



United States Department of Agriculture

# Final Environmental Impact Statement for the Prescott National Forest Land and Resource Management Plan, Volume 1

## Yavapai and Coconino Counties, Arizona



Forest Service

Southwestern Region

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# Final Environmental Impact Statement for the Prescott National Forest Land and Resource Management Plan, Volume 1

Yavapai and Coconino Counties, Arizona

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**Abstract:** This environmental impact statement discloses the detailed analysis of each of the five alternatives for revising the 1987 "Prescott National Forest Land and Resource Management Plan" (1987 plan). The analysis displays each alternative's anticipated progress toward the desired conditions as well as its potential environmental and social consequences. Alternative A represents no change to the 1987 plan (as amended). Alternative B emphasizes citizen collaboration; it was developed to address identified needs for change in existing plan direction including: ecosystem restoration, watershed integrity, sustainable recreation, fish habitat, and open space. Alternative C is similar to alternative B, but it places greater emphasis on ecosystem restoration and wildlife viability. Alternative D is also similar to alternative B, but it places greater emphasis on dispersed recreation opportunities. In response to comments received between the draft and final versions of the EIS, alternative E was developed as the final revised plan (selected). It is a modified version of alternative B, with a more modest emphasis on recreation and additional clarity of direction for watershed management, forest access, and land acquisitions.

# Summary

The Prescott National Forest (Prescott NF or the forest) proposes to implement a new land and resource management plan (plan). The area affected by the plan and alternatives covers approximately 1.2 million acres of Yavapai and Coconino Counties in west-central Arizona. The forest is currently being managed under the “Prescott National Forest Land and Resource Management Plan” (the 1987 plan) which was approved in 1987. This action is needed because environmental conditions and managed activities on the Prescott NF have evolved since 1987 to the point where previous guidance must be updated.

## Background

Extensive public involvement and collaboration related to developing the revised plan for the Prescott NF has occurred and is ongoing. Informal discussions with the public regarding needed changes to the 1987 plan began with a series of public meetings in 2007. This input, along with science based evaluations, was used to determine the needs for change. Additional meetings, correspondence, news releases, comment periods, Federal Register notices, Web postings, and other tools have been used to gather feedback from the public, Prescott NF employees, tribal governments, Federal and State agencies, and local governments. These public involvement efforts resulted in a proposed land and resource management plan, identified as alternative B (proposed revised plan) and two other action alternatives analyzed in the draft environmental impact statement.

Three primary issues arose that served as the basis for these other alternatives. The first was that the proposed plan did not place a big enough emphasis on ecosystem restoration to maintain species viability and habitat. Alternative C was developed to address this issue and features a more intensive set of vegetation treatments than alternative B.

The second was the desire to provide more dispersed recreation opportunities than those included in the proposed plan, including a greater emphasis on improving existing trail conditions and providing additional opportunities on new trails. The third issue was the wide variation of opinion on how much potential wilderness to recommend for designation. It ranged from those who felt that the existing designated wilderness areas are adequate, to those who felt that nearly all potential areas evaluated should be recommended for designation. Alternative D is focused on providing more dispersed recreation opportunities and includes the greatest number and extent of areas recommended for wilderness designation of any of the alternatives.

During the 90-day open comment period for the draft EIS, concerns were raised by both internal and external commenters about access to the forest for public and administrative use and the ability to fund the proposed recreation program under projected declining budget scenarios. These comments were considered and addressed by evaluating and modifying alternative B to form the selected alternative (alternative E). Alternative E has a more modest emphasis on recreation in response to increasing budget uncertainty and additional guidance for watersheds, forest access, and land acquisitions, including two additional objectives that address water rights and historic access. A new set of wilderness recommendations was selected for alternative E to minimize the disruption of existing access for recreation and administrative use while still addressing the public’s desire to expand the existing wilderness opportunities.

## **Alternatives**

### **Alternative A: 1987 Plan Direction**

Under alternative A, the 1987 plan would continue to guide management of the Prescott NF.

### **Alternative B: Proposed Revised Plan**

Alternative B represents the collaborative effort of citizens, agencies, and Prescott NF employees to respond to suggested needs for change in existing plan direction. It includes objectives for vegetation to address the need to restore vegetation structure and composition; direction to retain or improve watershed integrity; an expansion of opportunities for sustainable and diverse recreation; direction to restore and improve habitat for native fish species; and a focus on enhancing the value of open space provided by the Prescott NF.

### **Alternative C: Vegetation and Wildlife Emphasis**

Alternative C includes many of the same components of alternative B; however, it responds to the issue of species viability and habitat by placing increased emphasis on vegetation trends within both grassland and ponderosa pine vegetation types. This focus increases the rate of improvement in the most departed vegetation types and places less emphasis on other vegetation communities and recreation components. In addition, alternative C includes more management treatment for native fish and other aquatic species and pronghorn habitats; there are no areas recommended for wilderness designation.

### **Alternative D: Dispersed Recreation Emphasis**

Alternative D includes an emphasis on dispersed recreation in response to the issue of providing sustainable and diverse recreation opportunities. There would be a reduced emphasis on developed recreation and increased emphasis on dispersed recreation compared to alternative B. Examples include stronger direction for improving trails, trailheads, and increasing trail mileage, and a greater emphasis on designated dispersed sites. This alternative also includes the highest number of areas recommended for wilderness designation.

### **Alternative E: Final Revised Plan (Selected)**

Alternative E, the final revised plan (selected), is a modified version of alternative B, with a more modest emphasis on recreation and additional guidance for watersheds, forest access, and land acquisitions. It includes two additional objectives unique to the alternative that address water rights and historic access. It also includes a unique set of areas recommended for wilderness designation that were selected to respond to both the public's concerns for recreation and administrative access and the public's desire to expand existing wilderness opportunities.

## **Environmental Effects**

Chapter 3 of the environmental impact statement presents the affected environment and the analysis of potential positive and negative effects. The following is a summary of the potential effects, by resource area, predicted to result from the implementation of alternatives A, B, C, D, or E.

## **Vegetation and Fire**

Alternative A would achieve some desired conditions for some of the potential natural vegetation types (PNVTs) in the short term, but over the long term, the end result is the least restoration of vegetation and fire characteristics and the least similarity to desired conditions among all of the alternatives.

The higher minimum level of restoration treatments proposed across the landscape in alternatives B, D, and E would result in moderate restoration of vegetation and fire characteristics and more similarity to desired conditions than under alternative A.

Restoration efforts in alternative C are focused on those vegetation types that currently show the greatest gap between the existing and desired conditions and, as a result, the expected outcome is that alternative C would provide the most restoration of vegetation and fire characteristics and the most similarity to desired conditions among all of the alternatives.

## **Smoke and Air Quality**

Alternative A would result in the highest potential level of particulate emissions among all of the alternatives due to a greater overall vegetative fuel load and an increased presence of ladder fuels over the long term. Alternative A also lacks adequate plan components to address the public concerns over nuisance smoke. As a result, citizens are less aware of the timing, emission sources, and smoke dispersion patterns of prescribed and wildfire managed for resource benefits, leading to increased complaints about nuisance smoke, visibility, potential health hazards, and less understanding and acceptance of wildland fire as an ecosystem management tool.

Alternatives B and E would create more nuisance smoke and emissions in the short term than alternative A, in order to produce a lower likelihood of crown fire behavior and associated particulate emissions over the long term. This would result in expected future emission levels that are less than alternatives A and D but not as low as alternative C.

Alternative C would create more nuisance smoke and emissions in the short term in order to produce a lower likelihood of crown fire behavior and associated particulate emissions over the long term. This would result in expected future emission levels that are the lowest among all of the alternatives.

Alternative D would place less emphasis on managed fire than alternatives B, C, or E but still represents an increase over alternative A. This would result in expected future emission levels that are less than alternative A but not as low as alternatives B, C, or E.

The action alternatives (B, C, D, and E) address public concerns over nuisance smoke that were identified during the plan revision process. Plan components are expected to improve community public relations and education to advance public acceptance of the use of wildland fire and tolerance for smoke.

## **Terrestrial Species Diversity and Viability**

All alternatives may affect the Mexican spotted owl (MSO), but are not likely to adversely affect it, and are not likely to result in adverse modification to its critical habitat. For all alternatives, designing and implementing projects in compliance with the “Mexican Spotted Owl Recovery

Plan” would be expected to lead to improved habitat conditions for the species. For Sonoran desert tortoise, no effect was determined for any of the alternatives. All of the alternatives would be expected to maintain or improve desert communities habitat associated with desert tortoise habitat needs.

Future projects implemented under any alternative may render a “May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability” determination for regionally sensitive plant and animal terrestrial species.

Pronghorn antelope was chosen as a management indicator species (MIS) for the grassland PNVTs; northern goshawk was chosen as a MIS for ponderosa pine forest PNVTs. All alternatives include some plan direction to improve the quality of pronghorn habitat and increase the amount and quality of goshawk habitat available on available Prescott NF lands.

Alternative A mitigates the least amount of risk to landscape-level habitat conditions for sensitive species, and those associated with grassland and ponderosa pine forest PNVTs are most vulnerable because current habitat conditions in these PNVTs are the least similar to desired conditions.

Alternatives B, D, and E propose as much or more landscape-level habitat restoration treatment than alternative A. This would result in greater mitigation of the risk to habitat conditions for sensitive species and less vulnerability for those associated with grasslands and ponderosa pine forest PNVTs.

Alternative C proposes the highest range of restoration treatments to landscape-level habitat conditions of any of the alternative, with focused restoration efforts in the grasslands and ponderosa pine forest PNVTs. The result would be the most mitigation of risk to landscape-level habitat conditions for regionally sensitive species.

## **Watershed**

Alternative A would result in the slowest rate of improvement in watershed function among the alternatives, and contains no plan-level emphasis for watershed restoration. It would also continue to address water quality in a reactive, site-specific manner, with improvements in water quality occurring at the current rate of progress.

Under the action alternatives (B, C, D, and E), watershed conditions could be reasonably expected to trend upward as a result of increased vegetation treatments and recreation management. Water quality, quantity, and timing are directly related to the condition and function of the watershed, and the current trend in improvement of water quality would be accelerated by these vegetation treatments and recreation management proposals. Improvements to watershed conditions will also increase the ability of watersheds to adapt to changes in climate without a loss of function.

Alternative B would improve overall watershed integrity more than alternatives A and E but less than alternatives C and D.

Alternative C would have the greatest long term benefit on vegetation and wildlife habitats but the least reduction of recreation impacts. It would improve watershed integrity the most of all of the alternatives.

## Summary

Alternative D is similar to alternatives B, C, and E in the protections and benefits provided to watershed integrity; however, it focuses more on recreation and less on the restoration of vegetation and habitat. The result is that it would have similar long term benefits to vegetation and wildlife habitats as alternative B, but would provide more mitigation for recreation impacts. Alternative D would improve watershed integrity more than alternative B, but less than alternative C.

Alternative E is similar to alternative B but with less emphasis on developed recreation and trail maintenance and more emphasis on addressing riparian threats and repairing roads and trails. It includes an additional objective addressing water rights that could benefit riparian areas by increasing the recharge rate of riparian aquifers. Alternative E would improve overall watershed integrity more than alternative A, but less than alternatives B, C, and D.

## Recreation

Alternative A continues the direction set forth in the 1987 plan to maintain recreation capacity and improve existing facilities, rather than develop new areas to meet future demand. It would continue to provide designated dispersed camping in the Prescott Basin, but there would be no direction to develop designated dispersed camping opportunities in other parts of the forest.

Alternative A is also vague on the policy for using motorized vehicles for cross-country travel to retrieve big game, provides very little guidance for trails management, and recommends no potential wilderness areas (PWAs) for wilderness designation. This alternative would result in a decrease in the overall quantity and quality of available recreation opportunities.

Alternatives B and C would increase both the quantity and quality of overall recreation opportunities on the forest by creating more developed capacity, improving the condition of the existing infrastructure, and expanding the range of available recreation opportunities. They would balance the development of dispersed and developed recreation and increase in the ability of managers to contain or mitigate recreation impacts, leading to an increase in the quality of the recreation opportunities provided.

Alternative B would recommend an additional 43,000 acres of wilderness of designation in 8 potential wilderness areas. This is equal to approximately 40 percent of the current existing wilderness acreage. In alternative C, there are no PWAs recommended for wilderness designation.

Alternative D would also provide an increase in both the quantity and the quality of the overall recreation opportunities on the forest. In alternative D, the emphasis of the recreation program is shifted from developed recreation to dispersed recreation. It would result in one or more potential developed campground areas being managed instead for designated dispersed camping. It would also provide a greater emphasis on trails and trailheads than any of the other alternatives, and include additional direction to create new trails and decommission some existing trails.

Alternative D would recommend an additional 116,000 acres of wilderness designation in 16 potential wilderness areas equaling approximately 110 percent of the current existing wilderness acreage. This would result in the largest increase in the number of acres protected for wilderness character for any of the alternatives.

Alternative E would also increase the quantity and quality of recreation opportunities on the forest, but with a more modest emphasis than the other action alternatives. Alternative E combines

the developed recreation direction from alternative D with the dispersed recreation direction found in alternatives B and C. It would still increase the flexibility of recreation managers to contain or mitigate recreation impacts and expand the range of available recreation opportunities to meet changing demand; however, it recognizes that future funding levels are uncertain as budgets are projected to decline.

Alternative E would expand both developed and dispersed recreation opportunities by establishing new developed sites and designated dispersed camping areas, and improving trailheads and fishing opportunities. It would also recommend an additional 23,000 acres of wilderness of designation in eight potential wilderness areas equaling approximately 22 percent of the current existing wilderness acreage.

### **Aquatic and Riparian Species Diversity and Viability**

Under alternative A, the population trends for federally listed and regionally sensitive aquatic and riparian species would be stable, with a slow increase in habitat quality and no change in habitat quantity. There would also be a stable population trend for aquatic macro-invertebrates, the management indicator species for aquatic habitats. Aquatic macro-invertebrate habitat would experience a slow increase in quality, but no change in quantity.

Alternatives B, D, and E would promote increasing population trends for federally listed and regionally sensitive aquatic and riparian species, with an accelerated increase in habitat quality and no change in habitat quantity. Alternative E would provide additional protection for aquatic and riparian habitat in the form of direction to pursue in-stream flow water rights for some waterways on the Prescott NF. Aquatic macro-invertebrate population trends would also increase, with an accelerated increase in habitat quality but no change in habitat quantity.

Alternative C is expected to show the greatest increase in population trends for federally listed and regionally sensitive aquatic and riparian species, with the greatest increase in habitat quality, but no change in habitat quantity. Similarly, aquatic macro-invertebrate population trends would also increase, with greatest increase in habitat quality but no change in habitat quantity.

### **Scenery and Open Space**

Alternative A fails to address current issues regarding open space and threats to the scenic integrity of the forest. This could result in the degradation of the scenic integrity near communities that are adjacent to the forest as the visual quality analysis would be performed using the outdated 1986 visual quality objectives. In addition, the lack of specific direction to consider open space values during land exchanges could negatively affect communities adjacent to the forest. The primary focus of land exchanges is on facilitating forest management and meeting public and community needs for infrastructure growth, but it does not provide guidance for encouraging the retention of open space.

Alternatives B, C, and D would provide specific direction to retain open space values and protect riparian habitat by pursuing land acquisition opportunities. Alternative E provides broad direction to retain open space values by pursuing land acquisition opportunities. The result of these alternatives would be increased protection for visual quality, especially near communities that are adjacent to the forest, which in turn would provide positive benefits by retaining scenic integrity and helping to preserve the sense of openness and rural character in these communities. The rural

## Summary

character and sense of openness would be furthered by plan guidance to act on opportunities to acquire land, as feasible, to retain open space values.

### **Socioeconomic Resources**

Changes to resource availability and uses of the Prescott NF can affect the quality of life for area residents and forest visitors. Those who primarily value livestock grazing, mineral removal, timber, and forest product collection are unlikely to have their quality of life affected by decisions made under any of the alternatives. This leaves recreation and recommended wilderness as the sources of potential social consequences between the proposed alternatives.

Alternatives B, C, D, and E are expected to increase the quantity and quality of recreation opportunities on the Prescott NF. Therefore, in comparison to alternative A, these alternatives are likely to improve the quality of life for those who value recreation. Alternatives B, D, and E are expected to appeal to people and groups who seek additional wilderness recreation opportunities or the protection of forest resources. Alternatives A and C maintain current levels of wilderness and, therefore, they would not affect social well-being related to wilderness values.

