) watershed and Anderson Mesa	Camping, hiking, hunting, recreational driving and other activities outside of developed campgrounds. Affects soil, vegetation, wetlands, and wildlife. Use likely to increase as the growing urban population grows.	Ongoing
Elk grazing	San Francisco Wash (5th code) watershed and Anderson Mesa	Elk graze across the area. The extent and duration of grazing depends on elk numbers and movement. Elk are attracted to wetlands and affect vegetation and soil conditions similar to the way cattle do. Depending on climate conditions, elk may graze year-round.	Elk numbers began increasing in the 1950s, peaked in the mid-1980s and have generally declined since then.
Firewood gathering	Forest-wide, including the San Francisco Wash (5th code) watershed and Anderson Mesa	Removal of dead/down vegetation through a special use permit. People gather firewood in many areas. Effects to vegetation and soil can occur from driving vehicles off road or from trampling in areas where firewood is gathered.	Ongoing; use varies by year but majority of use occurs Oct 1 - Dec 15
Stock tank maintenance	Forest-wide, including the San Francisco Wash (5th code) watershed and Anderson Mesa	Stock tank maintenance includes cleaning of existing tanks that are not in seasonal or semipermanent wetlands. Effects are limited to 2 to 3 days of actual disturbance from equipment and the original stock tank perimeter. Typically, stock tanks are dry and vegetation is minimal, therefore, there is a low level of disturbance to wetlands.	Ongoing

Project Name	Location	Description/Effects	Status
Existing roads	Walnut Canyon Allotment	There are 140 miles of Forest System roads within the allotment, which are maintained by the Forest Service. User-created roads are localized and not widespread and are not maintained by the FS. People may occasionally turn off an existing forest system road to create a new user road, but this is rare (rocky/rugged conditions generally limit cross-country use).	Ongoing
Pine Grove Seasonal Closure	Area immediately south of Upper Lake Mary	Area closed to motor vehicles from 8/15 to 12/31. Roads within the area are closed, but the roads along the perimeter are open to motorized travel.	On-going since 1991
Mormon Lake and Fulton Canyon Protection	Within Walnut Creek 5th code watershed	Motor vehicle closure area between FH3 and Forest Road 90 to protect Mormon Lake and Fulton Canyon	On-going since 2000
Pine Hill and Hay Lake vehicle closure area	Anderson Springs Allotment	Prohibit vehicle use during pronghorn fawning season (April 15 – July 15).	Ongoing
345kV transmission line maintenance	Deep Lake Allotment and Anderson Mesa in general	Tree trimming and vegetation clearing, as needed, within the right-of-way corridor for the Glen Canyon–Flagstaff–Pinnacle Peak 345kV power line.	On-going
Mint Springs Analysis Area	South of Mormon Lake (Walnut Creek watershed)	Thin trees >5” dbh and pre-commercial thin 3,894 acres; broadcast burn 12,000 acres; treat and enhance 36 acres of aspen; close 8.8 mi. of road and obliterate 21.3 mi. road in the analysis area.	Work began 1998; all treatments completed except 3,000 acres of broadcast burn (scheduled for 2006)
Lake Mary Fuels Reduction	Southwest of Lake Mary (Walnut Creek watershed)	Thin 1,970 acres of ponderosa pine between 1and 12” dbh and broadcast burn a total of 2,935 acres.	Thinning completed 2002; 642 acres burned in 2005 and 2006
Post Lake Habitat Restoration Project	Area south of Post Lake	Agra-axe and hand thinning on 375 acres of scattered juniper, pinyon and ponderosa pine. Meadow and grassland habitat will be restored which will improve habitat and travel corridors for pronghorn and other wildlife. Grass and forb production will increase and soil conditions will stabilize or improve in 1 to 3 years depending on moisture availability.	Work began 06/2004
Antelope Tank Habitat Restoration	Area west of Ashurst Lake	Agra-axe and hand thinning on 963 acres of scattered juniper, pinyon and ponderosa pine. Same effects as Post	Work began 08/2004