From the economic impact analysis, the total number of jobs contributed to the economy by the Prescott NF is expected to range between 656 and 664. All of the action alternatives (alternatives B, C, D, and E) would provide more jobs than the current management direction (alternative A), but the difference between alternatives is not significant.

### **Environmental Justice**

It is unlikely that there would be a disproportionate adverse effect on minority or low-income populations from implementing any of the alternatives. In cases where management decisions would create jobs and boost the local economy, these populations may directly benefit.

### **Heritage Resources**

Alternative A would have no measurable direct effects on any heritage resources. However, there remains the risk of high-intensity wildfires, which could have an indirect effect on fire sensitive heritage sites such as those with wooden, glass, or other similar components, and all sites would remain at risk from increased soil erosion associated with high-intensity fires.

Alternatives B, C, D, and E would have no measurable direct effects on any heritage resources, similar to alternative A. Alternatives B, D, and E would place more emphasis on forest restoration activities and reduction of fuels near historic sites, coupled with a comparatively lower risk of high-intensity fire and associated soil erosion. Alternative C would have the highest emphasis on forest restoration activities and reduction of fuels near historic sites, and thus, the lowest risk of high-intensity fire and associated soil erosion.

Alternatives B, D, and E recommend potential wilderness areas (PWAs) for designation, which would increase the number and acreage of wilderness areas to help protect more known and unknown historic sites from direct human impacts. Alternatives A and C do not recommend any PWAs for designation.

## **Livestock Grazing**

Alternative A would have the least impact on yearly available forage for livestock of any of the alternatives, because it would not increase the number of acres burned in the grassland and chaparral vegetation types. However, because it would not increase the number of acres treated, it would also provide the least long term increase in available forage.

The vegetation treatments for grasslands in alternatives B, D, and E would have a greater impact on yearly available forage for livestock and a greater long term increase in available forage than alternative A, but less than alternative C. The acreages of treatment in the piñon-juniper and chaparral vegetation, and thus, the long term increase in available forage, would be comparable or greater than alternatives A and C.

Alternative C would have the highest impact on yearly available forage for livestock and the greatest long term increase in available forage because it provides direction for the greatest increase in acres of grassland treated. In addition, it directs treatment for at least as much acreage in the piñon-juniper vegetation and chaparral as alternatives B, D, and E.

## **Minerals**

Most of the direction that affects minerals activities comes from the Forest Service Manual and Handbook. The laws, regulations, and policies governing minerals are independent from forest plan direction and do not change across alternatives.

Alternatives A and C would have the greatest potential for negative impacts to other resources and the greatest potential to expand the development of minerals resources.

Alternatives B, D, and E would have less potential for negative impacts to other resources and less potential to expand the development of minerals resources due to the areas recommended for wilderness designation. If any of these areas were to be designated as wilderness, they would be closed to new claims for locatable minerals such as copper or gold, but any valid existing claim would not be affected. Recommended wilderness areas would become closed to new mineral leases for coal, oil shale, oil and gas, phosphate, potash, sodium, and geothermal resources and new mineral materials development, including sand, stone, gravel, and clay, at the discretion of the forest supervisor.

## **Forest Products**

Based on historic averages, alternative A would result in the lowest volume of both sawtimber and firewood production among any of the alternatives. It would have the fewest overall short term impacts on scenic quality, visitor experience, soil compaction and erosion, and potential for the introduction of nonnative plants, but in the long term, it would result in the least improvement to vegetation structure and composition.

Alternatives B and E would result in a volume of sawtimber higher than alternative A and equal to the volume in alternatives C and D and the highest volume of firewood production among any of the alternatives. It would have the greatest number of short term impacts on scenic quality, visitor experience, soil compaction and erosion, and potential for the introduction of nonnative plants, but in the long term, it would provide the most improvement to conditions in the piñon-juniper PNVTs.

## Summary

Alternatives C and D would result in a higher volume of both sawtimber and firewood than alternative A, and an equal volume of sawtimber but less firewood than alternative B or E. They would have fewer short term impacts on scenic quality, visitor experience, soil compaction and erosion, and potential for the introduction of nonnative plants than alternative B or E, but more than alternative A. In the long term, alternatives C and D would achieve a little less than half the amount (46 percent) of changed condition in piñon-juniper PNVTs than what would be expected under alternative B or E, but more than under alternative A.

## Special Uses

Most of the direction that affects special uses comes from the Forest Service Manual and Handbook, which are independent from direction in the forest plan. Changes in forest plan direction would have little direct effect on special use permits as most of the changes would occur at the project, or permit issuance, level.

## Transportation System

Under alternative A, erosion from poorly located roads and trails with improper stream and drainage crossings is adding to the sediment load and impacting watershed integrity. It can be reasonably assumed that in the absence of a change in management direction these impacts will continue to accumulate into the future.

Alternatives B, C, D, and E contain specific plan-level guidance for watershed protection that would help to mitigate and restore the effects on water quality from the existing transportation system. The result would be that these alternatives would improve water quality at a faster rate than alternative A.

Alternatives B, D, and E recommend additional acreage for wilderness designation. A recommendation for wilderness designation imposes restrictions on any activity that could affect the wilderness character of the area; this could include the creation of new or temporary roads in these areas that do not contain any National Forest System roads.

Alternatives A and C do not recommend any areas for wilderness designation; there would be no restrictions on any activity, such as road building, that could affect wilderness character.

Alternative E is the only alternative to provide direction for the forest to secure legal access along National Forest System roads where historic access to the national forest has been lost.

## Decision to be Made

Based upon the potential effects of the alternatives, the responsible official will decide whether to implement one of the alternatives as described above, to vary the plan content through some other combination of management direction to meet the purpose and need, or to take no action at this time.

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# Chapter 1. Needs for Change for Plan Revision

## Document Structure

The Forest Service has prepared this environmental impact statement (EIS) in compliance with the National Environmental Policy Act of 1970 (NEPA) (P.L. 91-190) and other relevant Federal and State laws and regulations. This EIS discloses the direct, indirect, and cumulative environmental consequences that would result from the proposed action and alternatives. The EIS is organized into four chapters:

- *Chapter 1. Needs for Change for Plan Revision:* This chapter includes information on the history of the plan revision process, needs for change to the 1987 plan, and the Agency's revised plan that responds to these needs for change. This section also briefly describes how the Forest Service collaborated with the public to develop needs for change and the revised plan.
- *Chapter 2. Alternatives:* This chapter provides an overview of the alternative development process and details and compares alternative responses to needs for change. Finally, this section provides summary tables comparing potential future activities by alternative and a summary of the environmental consequences associated with each alternative.
- *Chapter 3. Affected Environment and Environmental Consequences:* This chapter summarizes the physical, biological, social, and economic environments affected by the revised plan and the environmental consequences of implementing each alternative. This analysis is organized by the revision needs for change.
- *Chapter 4. Consultation and Coordination:* This chapter provides a list of preparers and agencies consulted during development of the EIS.

Other sections in the EIS include:

- *Glossary:* This section provides explanations for key concepts in the EIS.
- *References:* This section provides citations for references made in the EIS.
- *Appendix:* The appendix consists of multiple parts and provides more detailed information to support the analyses presented in the EIS.
- *Index:* The section provides page numbers by topic.

Additional documentation, including specialists' reports, may be found in the planning record.

## Location of the Prescott National Forest

The 1.2 million-acre Prescott National Forest (Prescott NF or the forest) is located in west-central Arizona (figure 1) and is within Coconino and Yavapai Counties. Although the Prescott NF resides in both Coconino and Yavapai Counties, nearly 97 percent is within Yavapai County. Ranger district offices are located in Camp Verde, Chino Valley, and Prescott. The supervisor's office is located in Prescott. The Prescott NF shares boundaries with: the Coconino, Kaibab, and Tonto National Forests; the Agua Fria National Monument; Bureau of Land Management—Hassayampa Field Office; Arizona State Trust lands; and several communities.



## Background

The Prescott NF is managed by the Forest Service, an agency of the U.S. Department of Agriculture (USDA). The forest is currently being managed under the “Prescott National Forest Land and Resource Management Plan” (the 1987 plan) which was approved in 1987. The 1987 plan, including its amendments, is the main document that guides forest managers’ decisionmaking with respect to managing natural resources (e.g., soil, water, vegetation, ecosystems) and human uses (e.g., recreation, thinning, livestock grazing, firewood gathering, special use permits, search for solitude) of the Prescott NF.

The Prescott NF is proposing to revise its 1987 plan. Per direction in the National Forest Management Act of 1976 (NFMA) (P.L. 94-588) and its implementing regulations found in 36 CFR 219<sup>1</sup>, every national forest must revise its land management plan:

- Every 10 to 15 years;
- When conditions or demands in the area covered by the plan have changed significantly;
- When changes in agency policies, goals, or objectives would have a significant effect on forest level programs; and
- When monitoring and evaluation indicate that a revision is necessary.

Because the 1987 plan is outdated and does not reflect current conditions, the Prescott NF has been engaged in the process of revising its plan since 2006. During this process, the Prescott NF developed multiple programmatic strategies (or alternatives) for revising its plan. A summary of these alternatives as well as analysis of the environmental consequences they pose are the focus of this EIS.

## Need for Change

The purpose of this EIS is to evaluate the different alternatives for revising the 1987 plan, including disclosure of their environmental consequences. There is a need to revise the 1987 plan to: (1) address recommended needs for change; (2) guide natural resource management activities on the forest for the next 10 to 15 years; and (3) meet the legal requirements of NFMA and the provisions of the 1982 Planning Rule.

Revising the 1987 plan is necessary because environmental conditions and managed activities on the Prescott NF have evolved since 1987 to the point where previous guidance must be updated. To identify recent changes in ecological, economic, and social conditions and trends, the Prescott NF compiled the “Ecological Sustainability Report” (ESR) (Forest Service, 2009a) and the “Economic and Social Sustainability Assessment” (ESSA) (Forest Service, 2009b). Using the information in these reports as well as information provided through extensive collaboration with various public groups, organizations, agencies, officials, and individuals, the Prescott NF identified five recommended needs for change in the 1987 plan. The findings from these reports and public input are summarized in the “Analysis of the Management Situation” (Forest Service, 2009c). Conclusions and information from all the preceding reports are incorporated in this EIS without further citation, and the reports themselves are included in the planning record.

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<sup>1</sup> The revised plan was completed using direction from the 2012 Planning Rule; the transition provisions of that rule allow use of the provisions of the 1982 Planning Rule to revise land management plans. The Prescott NF elected to use the provisions of the 1982 Planning Rule.

## Need for Change 1

*Restore vegetation structure and composition and desired characteristics of fire to selected ecosystems, while responding to citizen concerns related to smoke emissions.*

The ecosystems found on the Prescott NF are complex and diverse, reflecting a range of environments that extend from hot valley bottoms to cool mountaintops. These ecosystems support a variety of plant communities including cacti, grasslands, chaparral, woodlands, and conifer forests. These ecosystems have been classified and mapped into potential natural vegetation types (PNVTs). PNVTs are coarse-scale groupings of ecosystems that share similar topography, vegetation, and historic ecosystem disturbances such as fire, drought, and browsing by native species. PNVTs represent the vegetation type and characteristics that would occur when natural disturbance regimes and biological processes prevail.

Land use patterns and management activities over the last century have resulted in ecosystem conditions that are highly departed from those desired, especially for the grasslands, piñon-juniper, and ponderosa pine PNVTs. Ecosystem alterations include: increased tree and shrub density and canopy cover, lack of perennial grasses and forbs, the spread of nonnative plants, increases in exposed soil surfaces, and a lack of desired fire disturbance. There is a need to restore and maintain vegetation structure and disturbance regimes and to increase ecosystem resilience or adaptive capacity of plant communities to accommodate expected changes imposed by future climate trends for the Southwest.

Concerns to be addressed:

- Desired conditions and activities to improve vegetation structure, composition, and fire regimes are needed to lessen threats to ecosystem sustainability.
- Ecosystem resilience and adaptation needs to be promoted to respond to climate change.
- There are social concerns related to smoke in and near communities, such as nuisance and possible health sensitivities. These air quality concerns need to be considered as planning and managing prescribed fire activity moves forward.
- Changes in ecosystem conditions and trends may be affecting the diversity and viability of native birds, mammals, and plant species.

## Need for Change 2

*Retain or improve watershed integrity to provide desired water quality, quantity, and timing of delivery.*

Undesirable soil and vegetation conditions have reduced the watershed integrity within several sub-basins on the Prescott NF including: Big Chino Wash, Big Sandy River, Burro Creek, and the upper Verde River. Additionally, there are stream segments within the Agua Fria, Hassayampa, and Upper and Lower Verde River sub-basins which do not currently meet Federal and State water quality standards and are classified as impaired. There is a need to improve the health of these watersheds and continue to maintain the health of those in good condition in order to provide: water quality for human health and safety; water quantity for municipal demands and the maintenance of aquatic and riparian habitat; and timing of water delivery that is consistent with healthy soils, biological processes, and natural geomorphology.

Some management activities have impacted watershed function and need to be addressed in the revised plan such as: (a) some recreation activities or facilities are located too close to water bodies or riparian areas; (b) unauthorized motorized routes may cause soil compaction, erosion, sedimentation, and vegetation loss; (c) seeps and springs need to be protected from excessive animal and recreation use; and (d) riparian systems are being impacted by nonnative, invasive plant and animal species.

Concerns to be addressed:

- Impairments to watershed function from recreation and management activities need to be minimized.
- Management methods need to be identified that help retain or improve the function of riparian areas, seeps, and springs.
- Desired conditions need to be maintained or restored to better provide needed water quality, quantity, and timing of delivery to municipal watersheds and aquatic and riparian species habitat.
- Watershed resilience, in both uplands and near water bodies, needs to be promoted to respond to climate change.

### **Need for Change 3**

*Provide sustainable and diverse recreation opportunities that consider population demographic characteristics, reflect desires of local communities, avoid overcrowding and user conflicts, and minimize resource damage.*

The need to provide sustainable recreation opportunities was the number one concern at public meetings held in early 2009. With increasing populations and visitors to the Prescott NF, conflicts between types of activities, overcrowding, and resource impacts resulting from overuse need to be addressed. The number of recreationists on the Prescott NF has increased in recent years, both from increases in the local population and from an influx of visitors from the Phoenix metropolitan area. This has increased potential conflicts among all recreationists and leads to unmet expectations for recreation experiences. The increase in recreation use has also impacted ecosystems by causing changes in habitat, wearing away vegetation, and spreading seeds of nonnative plant species to new locations.

Concerns to be addressed:

- Recreation sites and trails need to be improved to trend toward desired conditions by decreasing maintenance backlog, improving trailheads and signage, and addressing conflicts on trails.
- There is a desire for designated recreational target shooting, as well as for limiting this activity where potential safety concerns exist.
- Recreational fishing opportunities need to be retained and improved.
- Methods of sharing information with visitors need to be expanded.
- Potential resource impacts due to dispersed recreation activities need to be mitigated or restoration methods applied, and boundary markings for designated wilderness boundaries need to be improved where there is evidence of motorized incursion.
- Additional areas that provide wilderness character should be identified.

- Resilience to the expected outcomes of climate change, such as increasing numbers of visitors and changes in timing of visits, needs to be promoted.

#### **Need for Change 4**

*Provide desired habitat for native fish species.*

Native fish and other aquatic species are in decline within several watersheds. Native aquatic species are no longer found in five watersheds that overlap with the Prescott NF. There is a need to provide habitat and watershed characteristics that will support native fish species. The Prescott NF could also cooperate with the State of Arizona in addressing the control of nonnative species.

Concerns to be addressed:

- The diversity and viability of native fish, amphibians, aquatic reptiles, and invertebrate species need to be addressed.
- Habitat for desired aquatic and riparian species needs to be retained or improved.

#### **Need for Change 5**

*Enhance the value of open space provided by the Prescott NF by defining the visual character within areas near or viewed by those in local communities.*

The high rate of population growth within Yavapai County combined with limited lands for development sensitizes residents to land development, land exchange, and land use issues. The Prescott NF has an opportunity via the revised plan to ensure that scenic values are taken into consideration as population density is expected to increase on other ownerships. Defining the value of open space on the Prescott NF will help to display the benefits these lands provide to local communities, should a land exchange be proposed.

Concerns to be addressed:

- Scenic integrity near communities and especially within the Verde Valley is an important social value and needs to be retained.
- Options for acquiring lands by the Prescott NF need to be investigated, especially in areas that provide riparian benefit and areas that help to retain open space values.

#### **Social and Economic Values**

Although the social and economic aspects of the 1987 plan were not identified as a need for change, the provisions of the 1982 Planning Rule require an analysis of the social and economic impacts of each alternative. Aspects addressed in this section include:

- The social impact analysis, which uses the baseline social conditions and visitor profiles for the forest to discern the primary values that the forest provides to area residents and visitors. Social effects are based on the interaction of the identified values with estimated changes to resource availability and uses.
- The economic impact analysis, which estimates the employment and labor income consequences of the management actions.

- The financial efficiency analysis, which compares expenditures and revenues throughout the life of the revised plan. The result is commonly expressed as present net value (PNV), the difference between program revenues (benefits) and program expenditures (costs).
- The cultural and historic resources on the Prescott NF.
- The amount of land on the Prescott NF that is suitable for grazing livestock.
- The mining and mineral resource program on the Prescott NF.
- The amount of land on the Prescott NF that is suitable for the production of timber. Timber suitability determination is based on the land's productivity, availability, and appropriateness.
- The amount of commercial wood products that may be sustainably harvested on the Prescott NF over a long period of time. This sustainable harvest estimate is called the long term sustained yield capacity (LTSYC).
- The expected maximum harvest volume per decade on the Prescott NF. This is the allowable sale quantity (AQS), and it is equal to, or less than, the amount of timber that could be harvested annually under the LTSYC.
- The services provided under special use permits on the Prescott NF.
- The transportation system for motorized access on the Prescott NF.

## Revised Plan

The revised “Prescott National Forest Land and Resource Management Plan” (revised plan)<sup>2</sup> was prepared in an iterative fashion with input from the public. In this EIS, it is referenced as alternative E. The revised plan will provide strategic, program-level guidance for management of the Prescott NF, including its natural resources and uses, over the next 10 to 15 years. For each of the needs for change described above, the plan revision team, in collaboration with the public and other agencies developed a vision for the revised plan, that:

- provides a context for future, project-level planning;
- identifies strategies to maintain or achieve goals (i.e., desired conditions) over time;
- identifies land areas as generally suitable or unsuitable for various uses;
- identifies standards and guidelines to guide the planning of projects and activities;
- identifies areas with special or unique characteristics;
- provides monitoring and evaluation requirements; and
- emphasizes the use of best available science and adaptive management.

## Decision Framework

The analysis in this EIS considers the effects of implementing the revised plan along with its alternatives. Many issues are beyond the scope of the plan revision process and will not be considered in the EIS. For example, site-specific activities that are addressed by project-level decisions are not addressed. Some issues (e.g., hunting regulations), although important, are beyond the authority or control of the Prescott NF and will not be considered. In addition, some

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<sup>2</sup> A complete copy of the revised plan is available on the Prescott NF Web site: [www.fs.usda.gov/land/prescott/landmanagement](http://www.fs.usda.gov/land/prescott/landmanagement).

issues, such as wild and scenic river suitability determinations, will not be undertaken at this time, but will be addressed in the future in separate analyses.

The responsible official for this proposed action is the regional forester of the Southwestern Region. After considering the results of the impacts analysis of all alternatives evaluated in the environmental impact statement, the responsible official will issue a record of decision, in accordance with 40 CFR 1505.2, that will:

- Disclose the decision (i.e., identify the Agency's selected alternative).
- Identify all alternatives considered by the Forest Service in reaching this decision, specifying which one is the environmentally preferred alternative.

Approval of the revised plan will result in the following components to guide management for the next 10 to 15 years.

- Desired conditions (i.e., goals)
- Objectives
- Forestwide standards and guidelines
- Management area desired conditions, standards, and guidelines
- Suitability of lands for timber production, grazing, and recreation opportunities
- Monitoring and evaluation requirements
- Recommendations for special areas, including areas that can only be designated by statute, such as wilderness

## **Public Involvement and Collaborative Planning**

The Prescott NF used both formal and informal collaboration methods to prepare for and carry out plan revision. The Prescott NF approach was to augment traditional public participation by engaging citizens in planning, implementation, and ongoing stewardship of the forest. This meant inviting citizens to discuss and agree on their desires for the future and exploring ways to support and sustain stewardship in and around the Prescott NF.

Informal methods used to engage citizens and local institutions included human geographic mapping, gaining understanding of informal community networks, and reaching out to informal community leaders. As part of the public involvement process, the Prescott NF made over 300 informal contacts with individuals, groups, government agencies, and tribal groups. Detailed information for each human geographic mapping unit was compiled, and community landscape vision statements were developed by 11 communities.

Discussions with citizen groups took place regarding draft versions of the revised plan. Five different draft versions were posted on the Prescott NF plan revision Web site for comment via email, phone, face-to-face, or online.

Formal methods used to gather feedback included public meetings sponsored by the Prescott NF, online feedback forms, and public comments on documents. Information from members of the public and Prescott NF personnel contributed to documents such as the "Economic and Social Sustainability Assessment," the "Analysis of the Management Situation," and the revised plan. The notice of intent (NOI) was published in the Federal Register on January 9, 2010. The NOI

summarized the “Analysis of the Management Situation,” in particular, the needs for change to be addressed in the revised plan. It asked for public comment on the needs for change from January 9 to February 15, 2010; however, the forest considered substantive comments that were received after this date. Comments were used to modify the proposed revised plan and to develop alternatives analyzed in the draft environmental impact statement.

The notice of availability (NOA) of the “Draft Prescott National Forest Land and Resource Management Plan” and “Draft Environmental Impact Statement for the Prescott National Forest Land and Resource Management Plan” was published in the Federal Register on August 25, 2012. The NOA announced the availability of these documents for review and asked for public comment from August 25 to November 28, 2012. The Prescott NF encouraged reviewers to submit substantive comments which may be used to modify alternatives, evaluate new alternatives, improve or modify the analysis, and make factual corrections. Review documents, including a reader’s guide, were made available on the Prescott NF plan revision Web site.

Public meetings were held during the comment period (October 2012) in the communities of Camp Verde, Chino Valley, and Prescott to answer questions about the proposed plan and EIS and to elicit feedback and comments.

Following the 90-day formal comment period, the Prescott NF reviewed and analyzed correspondence from 116 individuals and organizations. Response topics included water quality, trails maintenance and development, wilderness recommendations, protection of wildlife habitat, motorized access, prescribed burning, forest thinning, livestock grazing, and target shooting. Comment letters were posted on the Prescott NF plan revision Web site.

Between draft and final versions of the plan, the Prescott NF engaged in formal consultation with the U.S. Fish and Wildlife Service and prepared a biological assessment of the final revised plan (alternative E). The biological assessment analyzed, in greater detail, the potential impacts alternative E would have on federally listed wildlife species and their habitats. As part of the consultation process, the U.S. Fish and Wildlife Service issued a biological opinion of the assessment.

A notice announcing the availability of the record of decision, the final revised plan and environmental impact statement was published in the Federal Register during 2015. These documents were posted on the Prescott NF Web site, and hardcopies were distributed to stakeholders, tribes, local and State governments, and Federal agencies. Additional hardcopies were made available at the Prescott NF district offices in Camp Verde, Chino Valley, and Prescott.

Additional information concerning public collaboration can be found in the “Prescott National Forest Collaboration Report for Forest Plan Revision” (Forest Service, 2011n).

## **Issues**

The public and other agencies, both State and Federal, submitted comments in response to the 2010 NOI comment period and public meetings. These comments were analyzed to identify issues and frame their associated cause and effect relationships. Issues were separated into two groups: significant and non-significant. Significant issues are those used to develop alternatives and modify the proposed action. Non-significant issues are identified as those: (1) outside the scope of the proposed action; (2) already addressed by law, regulation, the revised plan, or other

higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence.

**Issues that served as the basis for alternative development:**

- An issue of high concern was the proposed plan did not place enough emphasis on **ecosystem restoration** to maintain species viability and habitat. Lack of fire as a natural disturbance process has led to a vegetation structure and composition that does not resemble the estimated reference conditions. Some of the public believe the level of vegetation treatments in the proposed plan may not achieve the desired conditions in the most severely departed vegetation types.
- Another issue of high concern to Prescott and Verde Valley residents was providing sustainable recreation opportunities on the Prescott NF. There was interest in providing more **dispersed recreation opportunities** than those included in the proposed revised plan (alternative B), including a greater emphasis on improving existing trail conditions and providing additional opportunities on new trails.
- There was also a wide variation of opinion on how much **recommended new wilderness** is appropriate. It ranged from those who felt that the existing designated areas are adequate to those who felt that nearly all areas evaluated should be recommended for designation.

**Issues and concerns that are outside the scope of the decision to be made:**

Some people requested that changes to the forest motor vehicle use map (MVUM) should be made via the plan revision process. It was determined that any changes in the designation of specific routes, trails, and areas for motorized vehicle travel and updates to the MVUM are outside the scope of the plan revision process; as such agency actions fall under the direction of the 2005 Travel Management Rule as stipulated at CFR Title 36 Part 212.

**Other Related Efforts**

Two national forests adjacent to the Prescott NF, the Coconino and Kaibab, have been actively revising their land management plans. The Coconino NF's draft revised plan was completed in December 2013, and the Kaibab NF's final revised plan was completed in February 2014. These versions were compared to the Prescott NF draft revised plan to determine how well its guidance coordinates and interacts with the guidance of these other forests. Results of this analysis indicate that there is no conflicting guidance.

The Bureau of Land Management recently completed resource management plans for the Agua Fria National Monument and the Bradshaw Harquahala Management Units that border the Prescott NF. The review of those plans also showed that there is no conflicting guidance. Additional information concerning other related efforts can be found in "Appendix C. Coordination with Other Planning Efforts."

# Chapter 2. Alternatives

## Introduction

This chapter describes and compares the alternatives considered for revision of the 1987 plan. It includes descriptions of each alternative considered; the selected alternative for the forest plan is referenced as alternative E. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a basis for choice among options by the decisionmaker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., variation in objectives included), and some of the information is based upon the potential environmental, social, and economic consequences of implementing each alternative.

## Alternatives Considered in Detail

Five alternatives are analyzed in this EIS: the no action alternative (alternative A) which represents the 1987 plan and the four action alternatives (alternatives B, C, D, and E) which respond to the needs for change and issues identified from public involvement.

## Alternative Development Process

Information gathered from citizens during the development of community vision statements, the “Ecological Sustainability Report” (ESR), the “Economic and Social Sustainability Assessment” (ESSA) and the “Analysis of the Management Situation” (AMS) influenced the themes of the alternatives.

Alternative B was developed iteratively in a collaborative manner to address the needs for change identified in chapter 1. Several drafts of the revised plan were developed for public review, and the feedback received from both citizens and Prescott NF employees led to modifications of each successive draft.

There was general agreement on alternative B with the following exceptions: (1) some felt that species viability and habitats should have the most emphasis in any alternative; (2) others were most concerned about increasing recreation opportunities to meet their desired experience; and (3) there was a wide variation in opinion on how much recommended new wilderness is appropriate. It ranged from those who felt that the existing designated areas are adequate, to those who felt that nearly all areas evaluated should be recommended for designation.

Alternative C was developed to address the issue specific to species viability and habitat by providing a greater focus on the improvement of ecological conditions and wildlife habitats. More emphasis was placed on restoring the vegetation types that are the most severely departed from desired conditions. Restoration treatment activities are increased within the ponderosa pine and grassland PNVTs. More emphasis is also included for native fish habitat and species such as pronghorn that are of viability concern. This alternative includes no additional recommended wilderness areas for designation.

Alternative D was developed to address the issue specific to providing a greater quantity and diversity of recreation. It focuses on increasing opportunities for sustainable and diverse recreation through additional trail mileage, more designated dispersed camping, and more trailhead improvement. This alternative also includes the highest number of recommended wilderness areas.

Alternative E was developed between the draft and final EIS in response to internal and public feedback during the comment period. It evolved through modifications to alternative B to become a separate alternative and was identified by the Prescott NF Leadership Team as the selected alternative for the revised plan. Alternative E addresses concerns about access for visitor and administrative uses (e.g. mountain biking, watershed and wildlife habitat improvements, range management) and responds to questions about future funding levels for recreation management. It has a reduced recreation emphasis, more clarity of direction for watersheds, forest access, and land acquisitions, and includes two new objectives not present in the other alternatives addressing historic access and water rights. This alternative also has a new set of recommended wilderness areas that minimizes the disruption of existing access and uses while still expanding protection of wilderness character.

### **Features Common to All Alternatives**

All five alternatives have a number of elements in common. In particular, they:

- Comply with applicable laws, regulations, and policies;
- Conserve soil and water resources and do not allow significant or permanent impairment of the productivity of the land;
- Provide protections for riparian areas;
- Maintain air quality that meets or exceeds applicable Federal, State, and/or local standards or regulations;
- Provide for and maintain diversity of plant and animal communities to meet overall multiple-use objectives;
- Provide for species' viability by providing appropriate habitat that is well distributed across the planning area;
- Include measures for preventing the destruction or adverse modification of critical habitat for threatened and endangered species;
- Use a common list of management indicator species<sup>1</sup> (MIS);
- Protect heritage resources;
- Recognize the unique status of American Indian tribes and their rights retained by trust and treaty with the United States, including consultation requirements;
- Provide sustained multiple uses, products, and services in an environmentally acceptable manner (including leasable and locatable minerals, timber, livestock forage, and recreation opportunities);
- Retain existing designated areas (e.g., wilderness areas, wild and scenic rivers, special areas).

In addition, the following features are common to all alternatives.

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<sup>1</sup> The list of 10 MIS from the 1987 plan was reviewed and, based on recommendations from forest specialists, modified. The following three MIS were used to compare and evaluate the alternatives: pronghorn antelope, northern goshawk, and aquatic macro-invertebrates.

## Desired Conditions

Desired conditions (or goals) that apply to all of the Prescott NF include descriptions of desired outcomes as a result of Forest Service management. The desired conditions are described in detail in the revised plan which accompanies this document. They are the same for all alternatives.

## Management Areas

Management area direction provides desired conditions, standards, and guidelines that apply to specific areas of the Prescott NF. Alternative A (the 1987 plan) identifies eight management areas based on vegetation and land use. Alternatives B, C, D, and E use a common set of seven management areas based on geographic areas.

## Standards and Guidelines

### Forestwide

Standards and guidelines that apply to all of the Prescott NF include design considerations, mitigations, and constraints for project-level decisions. Alternatives B, C, D, and E share a common set of standards and guidelines whereas the set that applies to alternative A is unique. In a few cases, the standards and guidelines were modified between the draft and final versions of the revised plan for clarity or to incorporate changes based on public and internal comments. The following is a list of those standards and guidelines<sup>2</sup> that were added or significantly modified.

- Guide-Soils-3 - This new guideline was added to address potential soil and watershed impacts from using heavy equipment on steep slopes such as for brush mastication.
- Guide-Soils-4 - This new guideline was added to address potential soil and watershed impacts on steep slopes and to sensitive soils.
- Guide-Soils-5 - This new guideline was added to provide additional protection to wet soils.
- All of the “Plants” standards and guidelines were renamed “Vegetation” for consistency with other plan components.
- Std-Veg-2 – This standard was renamed from “Std-Plants-2” and the sentence structure was modified to clarify that all weed treatments must follow appendix B design features. The way the sentence was previously stated could have been misinterpreted as only treatments specific to improving federally listed species and their habitats had to follow appendix B design features.
- Guide-Veg-7 – This guideline was added to provide additional protection for old-growth vegetation.
- Guide-Veg-8 – This guideline was added to provide direction for landscape scale restoration projects.
- Guide-WL-9 - This new guideline was added to address concerns for animal entrapments.
- Guide-WL-10 - This new guideline was added to address concerns about animal entrapments in vertical pipes.

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<sup>2</sup> Forestwide standards and guidelines are found in chapter 4 of the “Land and Resource Management Plan for the Prescott National Forest” (Forest Service, 2015) available on the Prescott NF Web site: <http://www.fs.usda.gov/land/prescott/landmanagement>.