Project Name	Location	Description/Effects	Status
Project		Lake Habitat Restoration Project.	
Ashurst Lake Habitat Improvement	Pickett Lake Allotment	Cutting of pinyon-juniper with an agra-axe approved for 1,500 acres. Same effects as Post Lake Habitat Restoration Project.	400 acres completed in 2004; 1,800 acres in 2005
Youngs Canyon Grassland Maintenance	Youngs Canyon Allotment	Project authorized under Youngs Canyon AMP (2001). Maintenance of previously treated openings (1,140 acres) and thinning of young pinyon-juniper (2,240 acres) within the allotment area.	400 acres completed in 2001-2002; 1,400 acres in 2005
Woody Vegetation Removal and Burning	State lands, Hopi and private lands Raymond Ranch Wildlife Area	Target 20,000 acres of treatment in area from Anderson Mesa to Grapevine tank; between Grapevine Canyon and Diablo Canyon; from the FS boundary east of Chavez Pass south and east to Jacks Canyon; from Dog Valley northeast and from West Sunset Mountain northwest to recent chaining. 2,000 acres of treatment	1,040 acres completed in 2002-2003; 440+ acres in 2004 600 acres of juniper/slash and 500 acres of aerial fertilization completed in 2004
Long Lake Grassland Improvement Project	Pickett Lake Allotment	Thinning 5,184 acres of scattered juniper and encroaching pinyon and ponderosa pine trees around Long Lake. Implementation will continue until entire area is thinned. Expect improvement in meadow and grassland habitat.	1,290 acres accomplished in 2005
Cow Lake Pronghorn Habitat Improvement	Bar T Bar Allotment	AZ Game and Fish Department project to hand thin small juniper trees on about 2,000 acres near Cow Lake for improving pronghorn habitat.	1,440 acres accomplished in 2005
Bar T Bar/Anderson Springs Allotment Management Plan	Southeast portion of Anderson Mesa	Over the next 10 years, the following will be implemented: install 17.6 miles of new wire fence; reconstruct 31.2 miles of fence; remove 4.7 miles of fence; install 3.8 miles of new electric fence; reconstruct 0.7 mile of electric fence; construct 5 new upland stock tanks; replace 3 waters; install 7 new cattle guards; build one reservoir cattle/elk exclosure; build 1 semipermanent wetland exclosure; build 7 seasonal wetland exclosures. Treat about 49,462 acres of young pinyon-juniper and ponderosa pine trees in traditional grassland areas for grassland maintenance and restoration;	Implementation began fall 2005

Project Name	Location	Description/Effects	Status
		open up 212 acres for wildlife corridors (figures are an aggregate across both allotments).	
APS Blue Ridge 69KV Transmission Line	Bar T Bar Allotment and state and private lands east of Anderson Mesa.	APS authorized to construct 39 miles of new overhead 69kV transmission line from Winslow to Blue Ridge. About 11 miles of line and a 2-acre substation near Blue Ridge, occur on Forest System land (remaining 28 miles occurs on State and private land east of the forest, mostly parallel to SR 87). Implementation includes 10 foot tall chain link fence around substation, improve 400 feet of access road, 55 acres of vegetation clearing, 50-acre small timber products sale, 1,300 acres of prescribed burning, and utilization of two 300-ft^2 staging areas. The utility corridor and area surrounding the substation will be maintained regularly, which includes tree trimming and vegetation clearing as needed and re-entry for prescribed burning every 5-7 years.	Implementation began fall of 2005
Anderson Mesa Prescribed Burn	Pickett Lake and Anderson Springs Allotments	Treat 5,962 acres of grasslands on Anderson Mesa; 1,100 are initially scheduled to begin summer or fall of 2005. The remaining 4,862 acres to be burned in subsequent years as funding and grazing rotations permit. Affects vegetative structure and soils. Short-term effect of reducing ground cover and slight increase in erosion (<6 months) and increasing lower successional species (<1 year). Long-term effects would improve grass and forb vigor, available habitat and improve forest habitat trends for grassland (>1 year).	Implementation began fall 2005; 1,100 acres burned in the NE Pine Hill pasture.
Pickett Lake-Padre Canyon Allotment Management Plan	Southeast of Walnut Canyon Allotment	Construct up to 1.5 miles of fence, in sections, along the Anderson Mesa rim and for a small holding pasture, and exclude Boot and Billy Back springs if utilization exceeds 20%; construct 4 wetland exclosure fences at Post, Perry, Ducknest, and Indian Tank lakes (~5.2 mi of fence). Under adaptive management, construct an additional 4 exclosure fences at Boot, Breezy,	ROD signed 7/28/2005; Implementation scheduled to begin spring 2006.