- Std-Wildland Fire-3 - This new standard was added to address concerns for protecting cultural and heritage sites during wildland fire activities.
- Guide-Wildland Fire-7 - This guideline was deleted to become Std-Wildland Fire-3 and limited in scope to specifically address cultural and heritage sites.
- Guide-Wildland Fire-10 - This guideline was modified so prescribed fire was not precluded from developed recreation sites.
- Guide-Rec-11 - This guideline was modified to emphasize the desired outcome for tree removal rather than the types of trees.
- Std-Wild-1 - This standard was modified to also emphasize wilderness “characteristics.”
- Guide-Wild-10 - This guideline was added to replace separate management area guidelines for each recommended wilderness area in chapter 5.
- Guide-Lands-4 – The last bullet was moved from Guide-Lands-4 to Guide-Lands-5 to be included in the list about guidelines for energy sources.
- Guide-Lands-6 – This guideline was deleted based on the advice of the forest Lands staff.

### **Management Areas**

Management area standards and guidelines apply to specific areas of the Prescott NF. Alternatives B, C, D, and E share a common set of management area standards and guidelines; whereas alternative A lacks management area specific standards and guidelines. The following is a list of those guidelines<sup>3</sup> that were added or significantly modified between draft and final.

- Guide-CK MA-2, Guide-UV MA-4, Guide-WVN MA-3, and Guide-VV MA-4 – These guidelines were deleted and replaced with Guide-Wild-10.
- Guide-PB MA-1 - This guideline was modified to include a reference to designated dispersed camping sites.
- Guide-VV MA-3 - This guideline was modified for specificity.

### **Monitoring Strategy**

Monitoring and evaluation provides the adaptive management strategy for determining the degree to which on-the-ground management is maintaining or making progress toward desired conditions. Alternatives B, C, D, and E share a common monitoring framework, whereas the monitoring strategy for alternative A is unique.

### **Suitability of Uses**

The criteria for the suitability of various uses (e.g., livestock grazing, timber harvest, recreation opportunity) are the same in all alternatives. However, when the criteria is applied to the different alternatives, there may be variations in the amount of land suitable for certain uses (i.e., if an alternative has more recommended wilderness, there would be less land suitable for timber harvest). The amount of land suitable for timber harvest and livestock grazing by alternative are listed at the end of chapter 2 in table 2.

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<sup>3</sup> Management area standards and guidelines are found in chapter 5 of the “Land and Resource Management Plan for the Prescott National Forest” (Forest Service, 2015) available on the Prescott NF Web site: <http://www.fs.usda.gov/land/prescott/landmanagement>.

### **Wild and Scenic Rivers**

All alternatives provide direction to protect the outstandingly remarkable values for the eligible and designated wild and scenic river segments of the Verde River (Forest Service, 2010c).

### **Research Natural Areas**

The Grapevine Botanical Area was identified as a potential research natural area during plan revision (Forest Service, 2010d); however, the forest supervisor elected not to recommend it for further consideration. All alternatives retain the direction that was contained in the 1987 plan (Amendment 10, 1997) to protect the unique botanic features of this area. No other areas were identified or considered for research natural area designation.

### **Other Special Areas**

All alternatives provide continued direction for the Grapevine Botanical Area that was designated in 1997 under the 1987 plan (as amended). No new areas are proposed for special designation except for the recommended wilderness areas.

### **Wildland-Urban Interface**

All alternatives provide direction for fuels reduction treatments and maintenance of vegetation for those areas of resident populations at imminent risk from wildfire, as well as human developments having special significance. These wildland-urban interface areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites regardless of the distance involved.

Details of the features common to alternatives (as described above) can be found in the 1987 plan (as amended) or in the revised plan, “Draft Land and Resource Management Plan for the Prescott National Forest” that accompanies this document.

### **Inventoried Roadless Areas**

These alternatives include management direction for inventoried roadless areas (IRAs) identified in the 2001 Roadless Area Conservation Rule (RACR). All alternatives include direction that retains the undeveloped character of these areas.

### **Management Requirements**

All alternatives include sufficient direction in the form of plan components to meet the management requirements listed in the 1982 Planning Rule Provisions § 217.27.

These provisions established minimum requirements to be met in accomplishing goals and objectives for the National Forest System. During forest plan development, the management practices and corresponding forest plan components needed to meet the management requirements were identified as minimum management requirements (MMRs). A plan component was considered an MMR if it established a minimum outcome or condition and was expected to be included as part of each action alternative. The MMR report (Forest Service, 2011t) is available on the Prescott NF plan revision Web site<sup>4</sup>.

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<sup>4</sup> [www.fs.usda.gov/land/prescott/landmanagement](http://www.fs.usda.gov/land/prescott/landmanagement)

## Features that Differ Between Alternatives

### Objectives

Objectives are concise projections of measurable, time specific intended outcomes that achieve, maintain, or progress towards the desired conditions. Alternative A contains a set of objectives that are unique to the 1987 plan. Alternatives B, C, and D use a common set of 29 objectives developed to respond to the Needs for Change. Differences in the quantity or extent of the objectives help to define and differentiate the alternatives. Alternative E proposes a set of 31 objectives that contains the 29 objectives common to the other action alternatives and the following two additional objectives<sup>5</sup> unique to alternative E.

- Obj-30 – This guideline was added to address concerns about legal access in areas where historic access to the national forest has been lost.
- Obj-31 – This guideline was added to address concerns for additional protections to watershed health.

### Recommended Wilderness

All of the alternatives contain eight existing designated wilderness areas covering over 100,000 acres, and three of the alternatives (B, D, and E) recommend new areas for wilderness designation. For alternatives A and C, there are no new recommended areas or acres. For alternative B, 8 additional areas, totaling 43,440 acres, are recommended. For alternative D, 16 potential areas are recommended, totaling 116,260 additional acres, and for alternative E, 8 areas, totaling 23,137 acres, are recommended (Forest Service, 2012a). See appendix B for maps of the wilderness recommendations by alternative.

### Alternative A: 1987 Plan Direction

Under alternative A, the 1987 plan would continue to guide management of the Prescott NF. The following describes how alternative A responds to each of the needs for change topics.

#### Need for Change 1

*Restore vegetation structure and composition and desired characteristics of fire to selected ecosystems, while responding to citizen concerns related to smoke emissions.*

**Vegetation and fire:** Alternative A would continue management under the 1987 plan for the Prescott NF. The plan provides for timber production, firewood harvest, hazardous fuel reduction treatments, prescribed fire, and management of wildfires to meet resource objectives.

Under alternative A, managed fire would average about 7,800 acres per year. Tree and shrub thinning treatments would average about 1,000 acres per year. These treatments would focus on restoring ponderosa pine, piñon-juniper, and interior chaparral ecosystems with little attention given to grassland ecosystems.

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<sup>5</sup> Objectives are found in chapter 3 of the “Land and Resource Management Plan for the Prescott National Forest” (Forest Service, 2015) available on the Prescott NF Web site: <http://www.fs.usda.gov/land/prescott/landmanagement>

**Ecosystem resilience and adaptation to climate change:** Alternative A would continue the direction found in the 1987 plan; however, it lacks management direction to emphasize ecosystem resilience and adaptation to climate change.

**Air quality:** Prescribed fire would be coordinated with the Arizona Department of Environmental Quality, as well as adjacent land management agencies, to ensure that State or Federal standards for ambient air quality are not exceeded.

**Species viability and diversity:** Alternative A mitigates the risk to landscape-level habitat conditions using restoration treatments (e.g., prescribed fire, tree and shrub thinning, brush crushing) to meet the desired conditions. For species determined to be at no or low risk, meeting and maintaining these desired conditions within the planning area would provide for the viability of those species. For species determined to be at some risk, implementing additional direction found in species specific conservation and recovery plans would lessen population viability risks and provide for the viability of those species.

## **Need for Change 2**

*Retain or improve watershed integrity to provide desired water quality, quantity, and timing of delivery.*

**Impairments to watershed function from recreation and management activities:** Watershed restoration efforts (e.g., tree and shrub thinning, brush crushing) would continue but not at a level sufficient to trend watershed function toward the desired conditions. Recreation activities would continue to cause negative impacts at popular dispersed camping sites outside the Prescott Basin and along some roads and trails.

**Seeps and springs and riparian function:** Flood plains and wetlands would be addressed by avoiding adverse impact to the public, facilities, and uses. Riparian area goals would include improvement and maintenance so that all areas would be in satisfactory condition. Few time specific statements of measureable results that respond to goals would be identified.

**Desired water quality, quantity, and timing:** Outdated goals for providing increased waterflow via large scale chaparral removal (e.g., Battle Flat project) would remain in place. Water quality would be similar to that found currently in streams and other water bodies. Timing of waterflows could be influenced by changing climatic characteristics.

**Watershed resilience to climate change:** Management direction would not take expected changes in climate into consideration and watershed resilience would not be emphasized.

## **Need for Change 3**

*Provide sustainable and diverse recreation opportunities that consider population demographic characteristics, reflect desires of local communities, avoid overcrowding and user conflicts, and minimize resource damage.*

**Recreation site/trail improvement:** There would be no increase in the number of developed recreation sites. Designated dispersed sites would be concentrated in the Prescott Basin and the number would remain static. The maintenance backlog for developed recreation sites would continue to decrease at a rate of about 88 percent over 10 years. The maintenance backlog for trails would continue to increase over this same period. About 3 to 5 percent of trail signage

would be maintained annually. The improvement of trailheads would not be emphasized. There is no management direction to address conflicts between various types of recreation activities.

**Recreational target shooting:** The permit for the only designated recreational target shooting area on the forest would not be renewed and development of additional areas would be unlikely.

**Fishing opportunities:** Recreational fishing opportunities are not addressed.

**Information sharing:** Methods for sharing information with visitors would focus on traditional maps, brochures, and face-to-face contacts.

**Recreation impacts:** The rehabilitation of recreation sites and trails that show evidence of resource damage would not be emphasized. Additionally, there would be little emphasis on marking wilderness boundaries in areas with high risk of motorized incursion.

**Recommended wilderness:** No areas are recommended for wilderness designation. The existing eight designated wilderness areas would continue to be managed for wilderness values.

**Recreation management response to climate change:** Little emphasis would be placed on creating resilience to increasing numbers of visitors and the likelihood of extended seasons of use due to changes in climate. Guidance from the 1987 plan is focused on maintaining existing facilities and services.

#### **Need for Change 4**

*Provide desired habitat for native fish species.*

**Diversity and viability of native fish, aquatic herps, and invertebrate species:** Alternative A mitigates the risk to aquatic and riparian habitat conditions using restoration treatments (e.g., tamarisk removal, native fish reintroduction). For species determined to be at no or low risk, meeting and maintaining the desired conditions within the planning area would provide for the viability of those species. For species determined to be at some risk, implementing additional direction found in species-specific conservation and recovery plans would lessen population viability risks and provide for the viability of those species.

**Aquatic/riparian habitat:** Restoration treatments would continue but not at a level sufficient to trend aquatic and riparian habitat toward the desired conditions. There would be no plan direction emphasizing the identification and restoration of improperly functioning riparian areas or the restoration of native fish species to their historic habitat range.

#### **Need for Change 5**

*Enhance the value of open space provided by the Prescott National Forest by defining the visual character within areas near or viewed by those in local communities.*

**Scenic integrity:** Visual quality would be managed using the outdated 1986 visual quality objectives (VQOs). Under these VQOs, only 13 percent of the forest is classified for retention or preservation of scenic values. The remaining areas allow for the modification or maximum modification of visual character. Most areas with high visual quality goals are found near highly traveled roads, roads leading to recreation areas, areas next to the Verde River, and areas surrounding developed recreation areas. The predominant VQOs within the Grief Hill and Black Canyon areas would be partial retention of scenic values.

**Land acquisition:** Under the 1987 plan, criteria for land acquisitions would focus on conveying isolated tracts that could not be efficiently managed, consolidating public lands, improving management efficiency, providing lands needed for expanding communities, and meeting overriding public needs.

### **Social and Economic Values**

**Economic impact:** The total amount of labor income and jobs contributed by the Prescott NF to the local economy would be \$23,616,000 and 656 total jobs, including 283 recreation related jobs (Forest Service, 2011a).

**Financial efficiency:** The present net value (PNV) was calculated over a 15-year period, using a 4 percent discount rate, as -\$23,230,148 (Forest Service, 2011a).

**Cultural and historic resources:** Most of the direction that affects cultural and historic resources comes from existing laws, regulations, and policies found in the Forest Service Manual and the Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable range acres:** The land base determined to be suitable for livestock grazing under alternative A is 913,078 acres. This figure is the same across all alternatives.

**Mining and mineral resources:** Most of the direction that affects minerals activities comes from existing laws, regulations, and policies found in the Forest Service Manual and the Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable timber acres:** The land base determined to be suitable for timber production under alternative A is 44,413 acres.

**Long term sustained yield capacity:** The sustainable harvest estimate for alternative A was determined to be 69,680 hundred cubic feet (CCF) per decade.

**Allowable sale quantity:** The expected maximum harvest volume for alternative A was determined to be 23,385 hundred cubic feet (CCF) per decade.

**Special use permits:** Most of the direction that affects special use permit issuance and administration comes from existing laws, regulations, and policies found in the Forest Service Manual and the Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Transportation system:** The motorized transportation system under alternative A consists of 1,357 miles of road and 408 miles of trails open to motorized vehicles less than 50 inches wide. These figures are the same across all alternatives.

### **Alternative B: Proposed Revised Plan**

Alternative B represents more than two years of collaborative work with citizens, agencies, and Prescott NF employees in an iterative manner to respond to suggested changes in plan components. It includes a mixture of proposed treatments for vegetation, watershed, recreation

opportunities, open space, and wildlife providing a mixture of benefits. The following describes how alternative B responds to each of the needs for change topics.

### **Need for Change 1**

*Restore vegetation structure and composition and desired characteristics of fire to selected ecosystems, while responding to citizen concerns related to smoke emissions.*

**Vegetation and fire:** Alternative B would increase the amount of restoration treatments, using thinning and managed fire, across the landscape. Managed fire would range from 10,600 to 25,300 acres per year on average. Tree and shrub thinning treatments would range from 750 to 6,500 acres per year on average. These treatments would focus on restoring grassland, ponderosa pine, piñon-juniper, and interior chaparral ecosystems.

**Ecosystem resilience and adaptation to climate change:** Alternative B would encourage management decisions that could increase ecosystem resilience to climate change such as:

- Retaining components, processes, and functions of ecosystems.
- Sustaining functions such as nutrient cycling, water infiltration, and carbon sequestration.
- Managing highly departed ecosystems to trend toward desired conditions.
- Working toward interconnectedness of continuous blocks of habitat to allow for adaptation, including genetic and behavioral interactions.
- Working toward the presence of well-distributed habitats to support recovery or stabilization of federally listed and other species.

**Air quality:** Prescribed fire would be coordinated with the Arizona Department of Environmental Quality, as well as adjacent land management agencies, to ensure that State or Federal standards for ambient air quality are not exceeded.

Additionally, wildland-urban interface (WUI) areas would be given high priority for fuel reduction treatments, using a combination of mechanical methods and domestic animals in lieu of prescribed fire to reduce the occurrence and concentrations of smoke near communities.

**Species viability and diversity:** Alternative B mitigates the risk to landscape-level habitat conditions using restoration treatments (e.g., prescribed fire, tree and shrub thinning, brush-crushing) to meet the desired conditions. For species determined to be at no or low risk, meeting and maintaining these desired conditions within the planning area would provide for the viability of those species. For those species determined to be at some risk, additional plan components (e.g., standards, guidelines, objectives) were developed that included direction from species-specific conservation and recovery plans to provide for the viability of those species.

Alternative B calls for 15,000 to 90,000 acres of habitat improvement plus treatment of two or three areas of migration habitat. In addition, movement of pronghorn would be facilitated by modification or removal of 3 to 5 miles of fence. Finally, alternative B would improve from 3 to 15 water developments for wildlife.

### **Need for Change 2**

*Retain or improve watershed integrity to provide desired water quality, quantity, and timing of delivery.*

**Impairments to watershed function from recreation and management activities:** Managed fire and mechanical vegetation treatments would be used to restore vegetation structure and composition, with concurrent improvements to watershed integrity. Twenty to 100 miles of designated roads or motorized trails that impact watershed integrity would be maintained, repaired, or relocated. Ten miles of unauthorized routes would be obliterated, closed, recontoured or revegetated. Approximately 15 to 25 stream or drainage crossings by roads or trails would be improved to facilitate flow and sediment transport.

**Seeps and springs and riparian function:** Ten to 40 percent of functionally impaired riparian areas would be treated to improve conditions within 1 to 5 years of detection. Twenty-five to 55 seeps and springs would be maintained or enhanced, including such activities as road or trail relocation, fencing, pasture rotation, or seasonal grazing restrictions.

**Desired water quality, quantity, and timing:** Over a 10-year period, 20 to 50 watershed improvement projects would improve conditions within high risk watersheds. Activities could include range improvements to distribute grazing, treatments to increase vegetative ground cover, stream stabilization, and mine site restoration. Trend toward desired conditions in upland vegetation would help maintain water quantity for both municipal watersheds and for aquatic habitats as well as provide timing that is commensurate with natural geomorphology.

**Watershed resilience to climate change:** Watershed improvement activities such as treatments that increase vegetative ground cover; repair of roads or trails that impact watershed integrity; and enhancing or restoring seeps and springs would increase watershed function and resiliency.

### Need for Change 3

*Provide sustainable and diverse recreation opportunities that consider population demographic characteristics, reflect desires of local communities, avoid overcrowding and user conflicts, and minimize resource damage.*

**Recreation site/trail improvement:** In comparison to alternative A, the number of developed recreation sites would increase by two to five areas. Similar to alternative A, the maintenance backlog would decrease by 80 to 90 percent over 10 years within developed recreation areas. Between one and four new designated dispersed camping areas would be developed outside of the Prescott Basin. Existing trails would be better maintained by improving 5 to 20 trailheads, annually maintaining 10 to 20 percent of signs, and reducing the trail maintenance backlog by 50 to 75 percent. In addition, 5 to 10 management actions would be carried out to meet desired conditions for trails. These could include actions to reduce conflicts between types of recreation use, projects to provide both loop and connector trails, or trail improvement projects designed to better meet the needs of a growing population. In general, alternative B displays a relative balance between increased availability of opportunities within more highly developed sites versus those that are more primitive and dispersed.

**Recreational target shooting:** Under alternative B, the Prescott NF would seek a partnership to create and operate a new designated target shooting area; while alternative A would close the existing venue without establishing a new one.

**Fishing opportunities:** Recreational fishing opportunities in areas like Lynx Lake and Granite Basin Lake would continue to be improved with the enhancement of two lakes or ponds.

**Information sharing:** Communication with forest visitors would be enhanced by developing two to five additional methods of sharing information. Examples include greater use of social media and the Prescott NF Web site.

**Recreation impacts:** Within two to five designated wilderness areas, the boundaries would be marked in places where the risk of motorized incursion is high. In addition, two to five areas or trails would be relocated or rehabilitated to mitigate or protect against resource damage. Types of activities could include relocating or decommissioning a dispersed recreation site that is too close to a spring and rehabilitating the area or moving a campsite away from a stream to prevent erosion.

**Recommended wilderness:** Eight potential wilderness areas (PWAs), encompassing 43,440 acres, are recommended for wilderness designation. This set of PWAs was selected to expand recreation opportunities in existing wilderness, complement management area desired conditions, address public concerns for maintaining open space in the Verde Valley, and to meet the operational needs of livestock-grazing permittees.

**Recreation management response to climate change:** Managers would have increased flexibility to adapt management strategies to respond to shifts in recreation use prompted by climate change. This includes ranges instead of fixed numbers for the development of new facilities, the incorporation of climate change assumptions in the development of plan components, and the integration of climate change guidance into the revised monitoring strategies.

#### **Need for Change 4**

*Provide desired habitat for native fish species.*

**Diversity and viability of native fish, aquatic herps, and invertebrate species:** Alternative B mitigates the risk to aquatic and riparian habitat conditions using restoration treatments (e.g., tamarisk removal, native fish reintroduction). For species determined to be at no or low risk, meeting and maintaining the desired conditions within the planning area would provide for the viability of those species. For species determined to be at some risk, implementing additional direction found in species specific conservation and recovery plans would lessen population viability risks and provide for the viability of those species. Under alternative B, the forest would work in cooperation with the Arizona Game and Fish Department (AZGFD) and the U.S. Fish and Wildlife Service (USFWS) to restore native fish species to two or three stream reaches on the Prescott NF.

**Aquatic/riparian habitat:** Aquatic and riparian habitat would benefit from watershed improvement projects and vegetation treatments proposed in this alternative. Ten to 40 percent of functionally impaired riparian areas would be treated to improve conditions within 1 to 5 years of detection.

#### **Need for Change 5**

*Enhance the value of open space provided by the Prescott National Forest by defining the visual character within areas near or viewed by those in local communities.*

**Scenic integrity:** The Scenery Management System (SMS), a new method for defining the relative value and importance of scenery, would be used to determine the scenic values on the

Prescott NF. In alternative B, approximately 42 percent of the forest would be classified as high or very high scenic integrity. In addition, a classification of high scenic integrity would be assigned to all of the Grief Hill area and about two-thirds of the Black Canyon area. The remainder of the Black Canyon area would be classified as moderate scenic integrity.

**Land acquisition:** Alternative B would direct the Prescott NF to pursue up to 10 opportunities to acquire lands within 10 years. The emphasis would be on acquisitions that would help retain open space values or protect riparian habitat. The Prescott NF would take scenic and open space values, as well as community vision statements, into account when responding to land exchange proposals.

### **Social and Economic Values**

**Economic impact:** The total amount of labor income and jobs contributed by the Prescott NF to the local economy would be \$23,882,000 and 664 total jobs, including 291 recreation related jobs (Forest Service, 2011a).

**Financial efficiency:** The PNV was calculated over a 15-year period, using a 4 percent discount rate, as -\$24,624,817 (Forest Service, 2011a).

**Cultural and historic resources:** Most of the direction that affects cultural and historic resources comes from existing laws, regulations, and policies found in the Forest Service Manual and the Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable range acres:** The land base determined to be suitable for livestock grazing under alternative B is 913,078 acres. This figure is the same across all alternatives.

**Mining and mineral resources:** Most of the direction that affects minerals activities comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable timber acres:** The land base determined to be suitable for timber production under alternative B is 38,462 acres.

**Long term sustained yield capacity:** The sustainable harvest estimate for alternative B was determined to be 60,343 hundred cubic feet (CCF) per decade.

**Allowable sale quantity:** The expected maximum harvest volume for alternative B was determined to be 40,447 hundred cubic feet (CCF) per decade.

**Special use permits:** Most of the direction that affects special use permit issuance and administration comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Transportation system:** The motorized transportation system under alternative B consists of 1,357 miles of road and 408 miles of trails open to motorized vehicles less than 50 inches wide. These figures are the same across all alternatives.

## **Alternative C: Vegetation and Wildlife Emphasis**

Alternative C includes many of the same components of alternative B; however, it responds to the issue of species viability and habitat by placing increased emphasis on vegetation trends within both grassland and ponderosa pine vegetation types. This focus increases the rate of improvement in the most departed vegetation types and places less emphasis on other vegetation communities and recreation components. In addition, alternative C includes more management treatment for native fish and other aquatic species and pronghorn habitats; there is much less emphasis on recommendation of potential wilderness areas. The following describes how alternative C responds to each of the needs for change topics.

### **Need for Change 1**

*Restore vegetation structure and composition and desired characteristics of fire to selected ecosystems, while responding to citizen concerns related to smoke emissions.*

**Vegetation and fire:** Alternative C would emphasize a higher range of managed fire and a lower range of thinning activity compared to alternatives A and B. Managed fire would range from 15,500 to 22,800 acres per year on average and would focus on restoring grassland and ponderosa pine ecosystems. Tree and shrub thinning treatments would range from 750 to 4,000 acres per year on average and would focus on restoring ponderosa pine, piñon-juniper, and Interior Chaparral ecosystems.

**Ecosystem resilience and adaptation to climate change:** The plan components used to promote ecosystem resilience and adaptation to climate change in alternative C are the same as those described in alternative B.

**Air quality:** The plan components used to address air quality in alternative C are the same as those described in alternative B.

**Species viability and diversity:** Alternative C places a greater emphasis on mitigating the risk to landscape-level habitat conditions using restoration treatments (e.g., prescribed fire, tree and shrub thinning, brush crushing) to meet the desired conditions.

Alternative C calls for 50,000 to 85,000 acres of habitat improvement plus treatment of three to six areas of migration habitat. In addition, movement of pronghorn would be facilitated by modification or removal of 10 to 15 miles of fence. Finally, alternative C would improve from 5 to 15 water developments for wildlife.

### **Need for Change 2**

*Retain or improve watershed integrity to provide desired water quality, quantity, and timing of delivery.*

The plan components used to address this need for change in alternative C would be identical to those described in alternative B.

### **Need for Change 3**

*Provide sustainable and diverse recreation opportunities that consider population demographic characteristics, reflect desires of local communities, avoid overcrowding and user conflicts, and minimize resource damage.*

The plan components used to address this need for change in alternative C are the same as those described in alternative B except for the items listed below:

**Recreation site/trail improvement:** Within alternative C, the reduction of the maintenance backlog for trails, at 35 to 50 percent, would be less than alternative B. In addition fewer trailheads would be improved (5 to 10), but the 5 to 10 actions to improve designated trails to meet desired conditions in Desired Condition-Recreation-2 Trails would be the same.

**Recommended wilderness:** Alternative C does not recommend any areas for wilderness designation.

**Recreation management response to climate change:** The ability to respond to increasing numbers of visitors and extended seasons of use would be similar to that described in alternative B, except there would be less emphasis on trail maintenance and trailhead improvements.

#### **Need for Change 4**

*Provide desired habitat for native fish species.*

**Diversity and viability of native fish, aquatic herps, and invertebrate species:** Alternative C places a greater emphasis on mitigating the risk to aquatic and riparian habitat conditions using restoration treatments (e.g., tamarisk removal, native fish reintroduction).

In alternative C, the forest would work in cooperation with the Arizona Game and Fish Department (AZGFD) and the U.S. Fish and Wildlife Service (USFWS) to restore native fish species to four to six stream reaches on the Prescott NF. Possible restoration projects would be the same as those listed for alternative B.

**Aquatic/riparian habitat:** The strategies used to address aquatic and riparian habitat concerns are the same as those described in alternative B.

#### **Need for Change 5**

*Enhance the value of open space provided by the Prescott National Forest by defining the visual character within areas near or viewed by those in local communities.*

**Scenic integrity:** The method and plan components used to address scenic integrity are the same as that described in alternative B.

**Land acquisition:** The plan components used for land acquisition are the same as those described in alternative B.

#### **Social and Economic Values**

**Economic impact:** The total amount of labor income and jobs contributed by the Prescott NF to the local economy would be \$23,882,000 and 664 total jobs, including 291 recreation related jobs (Forest Service, 2011a).

**Financial efficiency:** The PNV was calculated over a 15-year period, using a 4 percent discount rate, as -\$23,833,268 (Forest Service, 2011a).

**Cultural and historic resources:** Most of the direction that affects cultural and historic resources comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable range acres:** The land base determined to be suitable for livestock grazing under alternative C is 913,078 acres. This figure is the same across all alternatives.

**Mining and mineral resources:** Most of the direction that affects minerals activities comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable timber acres:** The land base determined to be suitable for timber production under alternative C is 44,413 acres.

**Long term sustained yield capacity:** The sustainable harvest estimate for alternative C was determined to be 69,680 hundred cubic feet (CCF) per decade.

**Allowable sale quantity:** The expected maximum harvest volume for alternative C was determined to be 40,447 hundred cubic feet (CCF) per decade.

**Special use permits:** Most of the direction that affects special use permit issuance and administration comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Transportation system:** The motorized transportation system under alternative C consists of 1,357 miles of road and 408 miles of trails open to motorized vehicles less than 50 inches wide. These figures are the same across all alternatives.

## **Alternative D: Dispersed Recreation Emphasis**

Alternative D includes an emphasis on dispersed recreation in response to the issue of providing sustainable and diverse recreation opportunities. Vegetation treatments would be similar to those in alternative B or slightly reduced. Emphasis on pronghorn and native fish would be identical to alternative B. Within recreation opportunities, there would be reduced emphasis on developed recreation, such as campgrounds, and increased emphasis on dispersed recreation, such as adding trails, improving trailheads, and adding designated dispersed sites. This alternative also includes recommendation of the highest number of potential wilderness areas. The following describes how alternative D responds to each of the needs for change topics.

### **Need for Change 1**

*Restore vegetation structure and composition and desired characteristics of fire to selected ecosystems, while responding to citizen concerns related to smoke emissions.*

**Vegetation and fire:** Alternative D would emphasize less managed fire than alternatives B and C and a similar or lower range of thinning activity. Managed fire would range from 10,600 to 18,800 acres per year on average. Tree and shrub thinning treatments would range from 750 to 4,000 acres per year on average.

**Ecosystem resilience and adaptation to climate change:** The strategies used to promote ecosystem resilience and adaptation to climate change in alternative D are the same as those described in alternative B.

**Air quality:** The plan components used to address air quality in alternative D are the same as those described for alternatives B and C.

**Species viability and diversity:** The plan components used to address species viability and diversity in alternative D are the same as those described in alternative B.

### **Need for Change 2**

*Retain or improve watershed integrity to provide desired water quality, quantity, and timing of delivery.*

The plan components used to address this need for change in alternative D would be identical to those described for alternatives B and C.

### **Need for Change 3**

*Provide sustainable and diverse recreation opportunities that consider population demographic characteristics, reflect desires of local communities, avoid overcrowding and user conflicts, and minimize resource damage.*

The plan components used to address this need for change in alternative D are the same as those described in alternative B except for the items listed below:

**Recreation site/trail improvement:** The number of additional developed recreation sites, such as campgrounds or day-use sites, would still increase (one or two new sites proposed) compared to the existing condition, but would be the least of alternatives B through D. Reduction of the maintenance backlog within developed sites would be the less than alternatives B and C at 50 to 60 percent. Conversely, the number of additional designated dispersed sites would be the highest of all alternatives at two to six new areas proposed. The range of trailheads to be improved would also be the highest of all alternatives at 10 to 25; while sign maintenance would remain at 10 to 20 percent annually, the same as alternatives B through C. Alternative D is the only alternative to add appreciable amount of mileage to trail systems. It would call for carrying out 5 to 15 actions to meet trail desired conditions (Desired Condition-Recreation-2 Trails), propose construction of 10 to 20 miles of new trail system and include an associated 5 miles of decommissioning unneeded trails. (Objective 17 would be modified to reflect these activities.)

**Recreation impacts:** Alternative D would increase the dispersed (primitive) camping opportunities to decrease the impacts to popular camping areas, especially near water bodies. Sites would be kept smaller and more distant from riparian areas than the existing user-created sites, providing increased protection. Periodic closure of some sites for rehabilitation would also be possible. Relocation or decommissioning sites to avoid or mitigate resource impact would be the same as that described in alternative B. Designated wilderness boundary marking would also be the same as descriptions in alternative B.

**Recommended wilderness:** Sixteen potential wilderness areas (PWAs), encompassing 116,260 acres, would be recommended for wilderness designation. These areas were selected to more than

double the acreage managed for wilderness character while still retaining the existing motorized recreation opportunities.

**Recreation management response to climate change:** The ability to respond to increasing numbers of visitors and extended seasons of use would be similar to that described in alternative B, except there would be more emphasis on trail maintenance, trailhead improvements, and designating dispersed camping areas.

#### **Need for Change 4**

*Provide desired habitat for native fish species.*

**Diversity and viability of native fish, aquatic herps, and invertebrate species:** The plan components used to address aquatic and riparian species diversity and viability are the same as those described in alternative B.

**Aquatic/riparian habitat:** The plan components used to address aquatic and riparian habitat concerns are the same as those described in alternative B.

#### **Need for Change 5**

*Enhance the value of open space provided by the Prescott National Forest by defining the visual character within areas near or viewed by those in local communities.*

**Scenic integrity:** The method and plan components used to address scenic integrity are the same as that described in alternative B. However, the recommended potential wilderness areas are not visible from the Verde Valley or Quad Cities area.