Project Name	Location	Description/Effects	Status
		Indian, and West Breezy lakes (~5.25 mi of fence). Install 4 miles of pipeline and 5 drinkers on the Padre Canyon Allotment. ~0.5 mi section of 82D road at Post Lake rerouted to the 9117F road and 0.5 mi segment of the 9117P road at Perry Lake will be decommissioned.	
Mormon Lake Basin Fuels Reduction	SW of Mormon Lake Community	Thin ponderosa pine on 2,388 acres and broadcast burn 2,831 acres; convert 2 user-created roads to trails; maintenance burn every 5-10 yrs after 1st burn.	Implementation to begin FY 2006
Skunk Canyon Prescribed Fire	T20NR7E Sect. 2,3,10,11 (Walnut Creek watershed)	Broadcast burn 831 acres in former Skunk Hollow thinning project area over next 5-6 yrs. Conduct maintenance burns every 4-15 yrs. as needed afterward.	Implementation to begin FY 2006

Table 29. Reasonably foreseeable future projects

Project Concept	Location	Description	Strategy
Deep Lake Allotment Management Plan	Adjacent (east) of Walnut Canyon Allotment	Build 5 wildlife-accessible waterlots (1.5 mi of total fence) around five existing stock tanks. Construct 2 mi. exclosure around Deep Lake and remove 0.3 mile of excess allotment boundary fence in the middle of the wetland. Add 1 mi. of fence to existing Horse Lake exclosure to protect the wetlands at Horse Tank and remove 0.5 mi of excess fence. All exclosures would contain lanes for cattle to access existing stock tank waters.	NEPA decision expected 6/2006
Mountainaire HFRA (Fuels Reduction)	Portion of project within western section of Walnut Creek 5th code watershed	Mechanically thin 13,363 acres; restore 2,805 acres of savannah/grassland (remove trees < 24”dbh); broadcast burn 15,109 acres; designate open 47.7 mi. open road system and decommission 55.7 mi. roads; designate dispersed camping in southern project area.	NEPA decision expected 04/2006; implement summer 2006
Forest Highway 3 (Lake Mary Road) Reconstruction	Portion of project within Walnut Creek watershed	Widen 4.6 miles of FH3 from Mormon Lake Ranger Station to Flagstaff City limits; replace existing guardrail that is too low between MPs 338 and 328; construct turn lane additions to Lake Mary Boat Launch (MP 332) and Pine Grove Campground (MP 326); replace worn surfacing and provide ADA-access at the Mormon Lake Scenic Overlook parking area (MP 320).	Federal Highway Administration (FHWA) signed NEPA decision 03/2006
Cross Country Use of Motorized Vehicles in Five Arizona National Forests	Kaibab, Prescott, Apache-Sitgreaves, Tonto, and Coconino NFs	Proposed Forest Plan amendments on these five AZ national forests to prohibit cross-country (i.e., off–road) travel by off highway vehicles (OHVs). Could possibly reduce the number of roads within the analysis area.	DEIS completed in 2003; FEIS expected 05/2006
GFFP Eastside	Coconino National Forest lands east of Flagstaff	Area near Cosnino within the San Francisco Wash (5th code) watershed vegetation management and other activities proposed to help reduce wildfire risk and improve overall forest health.	NEPA analysis in progress; decision expected 09/2006
Angell Allotment Management Plan	Generally east of Winona and north of I-40; some of the allotment lies south of I-40, adjacent to Deep Lake.	Prepare a new AMP for cattle grazing on 62,784 acres.	NEPA analysis planned for 2006; implementation expected 2007