**Land acquisition:** The plan components used for land acquisition are the same as those described in alternative B.

#### **Social and Economic Values**

**Economic impact:** The total amount of labor income and jobs contributed by the Prescott NF to the local economy would be \$23,850,000 and 663 total jobs, including 290 recreation related jobs (Forest Service, 2011a).

**Financial efficiency:** The PNV was calculated over a 15-year period, using a 4 percent discount rate, as -\$24,558,106 (Forest Service, 2011a).

**Cultural and historic resources:** Most of the direction that affects cultural and historic resources comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable range acres:** The land base determined to be suitable for livestock grazing under alternative D is 913,078 acres. This figure is the same across all alternatives.

**Mining and mineral resources:** Most of the direction that affects minerals activities comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable timber acres:** The land base determined to be suitable for timber production under alternative D is 38,063 acres.

**Long term sustained yield capacity:** The sustainable harvest estimate for alternative D was determined to be 59,706 hundred cubic feet (CCF) per decade.

**Allowable sale quantity:** The expected maximum harvest volume for alternative D was determined to be 40,447 hundred cubic feet (CCF) per decade.

**Special use permits:** Most of the direction that affects special use permit issuance and administration comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Transportation system:** The motorized transportation system under alternative D consists of 1,357 miles of road and 408 miles of trails open to motorized vehicles less than 50 inches wide. These figures are the same across all alternatives.

### **Alternative E: Final Revised Plan (Selected)**

Alternative E, the final revised plan (selected), is based on alternative B, with changes that address concerns about access for public and administrative uses and the future availability of recreation funding. It has a more modest emphasis on recreation in response to increasing budget uncertainty and additional guidance for watersheds, forest access, and land acquisitions, including two objectives unique to the alternative that address water rights and historic access. Vegetation treatments would be the same as those in alternative B, as would the emphasis on pronghorn and native fish habitat recovery. The wilderness recommendations were selected to minimize the disruption of existing access for recreation and administrative use. The following describes how alternative E responds to each of the needs for change topics.

#### **Need for Change 1**

*Restore vegetation structure and composition and desired characteristics of fire to selected ecosystems, while responding to citizen concerns related to smoke emissions.*

**Vegetation and fire:** Alternative E contains the same levels of thinning and managed fire found in alternative B. Managed fire would range from 10,600 to 25,300 acres per year on average. Tree and shrub thinning treatments would range from 750 to 6,500 acres per year on average. These treatments would focus on restoring grassland, ponderosa pine, piñon-juniper, and interior chaparral ecosystems.

**Ecosystem resilience and adaptation to climate change:** The plan components used to promote ecosystem resilience and adaptation to climate change in alternative E are the same as those described in alternatives B and D.

**Air quality:** The plan components used to address air quality in alternative E are the same as those described for alternatives B, C, and D.

**Species viability and diversity:** The plan components used to address species viability and diversity in alternative E are the same those described in alternatives B and D, except that alternative E would improve up to 25 existing and 5 new water developments for wildlife.

## Need for Change 2

*Retain or improve watershed integrity to provide desired water quality, quantity, and timing of delivery.*

**Impairments to watershed function from recreation and management activities:** The plan components used to address this issue in alternative E would be similar to those described for alternatives B, C, and D. Alternative E differs in that it calls for 20 to 100 miles of designated roads or motorized trails that impact watershed integrity to be repaired or relocated and does not count routine maintenance towards meeting this objective.

**Seeps and springs and riparian function:** One to 3 critical threats to riparian system functionality would be addressed within 2 to 3 years of detection. Twenty-five to 55 seeps and springs would be maintained or enhanced, including such activities as road or trail relocation, fencing, pasture rotation, or seasonal grazing restrictions. Alternative E also contains an objective (Objective 31) not present in the other alternatives that provides direction to apply for 8 to 10 in-stream flow water rights to help provide for channel and floodplain maintenance and the recharge of riparian aquifers.

**Desired water quality, quantity, and timing:** Over a 10-year period, 5 to 50 essential projects would improve conditions within high risk watersheds. Activities would be the same as under the other action alternatives and could include range improvements to distribute grazing, treatments to increase vegetative ground cover, stream stabilization, and mine site restoration.

**Watershed resilience to climate change:** This concern would be addressed the same way as that described in alternatives B, C, and D.

## Need for Change 3

*Provide sustainable and diverse recreation opportunities that consider population demographic characteristics, reflect desires of local communities, avoid overcrowding and user conflicts, and minimize resource damage.*

The plan components used to address this need for change in alternative E are the same as those described in alternative B except for the items listed below:

**Recreation site/trail improvement:** Alternative E is the same as alternative D with regard to developed recreation. The number of additional developed recreation sites, such as day-use sites, developed river access, or campgrounds would still increase (1 or 2 new sites proposed) compared to the existing condition, and the reduction of the maintenance backlog within developed sites would be 50 to 60 percent of the baseline which is the same as alternative D. The direction for additional designated dispersed camping areas outside of the Prescott Basin is the same as that in alternative B (1 to 4 areas), as is the direction for improving trailheads (5 to 20 trailheads), maintaining signage (10 to 20 percent), and carrying out management actions to meet desired conditions for trails (5 to 10 actions). However, alternative E removed the direction to reduce the maintenance backlog for trails.

**Recreational target shooting:** Alternative E differs from alternatives B, C, and D in that it emphasizes the development and implementation of strategies to raise awareness of responsible target shooting practices as a means of promoting visitor safety, rather than creating and operating a new designated target shooting area.

**Recommended wilderness:** Eight potential wilderness areas (PWAs), encompassing 23,137 acres, would be recommended for wilderness designation. These PWAs were selected to respond to both the public's concerns for recreation and administrative access and the public's desire to expand existing wilderness opportunities.

**Recreation management response to climate change:** The ability to respond to increasing numbers of visitors and extended seasons of use would be similar to that described in alternative D, except there would be less emphasis on designating dispersed camping areas and trail maintenance.

#### **Need for Change 4**

*Provide desired habitat for native fish species.*

**Diversity and viability of native fish, aquatic herps, and invertebrate species:** The plan components used to address aquatic and riparian species diversity and viability are the same as those described in alternatives B and D.

**Aquatic/riparian habitat:** The plan components used to address aquatic and riparian habitat concerns are the same as those described in alternatives B and D.

#### **Need for Change 5**

*Enhance the value of open space provided by the Prescott National Forest by defining the visual character within areas near or viewed by those in local communities.*

**Scenic integrity:** The method and plan components used to address scenic integrity are the same as that described in alternative B. However, the recommended potential wilderness areas are not visible from the Verde Valley or Quad Cities area.

**Land acquisition:** Alternative E would direct the Prescott NF to pursue up to 10 opportunities to acquire lands within 10 years, with an emphasis on parcels that would help retain open space values. It also contains an additional objective (Objective 30) to act on up to 10 opportunities to restore historic access to the national forest. As with alternative B, the Prescott NF would take scenic and open space values, as well as community vision statements, into account when responding to land exchange proposals.

#### **Social and Economic Values**

**Economic impact:** The total amount of labor income and jobs contributed by the Prescott NF to the local economy would be \$23,735,000 and 660 total jobs, including 287 recreation related jobs (Forest Service, 2011a).

**Financial efficiency:** The PNV was calculated over a 15-year period, using a 4 percent discount rate, as -\$24,731,896 (Forest Service, 2011a).

**Cultural and historic resources:** Most of the direction that affects cultural and historic resources comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable range acres:** The land base determined to be suitable for livestock grazing under alternative E is 913,078 acres. This figure is the same across all alternatives.

**Mining and mineral resources:** Most of the direction that affects minerals activities comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Suitable timber acres:** The land base determined to be suitable for timber production under alternative E is 38,875 acres.

**Long term sustained yield capacity:** The sustainable harvest estimate for alternative E was determined to be 60,996 hundred cubic feet (CCF) per decade.

**Allowable sale quantity:** The expected maximum harvest volume for alternative E was determined to be 40,447 hundred cubic feet (CCF) per decade.

**Special use permits:** Most of the direction that affects special use permit issuance and administration comes from existing laws, regulations, and policies found in the Forest Service Manual and Forest Service Handbook. This guidance is independent from forest plan direction and does not change across alternatives.

**Transportation system:** The motorized transportation system under alternative E consists of 1,357 miles of road and 408 miles of trails open to motorized vehicles less than 50 inches wide. These figures are the same across all alternatives.

## **Alternative that Incorporates the RPA Program Resource Objectives**

The 1982 Planning Rule Provisions at 219.12(f)(6) require land management plans to respond to and incorporate the Renewable Resource Planning Act of 1974 (RPA) (P.L. 93-378) program objectives for each national forest as displayed in regional guides. There is no longer a regional guide for the Southwestern Region. This was withdrawn as required by the 2000 Planning Rule (Section 219.35(e)). The last RPA Program was developed in 1995. In lieu of the RPA Program, the “USDA Forest Service Strategic Plan FY 2007-2012” (Forest Service, 2007a) provides broad overarching national guidance for land management planning and national objectives for the Agency as required by the Government Performance Results Act of 1993 (P.L. 103-62). All of the alternatives in this EIS address these broad strategic objectives.

## **Alternatives Considered but Eliminated from Detailed Study**

Federal agencies are required by NEPA to rigorously explore and objectively evaluate 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 during the plan revision process provided suggestions for the revised plan. Some of these suggestions may not have been part of identified needs for change, were duplicative of the alternatives considered in detail, or were determined to contain components that would cause unnecessary environmental harm.

A number of alternatives were considered but dismissed from detailed consideration for reasons as summarized in the following paragraphs.

**Alternative that responds to the changing climate:** An alternative that responds to changes in global and regional climate due to increasing atmospheric concentrations of greenhouse gases was suggested during the comment period. Climate change effects to resources are addressed in all of the action alternatives throughout the EIS. Plan direction also facilitates in building ecosystem resilience through desired conditions, objectives, and monitoring. Ecosystem resilience and adaptive capacity is expected to be achieved through the restoration of vegetation structure, vegetation composition, and appropriate fire regimes to ecosystems on the Prescott NF.

**Alternative that phases out issuance of livestock grazing permits over time:** An alternative emphasizing ecosystem restoration that would phase out livestock grazing forestwide over the life of the revised plan was suggested by the public. In the Multiple Use–Sustained Yield Act of 1960 (P.L. 86-517), Congress declared that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. The National Forest Management Act of 1974 (P.L. 94-588) reiterates this commitment to multiple use in Section 6 – National Forest System Resource Planning. Given these legal requirements, it was determined that this alternative was not consistent with the mission of the Forest Service and, therefore, outside the scope of this decision.

**Alternative that adopts a “hands-off” management approach:** An alternative was suggested that would maximize long term vegetative health and the retention of water and forage for wildlife through the implementation of a minimal management strategy. However, this type of “hands-off” approach is contrary to the best available science that recommends active restoration efforts for many of the departed ecosystems on the Prescott NF. The action alternatives address long term vegetative health in the desired condition statements of how the various vegetation types on the Prescott NF should look and function. Management action is necessary to trend these ecosystems towards the desired conditions and strengthen ecosystem resilience in the face of expected changes in the climate of the Southwest.

**Alternative that adjusts relative mileage of motorized and nonmotorized trails:** A recreation oriented alternative was suggested that would increase the miles of nonmotorized trails relative to the miles of motorized trails. Current trail mileage for nonmotorized use is approximately equal to the mileage of motorized or multi-use trails (394 miles of nonmotorized trails versus 408 miles of motorized trails). An alternative was suggested that would provide direction to adjust the nonmotorized trail mileage to exceed motorized trail mileage by about 40 percent to better respond to the proportions of visitor use.

The five alternatives considered in detail vary from adding no new system trails to adding 10 to 20 miles of trail; however, none of them would adjust the relative trail mileages to the extent suggested. Due in part to the average speed of travel, it is reasonable to expect that more miles of trail are required to provide the opportunity for a desired experience to an OHV rider than to a hiker. Motorized or nonmotorized designation for trails will be determined at the site-specific level after specific proposals are identified and analyzed and there is the opportunity for public involvement.

**Alternative that limits the road density:** An alternative was suggested that would prohibit new road construction and require a reduction in road density to less than 2 miles per square mile. This was not considered as a separate alternative because the current road density (including motorized

trails) of the Prescott National Forest is less than 0.97 miles per square mile and all of the action alternatives include direction to minimize, but not prohibit, new road construction. Road density on the forest is even less if wilderness areas are included in the calculations.

All of the action alternative address the impacts of roads and motorized trails by providing guidance for maintaining and restoring the health of watersheds and aquatic and riparian habitats impacted by existing roads. This includes objectives to repair or relocate roads or trails that impact watershed integrity, rehabilitate unauthorized routes that impact watershed integrity, and improve stream and drainage crossings.

## Comparison of Alternatives

This section provides a summary of the activities by alternative in table 1 and compares effects and outcomes of implementing each alternative in table 2. Information in the tables is focused on activities and effects where different levels of activities, consequences, or outcomes can be distinguished quantitatively or qualitatively among alternatives. Figures in table 1 for all alternatives are estimated for a 10-year period unless indicated otherwise.

### Comparison of Activities by Alternative

**Table 1. Comparison of plan components or potential activities by alternative**

Activities	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
<b>Vegetation</b>					
Use wildland fire to meet resource objectives in Semi-Desert Grasslands	13,300 acres	25,000 to 65,000 acres	65,000 to 85,000 acres	25,000 to 65,000 acres	
Use wildland fire to meet resource objectives in Great Basin Grasslands	400 acres	1,000 to 5,000 acres	5,000 to 10,000 acres	1,000 to 5,000 acres	
Mechanical treatments or wildland fire to meet resource objectives in Juniper Grasslands and Piñon-Juniper Evergreen Shrub	25,000 acres of fire 3,100 acres of mechanical treatment	20,000 to 90,000 acres	20,000 to 40,000 acres		20,000 to 90,000 acres
Mechanical treatments, biomass removal, or wildland fire to meet resource objectives in Interior Chaparral	44,400 acres of fire 1,600 acres of mechanical treatment	40,000 to 100,000 acres	40,000 to 60,000 acres		40,000 to 100,000 acres
Timber harvest in Ponderosa Pine	5,600 acres	2,500 to 8,000 acres			
Use wildland fire to meet resource objectives in Ponderosa Pine	24,300 acres	25,000 to 50,000 acres	30,000 to 65,000 acres	25,000 to 50,000 acres	

<b>Activities</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. C</b>	<b>Alt. D</b>	<b>Alt. E</b>
Management of nonnative invasive plant species	1,240 acres of treatment	Control or eradicate 75–95 percent of populations within 1 to 2 years of detection.			Treat 50 percent of populations within 1 to 2 years of detection
Management of sensitive plant species	Project level mitigations during analysis of site-specific projects	Guidelines-Plants-1 to 6 Std-Plants-1 to 2			
<b>Watershed Integrity</b>					
Projects to improve watershed conditions	4,180 acres, 3 miles, and 2 other projects. Estimate 8 to 12 projects.	20 to 50 projects			5 to 50 essential projects
Improve conditions in identified improperly functioning and at risk riparian areas within 1 to 5 years of detection.	10 acres and 17 segments improved; timing unknown.	Improve 10–40 percent of identified riparian areas			Counter 1 to 3 critical threats to riparian system functionality
Maintain or repair designated motorized roads or trails that impact watershed integrity.	30 miles, 2 erosion control projects, and 62 acres improved.	Maintain or repair 20 to 100 miles of road or trail			Repair 20 to 100 miles of road or trail
Obliterate, close, recontour, or revegetate unauthorized routes that impact watershed integrity.	23 miles and 14 acres obliterated	Minimum of 10 miles of routes			
Improve stream or drainage crossings by roads or trails.	2 crossings improved	15 to 25 crossings			
Enhance and restore water dependent ecosystem sites (seeps and springs).	12 sites	25 to 55 sites			
Apply for in-stream flow water rights to provide for channel and floodplain maintenance		Not addressed			8 to 10 water rights
<b>Recreation</b>					
Additional developed recreation areas	No areas	2 to 5 areas		1 or 2 areas	
Additional designations of dispersed camping areas.	No areas	1 to 4 areas		2 to 6 areas	1 to 4 areas