Project Concept	Location	Description	Strategy
Winona Wireless Communications Site	North of Winona	Designation of a new communication site to provide wireless telephone coverage for a portion of I-40 near Winona, AZ.	NEPA analysis planned for 2006; implementation expected 2007
APS Substation	South of Winona (Youngs Canyon Allotment)	Construction of a substation next to the WAPA substation southeast of Winona.	NEPA analysis planned for 2006; implementation expected 2008
Elk Park Fuels Reduction	Within Walnut Creek 5th code watershed	6,885 acres surrounding Elk Park Meadows community proposed for thinning and/or prescribed burning treatments.	NEPA analysis planned for 2006/2007
National Travel Management Rule Implementation	Forest-wide	Designate a system of National Forest System roads, trails, and areas open to vehicle use. Motor use off designated roads and trails and outside of designated areas would be prohibited under 36 CFR 261.13. Could possibly reduce the number of roads and trails open to motorized vehicle use within the project and cumulative effects areas.	Forest transportation atlas published by end of 2009.

Table 30. Adjacent allotments

Allotment Name	Acres	Number of Head	Season of Use	Utilization Guideline
Pickett Lake/Padre Canyon	55,807	913 cow/calf	6/1 to 9/30	35% 20% woody vegetation in riparian areas
Deep Lake	10,994	105 cow/calf	5/1 to 10/31	35% 20% woody riparian
Lake Mary	28,659	Grassbank, non-use since 2001		
Youngs Canyon	10,365	110 yearlings or 63 cow/calf	5/15 to 10/31	35% 20% woody riparian
Angell	62,784	425 cow/calf	5/15 to 10/31	50%
Bar T Bar	186,493	18,050 head months	n/a	35 to 50% 20% woody riparian
Anderson Springs	44,656	7,042 head months	n/a	35 to 50% 20% woody riparian
Tinny Springs	61,165	500 cow/calf	6/1 to 10/15	50% general 40% owl 20% woody riparian
Apache Maid	169,646	1045	Yearlong	50% 20% woody riparian

Appendix C: Example Grazing Schedules

Three year grazing schedules for Alternatives 1 (Current Management) and 3 (Proposed Action) are provided here. These schedules are given as examples for comparison purposes only. Grazing schedules will be determined each year depending on weather and the permittees input, via the AOIs. Cattle numbers are given as maximums, which could occur once all structural improvements are in place. Cattle numbers may vary below these maximums to zero.

Alternative 1 (Current Management)

Year 1

Grazing Location	Graze Dates	Cattle Number
Newman	6/1-6/23	350
Cherry	6/24-8/14	350
Youngs	8/15-9/14	350
Observatory	9/15-10/20	350
Marshall/Shipping	10/21-10/31	350

Year 2

Grazing Location	Graze Dates	Cattle Number
Cherry	6/1-7/14	350
Youngs	7/15-8/14	350
Observatory	8/15-9/14	350
Newman	9/15-10/20	350
Marshall/Shipping	10/21-10/31	350

Year 3

Grazing Location	Graze Dates	Cattle Number
Cherry	6/1-7/14	350
Youngs	7/15-8/14	350
Observatory	8/15-9/14	350
Newman	9/15-10/20	350
Marshall/Shipping	10/21-10/31	350

Alternative 3 (Proposed Action)

Year 1

Grazing Location	Graze Dates	Cattle Number
Cherry	6/1-7/14	350
Youngs	7/15-8/14	350
Observatory	8/15-9/14	350
Newman	9/15-10/20	350
Marshall/Shipping	10/21-10/31	350

Year 2

Grazing Location	Graze Dates	Cattle Number
Youngs	6/1-7/1	350
Observatory	7/2-8/14	350
Newman	8/15-9/2	350
Cherry	9/3-10/20	350
Marshall/Shipping	10/21-10/31	350

Year 3

Grazing Location	Graze Dates	Cattle Number
Newman	6/1-6/23	350
Youngs	6/24-7/14	350
Cherry	7/15-8/20	350
Observatory	9/21-10/20	350
Marshall/Shipping	10/21-10/31	350