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<b>Activities</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. C</b>	<b>Alt. D</b>	<b>Alt. E</b>
Percent reduction in maintenance backlog—developed recreation sites.	88 percent	80–90 percent of maintenance backlog		50–60 percent of maintenance backlog	
Percent reduction in maintenance backlog—trails.	No reduction, expected increase	50–75 percent of maintenance backlog	35–50 percent of maintenance backlog	50–75 percent of maintenance backlog	No reduction
Designated target shooting areas.	1 area exists; permit will not be renewed	1 new area			No new area
Improvement in trailheads.	None reported	5 to 20 trailheads	5 to 10 trailheads	10 to 25 trailheads	5 to 20 trailheads
Annual recreation sign maintenance.	3–5 percent of signage maintained	10–20 percent of signage maintained			
Maintain or enhance fishing opportunities.	Two lake treatments	Two lakes or ponds maintained or enhanced			
Enhance means of communication with visitors.	No	Develop 2 to 5 additional methods			
Improved identification of designated wilderness boundaries.	1 mile marked	2 to 5 at-risk areas			
Add protective measures where there is evidence of resource damage due to recreation use.	2 locations	2 to 5 locations			
Trail improvement to meet desired conditions.	No documented actions	5 to 10 actions		5 to 15 actions, includes 10 to 20 miles of new trail, and up to 5 miles of trail decommission	5 to 10 actions
Number of areas and acreage of designated wilderness and WSR segments.	8 wilderness areas: 104,480 acres 1 wild and scenic river segment				
Number of areas and total acreage of potential wilderness recommended.	No areas No acres	8 areas 43,440 acres	No areas No acres	16 areas 116,260 acres	8 areas 23,137 acres
Number of eligible wild and scenic river segments recommended.	No segments				
Number of inventoried roadless areas	11 inventoried roadless areas; 139,591 acres				

<b>Activities</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. C</b>	<b>Alt. D</b>	<b>Alt. E</b>
Number of research natural areas recommended	No areas; No acres				
<b>Aquatic and Terrestrial Species Habitat</b>					
Improvement of habitat for native fish species.	76 acres of tamarisk treatment along Verde Wild & Scenic River	Work with AZGFD and USFWS to improve 2 or 3 stream reaches	Work with AZGFD and USFWS to improve 4 to 6 stream reaches	Work with AZGFD and USFWS to improve 2 or 3 stream reaches	
Improvement of pronghorn habitat: modification or fence removal.	None reported; 2 miles estimated	3 to 5 miles of fence	10 to 15 miles of fence	3 to 5 miles of fence	
Improvement of pronghorn habitat: habitat quality.	4,750 acres	15,000 to 90,000 acres	50,000 to 85,000 acres	15,000 to 90,000 acres	
Improvement of pronghorn habitat: migration corridors.	Little focus on corridors specifically	2 or 3 corridors	3 to 6 corridors	2 or 3 corridors	
Improve water developments with AZGFD.	5 water developments	3 to 15 water developments	5 to 15 water developments	3 to 15 water developments	25 existing and 5 new water developments
Acres of northern goshawk nesting habitat (MIS).	62,125 to 62,761 acres				
Acres of northern goshawk foraging habitat (MIS).	17,524 acres	18,651 to 22,518 acres			
Acres of pronghorn habitat (MIS).	164,350 acres	177,485 to 196,930 acres	196,930 to 203,980 acres	177,485 to 196,930 acres	
Miles of aquatic macro-invertebrate habitat (MIS).	193 miles				
<b>Open Space</b>					
Act on opportunities to acquire land to retain open space.	1 opportunity	Up to 10 opportunities in the Verde Valley and along the Verde River to retain open space and protect riparian habitat		Up to 10 opportunities	
Visual integrity objectives within Grief Hill and Black Canyon areas.	Moderate	High			
Act on opportunities to secure legal access to national forest land.	Not addressed				Up to 10 opportunities

### Comparison of Effects by Alternative

Table 2 contains a qualitative comparison of how each alternative addresses the needs for change and a quantitative comparison of the social and economic effects. It also illustrates the response to the primary issues that served as the basis for alternative development: ecosystem restoration, dispersed recreation opportunities, and recommended wilderness. The emphasis on ecosystem restoration is captured under “Terrestrial Ecosystems,” “Watershed Integrity,” and “Aquatic and Riparian Species Habitat” in the table below. Dispersed recreation opportunities and recommended wilderness are both captured under “Recreation.” This table summarizes the analysis of the alternatives discussed in further detail in chapter 3 of this EIS.

**Table 2. Comparison of the response to needs for change by alternative**

Need for Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
<b>Terrestrial Ecosystems</b>					
Improve vegetation structure, composition, and fire regime	Least improvement	Moderate improvement	Most improvement	Moderate improvement	
Improve ecosystem resilience to climate change	No change	Moderate improvement	Most improvement	Moderate improvement	
Predicted air quality	Most particulate emissions	Some particulate emissions	Least particulate emissions	Some particulate emissions	
Address public concerns over smoke	Less emphasis	More emphasis			
Consider air quality impacts in restoration needs	Moderate ratio of thinning to fire	Highest ratio of thinning to fire	Lowest ratio of thinning to fire	Moderate ratio of thinning to fire	Highest ratio of thinning to fire
Animal species viability	Some risk	Less risk to animal species viability			
Plant species viability	Some risk	Less risk to plant species viability			
<b>Watershed Integrity</b>					
Impact to watersheds from vegetation management	No change	Increased short term impacts, more long term benefit	Greatest short term impacts, most long term benefit	Increased short term impacts, more long term benefit	
Impact to watersheds from recreation activities	No change	Some reduction	Least reduction	Most reduction	Some reduction
Functional improvement to riparian areas, seeps, and springs	No change in rate of improvement	Accelerated rate of improvement			
Provide needed water quality, quantity, and timing	No change	Some increase			

<b>Need for Change</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. C</b>	<b>Alt. D</b>	<b>Alt. E</b>
Strengthen watershed resilience to climate change	No change	Faster rate of improvement			
Apply for in-stream flow water rights	No				Yes
<b>Recreation</b>					
Improve recreation sites	Yes, but no new facilities	Yes, more new facilities		Yes, fewer new facilities	
Reduce developed sites maintenance backlog	Yes, at current rate			Yes, but at a slower rate	
Improve trails	Yes, least	Yes, some		Yes, most and creates new trails	Yes, some
Improve trailheads	No	Yes, more	Yes, least	Yes, most	Yes, more
Improve signage	Yes	Yes, at an accelerated rate			
Reduce trails maintenance backlog	No	Yes	Yes, at a slower rate	Yes	No
Address conflict on trails	No	Yes			
Replace shooting venue	No	Yes			No
Improve fishing	Maintenance only	Yes			
Expand methods of information sharing	No	Yes			
Mitigate dispersed recreation impacts	Yes	Yes, with stronger direction			
Mitigate impacts from dispersed camping	Designated in Prescott Basin only	Yes, some new designated areas across forest		Yes, most new designated areas across forest	Yes, some new designated areas across forest
Mark wilderness boundaries	Yes	Yes, at an accelerated rate, with stronger direction			
Potential wilderness recommended	None	Some	None	Most	Least
Adapt management to climate change	Additional effort required	Integrated into plan			
<b>Aquatic and Riparian Species Habitat</b>					
Aquatic species distribution and abundance	Decreasing	Increasing			

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<b>Need for Change</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. C</b>	<b>Alt. D</b>	<b>Alt. E</b>
Riparian species distribution and abundance	Stable				
Aquatic habitat quantity, quality, and distribution	Stable	Increasing			
Riparian habitat quantity, quality, and distribution	Stable				
<b>Open Space</b>					
Scenic integrity near communities	Least protection, long term decrease in visual quality	Most protection for scenic integrity, improved visual quality	Protection for scenic integrity, most long term improvement	Protection for scenic integrity, improved visual quality	
Open space values	No emphasis	Strong emphasis			
Restore historic access	No				Yes
<b>Social and Economic Values</b>					
Labor income generated	\$23,616,000	\$23,882,000		\$23,850,000	\$23,735,000
Total jobs contributed	656	664		663	660
Present net value	-\$23,230,148	-\$24,624,817	-\$23,833,268	-\$24,558,106	-\$24,731,896
Heritage resources	Least potential to disrupt sites	Most potential to disrupt sites	Some potential to disrupt sites		Most potential to disrupt sites
Livestock grazing	Fewest short term impacts, fewest long term benefits	Increased short term impacts, more long term benefit	Greatest short term impacts, most long term benefit	Increased short term impacts, more long term benefit	
Suitable range	913,078 acres				
Minerals	No effect on new or existing claims	Some possible effect on new claims, no effect on existing claims	No effect on new or existing claims	Some possible effect on new claims, no effect on existing claims	
Suitable timber	44,413 acres	38,462 acres	44,413 acres	38,063 acres	38,875 acres
Long term sustained yield capacity (LTSYC)	69,680 CCF <sup>1</sup> per decade	60,343 CCF per decade	69,680 CCF per decade	59,706 CCF per decade	60,996 CCF per decade
Allowable sale quantity (ASQ)	23,385 CCF per decade	40,447 CCF per decade			
Special uses	No effect on new or existing permits	Possible effect on new permits, no effect on existing permits, project specific analysis required			
Transportation system	No effect	Improved conditions for NFS roads and trails			

<sup>1</sup> Hundred cubic feet of volume

# Chapter 3. Affected Environment and Environmental Consequences

## Introduction

This chapter summarizes the physical, biological, social, and economic environments of the planning area and the environmental consequences that may occur by implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in chapter 2. More detailed information, including methodology, assumptions, and effects analyses, can be found in appendix B or the specific resource specialist report located in the planning record and available upon request.

## Plan Decisions and Site-Specific Projects and Activities

The revised plan and EIS alternatives do not authorize implementation of management activities described in the effects analyses. The revised plan and EIS alternatives provide a programmatic framework that guides site-specific actions but does not authorize, fund, or carryout any project or activity.

Because the land management plan does not authorize or mandate any site-specific projects or activities (including ground-disturbing actions), there can be no direct effects. However, there may be implications, or longer term environmental consequences, of managing the forest under this programmatic framework. The revised plan sets the stage for what future management actions are needed to achieve desired outcomes (e.g., desired conditions, objectives, special areas), and provides the sideboards (e.g., suitability, standards, guidelines) under which future activities may occur in order to manage risks to ecological, social, and economic environments. To actually implement site-specific projects, project- and activity-level planning, environmental analysis, and decisions must occur. For example, the revised plan contains direction to close or rehabilitate roads in order to benefit riparian areas; however, a subsequent site-specific analysis and decision must be made for each proposal that involves any specific road closure or obliteration.

## Environmental Analyses

During development of the environmental analyses that follow, the best science was considered and documented in the planning record. The environmental analyses were focused on the needs for change to the existing plan and issues identified through the scoping process and examined those potential effects to Prescott NF programs and resources.

The discussions here refer to the potential for the consequences to occur, realizing that in many cases, these are only estimates. For estimating the consequences of alternatives at the programmatic plan level, the assumption has been made that the kinds of resource management activities allowed under the prescriptions will in fact occur to the extent necessary to achieve the objectives and move toward or achieve the desired conditions of each alternative. This analysis is useful in comparing and evaluating alternatives on a forestwide basis but is not to be applied to specific locations on the forest.

Several assumptions were made in the analyses of alternatives, including:

- Plan decisions (i.e., desired conditions, objectives, standards, guidelines, special areas, suitability, monitoring) would be followed when planning or implementing site-specific projects and activities.
- Implementation of the land management plan would facilitate progress toward the attainment of desired conditions for each resource.
- Law, policy, regulations, and applicable best management practices (BMPs) would be followed when planning or implementing site-specific projects and activities.
- Monitoring would occur and the land management plan will be amended, as needed.
- The planning period is 10 years; other timeframes may be used to compare expected future trends.

## **Environmental Consequences of Each Alternative**

All relevant resources were analyzed for anticipated environmental consequences from implementing each alternative. Specialist reports containing further documentation of the analyses and resulting consequences can be found in the planning record located at the Prescott NF Supervisor's Office in Prescott, Arizona. This section examines, in detail, five different alternatives for revising the 1987 "Prescott National Forest Land and Resource Management Plan" (1987 plan).

## **Need for Change 1**

*Restore vegetation structure and composition and desired characteristics of fire to selected ecosystems, while responding to citizen concerns related to smoke emissions.*

This section summarizes current terrestrial ecosystem conditions, air quality conditions on the Prescott NF, and the consequences of implementing the revised plan or its alternatives. It has been organized by concerns associated with "Need for Change 1" in chapter 1 and the broad issue of ecosystem restoration and its relationship to species viability. This includes restoring vegetation structure, composition and desired fire frequency, improving ecosystem resilience to the expected outcomes of climate change, maintaining air quality, addressing public concerns about smoke, and assessing effects to terrestrial plant and animal species viability and diversity. The full analyses can be found in the "Prescott National Forest Plan Revision Vegetation and Fire Ecology Specialist Report" (Forest Service, 2011b), "Prescott National Forest Plan Revision Air Quality Specialist Report" (Forest Service, 2011c), "Prescott National Forest Plan Revision EIS Vascular Plant Viability Analysis" (Forest Service, 2011d), "Prescott National Forest Plan Revision Terrestrial Wildlife Specialist Report" (Forest Service, 2011e), and "Prescott National Forest Plan Revision EIS Terrestrial Species Viability Report" (Forest Service, 2011m).

## **Vegetation and Fire**

### **Background**

During plan revision efforts, the terrestrial ecosystems of the Prescott NF were classified into potential natural vegetation types (PNVTs) based on similar units of vegetation, soil, climate, and disturbance at a landscape scale. PNVTs represent the vegetation type and characteristics that would occur when natural disturbance regimes and biological processes prevail. The PNVT

classifications were developed from data available in the “Terrestrial Ecosystem Survey of the Prescott National Forest” (Robertson et al., 2000) and from information on vegetation dynamics and natural variability compiled by The Nature Conservancy<sup>1</sup> and the Landscape Fire and Resource Management Planning Tools Project<sup>2</sup> (commonly called LANDFIRE).

The initial classification of PNVTs resulted in 13 categories as reported in the “Prescott NF Ecological Sustainability Report” (Forest Service, 2009a). Additional data gathering and assessment since 2009 resulted in a refinement of the PNVT classification. Based on updated midscale vegetation inventory, field visits, and data review, the number of PNVTs identified on the Prescott NF was adjusted from 13 to 10. Table 3 lists these 10 PNVTs and their area.

**Table 3. Potential natural vegetation types (PNVTs) of the Prescott NF**

PNVT	Acres	Percent
Semi-Desert Grassland	125,712	10
Great Basin Grassland	38,389	3
Juniper Grassland	137,274	11
Piñon-Juniper Evergreen Shrub	463,296	37
Interior Chaparral	315,445	25
Ponderosa Pine-Evergreen Oak	63,539	5
Ponderosa Pine-Gambel Oak	49,052	4
Piñon-Juniper Woodland	36,263	3
Desert Communities	5,919	< 1
Riparian Gallery Forest	12,439	1
<b>Total</b>	<b>1,247,328</b>	<b>100</b>

Refinements in the identification and classification of PNVTs included:

- The Mixed-Conifer with Frequent Fire PNVT (6,600 acres) was combined with the Ponderosa Pine Forest PNVT because they are described by the same biophysical setting model (e.g., vegetation structure and disturbance regime) developed by the Nature Conservancy<sup>3</sup>. The Ponderosa Pine Forest PNVT was later renamed as Ponderosa Pine-Gambel Oak PNVT.
- The Mixed-Conifer with Aspen PNVT (80 acres) was determined to be a misidentification and the acres were added to the Ponderosa Pine-Gambel Oak PNVT.
- The Madrean Encinal Woodland PNVT (5,500 acres) map units were grouped with adjoining PNVT units because of concerns about their identification. Most of the

<sup>1</sup> [www.azconservation.org/downloads/category/southwest\\_regional/](http://www.azconservation.org/downloads/category/southwest_regional/)

<sup>2</sup> [www.landfire.gov](http://www.landfire.gov)

<sup>3</sup> TNC biophysical setting model “Ponderosa Pine/Bunchgrass”

indicator species describing this PNVT, with the exception of the Mexican pines, were observed during field visits to the small and scattered map units assigned to this PNVT. These units were found to be interspersed with Interior Chaparral and Ponderosa Pine-Evergreen Oak PNVTs, suggesting the possibility that multiple fire disturbance regimes existing in close proximity to one another could account for the observed variations in vegetation composition and structure. There is uncertainty in how much the observed vegetation structure may reflect recent land use and/or disturbance history versus the presence of a distinct PNVT. Until additional information is available to address the uncertainty associated with identification of the Madrean Encinal Woodland PNVT, it was decided to manage the vegetation of these map units based on their adjoining PNVT.

- The Colorado Plateau Grassland PNVT also known as Colorado Plateau/Great Basin Grassland<sup>4</sup> was shortened in name to Great Basin Grassland PNVT to acknowledge the fact that the Prescott NF does not reside on the Colorado Plateau. The Riparian Forest PNVT<sup>5</sup> was renamed Riparian Gallery Forest PNVT in recognition of the long and narrow patterns that this PNVT forms along perennial and intermittent streams found on the Prescott NF.

PNVT reference conditions that identified the relative amount of each vegetation state, and the frequency of transitions between states, were estimated based on scientific literature (Schussman and Smith, 2006a) and Forest Service experience within the western U.S. (Hann et al., 2008). Existing mid-scale vegetation mapping<sup>6</sup> was used to represent the PNVT current conditions.

Comparisons between the PNVT reference conditions, current conditions, and desired conditions were made to identify potential vegetation and fire treatment objectives for each of the alternatives. Computer models and published literature were then used to estimate future PNVT conditions and ecological effects based on current PNVT conditions and the proposed vegetation and fire treatment levels of the various alternatives (see appendix B for analysis methodology).

The “Prescott NF Ecological Sustainability Report” (Forest Service, 2009a), summarized threats to terrestrial ecosystem sustainability using comparisons of PNVT reference conditions to PNVT current conditions. The differences between these PNVT conditions were reported as the *departure from reference conditions*.

In the present analysis, comparisons between PNVT current conditions and PNVT desired conditions are emphasized, and the differences between PNVT conditions are referred to as *similarity to desired conditions*. This change in terminology was intentional for the purpose of measuring progress toward desired conditions over time using positive rather than negative terms. For this analysis, similarity and departure share an inverse relationship. In other words, a PNVT that exhibits a high similarity to desired conditions, would exhibit a low departure from reference conditions.

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<sup>4</sup> LANDFIRE biophysical setting model 1511350 “Inter-Mountain Basins Semi-Desert Grassland”

<sup>5</sup> LANDFIRE biophysical setting model 1511552 “North American Warm Desert Riparian Systems”

<sup>6</sup> Mid-scale vegetation mapping was conducted in 2005 and 2006 using satellite data and is mapped at the scale of 1:100,000. The map contains geospatial polygons with characteristics of life form (tree, shrub, grass, and forbs), size class (for trees and shrubs), and canopy cover.

## Affected Environment

Based on mid-scale vegetation assessments compiled in 2010, the current conditions for some PNVTs show a high similarity to the desired conditions (e.g., Piñon-Juniper Woodland and Interior Chaparral) as shown in table 4 below. For many of the PNVTs, however, the vegetation and fire characteristics currently exhibit a low similarity to the desired conditions.

**Table 4. Current conditions of PNVTs found on the Prescott NF**

Potential Natural Vegetation Type	Acres	Percent of PNF Area	Similarity to Desired Conditions		Management Concerns	PNVT Group
			Vegetation Structure	Fire Disturbance		
Semi-Desert Grassland	125,712	10	Low	Low	Lack of desired fire disturbance; tree and shrub encroachment; increases in exposed soil surface and spread of nonnative plants.	Grassland PNVTs
Great Basin Grassland	38,389	3	High	Moderate		
Juniper Grassland	137,274	11	Moderate	Moderate	Lack of desired fire disturbance; increased tree and shrub density and canopy cover; lack of perennial grasses and forbs.	Piñon-Juniper PNVTs
Piñon-Juniper Evergreen Shrub	463,296	37	Low	Moderate		
Piñon-Juniper Woodland	36,263	3	High	High		
Interior Chaparral	315,445	25	High	High	Wildfire threat to human life and property.	
Ponderosa Pine-Evergreen Oak	63,539	5	Low	Low	Increased tree and shrub density; increased fuel load, increased risk of uncharacteristic high-intensity fire, proximity to human life and property.	Ponderosa Pine PNVTs
Ponderosa Pine-Gambel Oak	49,052	4	Low	Low		
Desert Communities	5,919	<1	High	High	Threat of human-caused fire.	
Riparian Gallery Forest	12,439	1	High	High	Invasion by nonnative plants; trampling of vegetation.	
<b>Grand Total:</b>	<b>1,247,328</b>	<b>100</b>				

Current conditions and ecosystem concerns summarized above are described in more detail for each PNVT in the sections that follow. Several of the PNVTs have been grouped to facilitate discussion throughout the remainder of this document: Grassland PNVTs (Semi-Desert and Great

Basin), Piñon-Juniper PNVTs (Juniper Grassland, Evergreen Shrub, and Woodland), and Ponderosa Pine PNVTs (Ponderosa Pine-Evergreen Oak and Ponderosa Pine-Gambel Oak).

### **Grassland PNVTs**

There are two grassland PNVTs classified for the Prescott NF: Semi-Desert and Great Basin. Grassland PNVTs are characterized as having less than 10 percent tree cover.

The **Semi-Desert Grassland PNV**T encompasses roughly 126,000 acres at elevations ranging from 3,000 to 4,500 feet. These grasslands are bounded by desert communities at the lowest elevations and Piñon-Juniper Woodlands or Interior Chaparral at higher elevations. Species composition and dominance varies based on soils and topography. The more common grass species include black grama, blue grama, hairy grama, tobosa, and giant sacaton. Various shrub species also inhabit these grasslands including: creosote bush, catclaw acacia, mimosa, burroweed, broom snakeweed, and mesquite.

The **Great Basin Grassland PNV**T encompasses almost 38,000 acres and intermingles with piñon-juniper ecosystems adjacent to Chino Valley. This grassland PNV T is higher in elevation (approximately 4,700 to 7,600 feet) and climatically cooler and moister than the Semi-Desert Grassland PNV T. Vegetation consists mostly of grasses and forbs with interspersed shrubs. Grass species may include, but are not limited to, Indian ricegrass, threeawns, blue grama, needle grass, bottlebrush squirreltail, James' galleta, dropseed, and tobosa grass. Shrub and half-shrub species may include, but are not limited to, saltbush, snakeweed, winterfat, buckwheat, and juniper.

The grasslands PNV T s of the Prescott NF have undergone some dramatic changes over the last 130 years. Changes include encroachment by trees and shrubs, loss of perennial grass cover, loss of cool season plant species, increase in exposed soil surface, and the spread of nonnative annual grasses.

Fire plays a key role in the ecological sustainability of grasslands (McPherson, 1995). Fire historically occurred every 10 to 30 years in the Great Basin Grassland PNV T and 2 to 10 years in the Semi-Desert Grassland PNV T. Current fire activity within these grasslands is considerably less often than desired.

A mid-scale assessment of vegetation conditions shows the Semi-Desert Grassland PNV T having a low similarity to desired conditions for vegetation structure. Current conditions are as those described above with encroachment by trees and shrubs, loss of perennial grass cover, and increases in exposed soil surfaces and nonnative plant species. The Great Basin Grassland PNV T in contrast, demonstrates a high similarity to desired conditions for vegetation structure and composition, based on a mid-scale assessment. However, other field-based vegetation surveys (Forest Service 2009a, Robertson et al., 2000) suggest that species richness (i.e., plant composition) and perennial grass canopy cover within the Great Basin Grassland PNV T are in decline.

Healthy grasslands are important habitat for a variety of wildlife species and are essential to maintaining pronghorn antelope populations. Pronghorn antelope was chosen as a management indicator species (MIS) for the grasslands PNV T s because it demonstrates a strong and/or predictable response to proposed management activities including prescribed fire; shrub and tree thinning/removal; road and/or trail maintenance; and watershed or rangeland improvements.

### **Piñon-Juniper PNVTs**

At roughly 636,800 acres, the three piñon-juniper PNVTs cover a majority of the Prescott NF landscape and represent one of the most extensive plant communities in the Southwest. These PNVTs are characterized by piñon and/or juniper species at elevations ranging from 4,500 to 7,500 feet. The piñon component includes Colorado and single leaf species. The juniper component is a variable mix of alligator, oneseed, Utah, and Rocky Mountain. Annual and perennial grasses, forbs, and shrubs can be found beneath the woodland overstory. Species composition, stand structure, and density vary by location primarily due to disturbance history, precipitation, elevation, temperature, and soil type. On erosive soil types within these communities, shrub, tree, and herbaceous ground cover help to lessen raindrop intensity and soil movement.

The piñon-juniper ecosystems on the Prescott NF have been classified as three distinct PNVTs: Juniper Grassland, Piñon-Juniper Evergreen Shrub, and Piñon-Juniper Woodland. Each one is described in more detail in the following sections.

The **Juniper Grassland PNV**T, with a grass and forb-dominated understory and scattered overstory trees, generally occurs on flats, basins, gentle sloping foothills, and transitional valleys at generally lower elevations. The soils associated with Juniper Grasslands are generally deep and productive. Juniper Grasslands cover about 137,300 acres of the Prescott NF.

Existing conditions for the Juniper Grassland PNVT are moderately similar to desired ecological conditions. Fire has been excluded from this PNVT for most of the last century, allowing for increases in the age, density, and canopy cover of trees and shrubs and a reduction in fire-stimulated regrowth and germination of perennial grasses and forbs. The desired fire frequency is every 1 to 35 years.

The **Piñon-Juniper Evergreen Shrub PNV**T, with an understory dominated by a mix of shrub species, generally occurs on elevated and lowland plains, hills, and lower-mountain slopes. The soils associated with this PNVT are variable and include those derived from granite, limestone, basalt, sandstone, and alluvium. Covering more than 463,000 acres, this is the most common piñon-juniper PNVT on the Prescott NF.

The Piñon-Juniper Evergreen Shrub PNVT has a low similarity to desired conditions for vegetation structure. For example, there are too many young and mid-aged trees and shrubs growing closely together. Also, there is a higher proportion of recently disturbed, open-canopy grass-forb-shrub state than expected. This is likely due to management activities during the 1950s to 1970s that involved “juniper pushes” where juniper trees were removed for firewood or to increase grass cover for livestock grazing. The fire regime for this PNVT is moderately similar to desired conditions with less than desired frequency, but similar severity and intensity of fires when they do occur.

The **Piñon-Juniper Woodland PNV**T has a persistent tree overstory and a discontinuous understory of grasses and shrubs. It generally occurs on flats, ridgetops, rugged uplands, and steep slopes at various elevations and on soils that are shallow and rocky. Covering about 36,000 acres, this PNVT is the least abundant of the piñon-juniper vegetation types on the Prescott NF. Fire in this PNVT is less frequent and more variable than in the Juniper Grassland and Piñon-Juniper Evergreen Shrub PNVTs due to differences in the amount and arrangement of vegetative

ground cover and fine fuels. Vegetation structure and fire regimes within the Piñon-Juniper Woodland PNVN exhibit a high similarity to desired ecological conditions.

### **Interior Chaparral PNVN**

The Interior Chaparral PNVN extends over 315,400 acres and represents the second largest PNVN on the Prescott NF. Interior Chaparral occurs at mid-elevations (3,400 to 6,600 feet) on foothills and lower mountain slopes. It is bordered by ponderosa pine or piñon-juniper woodlands and shrublands at the upper elevations and semi-desert grasslands at the lower elevations. Interior Chaparral vegetation has a uniform dense structure dominated by shrubs with thick, often stiff, waxy evergreen leaves.

The vegetation composition, structure, and fire characteristics within the Interior Chaparral PNVN on the Prescott NF exhibit a high similarity to desired conditions. Prescribed fires and hazardous fuel reduction activities implemented under the 1987 plan have contributed to these conditions. Wildland-urban interface<sup>7</sup> areas occur within this PNVN. A range of prescribed fire and fuel treatment objectives are evaluated in the proposed alternatives to maintain these desired conditions and to address concerns about the proximity of this wildland vegetation to human developments, life, and property.

### **Ponderosa Pine PNVNs**

There are two ponderosa pine PNVNs classified for the Prescott NF: Ponderosa Pine-Evergreen Oak and Ponderosa Pine-Gambel Oak.

**The Ponderosa Pine-Evergreen Oak PNVN** covers more than 63,500 acres of the Prescott NF at elevations ranging from approximately 6,000 to 7,500 feet. This PNVN is dominated by ponderosa pine and can be distinguished from the Ponderosa Pine-Gambel Oak PNVN by one or more well represented evergreen oak tree species (e.g., Emory oak and Arizona white oak), juniper species, piñon pine species, and Arizona cypress in some locations. This PNVN has an understory of primarily evergreen shrubs including manzanita, turbinella oak, sumac species, and mountain mahogany species.

Conditions found within the Ponderosa Pine-Evergreen Oak PNVN show a low similarity to desired ecological conditions. Fuel loads have accumulated on the forest floor. This PNVN has too many young and mid-aged trees and shrubs growing closely together. The current fire regime is dissimilar to the desired regime that includes: a frequency of every 6 to 12 years with low intensities to maintain an open pine forest with a mix of young evergreen oaks and shrubs underneath (Schussman and Smith, 2006a). When wildfires occur under current conditions, they are more likely to kill many of the large and old trees, moving the vegetation structure further from desired conditions, and thereby, increasing the time it would take to restore forest structure to groups of uneven aged, multistoried stands described in the desired conditions.

Approximately two-thirds of this PNVN includes areas of wildland-urban interface. A range of prescribed fire and fuel treatment objectives are evaluated in the proposed alternatives to address

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<sup>7</sup> The wildland-urban interface includes those areas of resident populations at imminent risk from wildfire, as well as human developments having special significance. These areas encompass not only the sites themselves but also the continuous slopes and fuels that lead directly to the sites regardless of the distance involved.

concerns about the proximity of this wildland vegetation to human developments, life, and property.

**The Ponderosa Pine-Gambel Oak PNVT** occurs on about 49,000 acres of the Prescott NF at elevations ranging from 5,500 to 9,000 feet. This PNVT is dominated by ponderosa pine and Gambel oak and commonly includes other tree species such as New Mexico locust, juniper, and piñon. Occasionally, tree species such as aspen, Douglas-fir, and white fir may be present, especially in relatively moist or shady areas. Desired conditions include an understory of grasses and forbs with occasional shrubs.

This PNVT has a low similarity to desired conditions. As with the Ponderosa Pine-Evergreen Oak PNVT, fine fuels in this PNVT have accumulated on the forest floor. There are too many young and mid-aged trees and too few old trees. The natural fire regime is dissimilar to the desired regime that includes: a frequency of every 1 to 15 years with low intensities to maintain an open pine forest with abundant herbaceous cover (Covington, 2003). When wildfires occur under current conditions, they are more likely to kill many of the large and old trees, moving the vegetation structure further from desired conditions, and thereby, increasing the time it would take to restore forest structure to groups of uneven aged, multistoried stands described in the desired conditions for the Ponderosa Pine-Gambel Oak PNVT.

Healthy pine forests provide important habitat for a variety of wildlife species and are essential to maintaining bird populations such as the northern goshawk and Mexican spotted owl. Northern goshawk was chosen as a management indicator species (MIS) for the ponderosa pine PNVTS, because it demonstrates a strong and/or predictable response to proposed management activities including: prescribed fire, timber harvest, shrub and tree thinning/removal, and road and/or trail maintenance.

#### **Desert Communities PNVT**

The Desert Communities PNVT covers approximately 5,900 acres of the lowest elevations of the Prescott NF. They most often have the appearance of a scrubland or low woodland of leguminous trees with intervening spaces characterized by one to several open layers of shrubs, cacti, and perennial succulents. This PNVT is found on broken ground and dissected sloping plains.

Historically, weather events such as drought, frost, and wind thinned the dominant overstory plants. Vegetation within the Desert Communities PNVT is not thought to have supported fuel loads to sustain large fires prior to European habitation of the region. Fires would have been associated with dry lightning coincident with monsoonal storms during years when previous winter precipitation was abundant to create a thick fine fuel bed of annual plants. Fires killing a high proportion of the overstory plants were very rare or absent (averaging about once in 100 to 998 years) (LANDFIRE, 2007).

The vegetation composition and structure within the Desert Communities PNVT exhibit a high similarity to desired conditions. Over the last few decades, however, some nonnative grasses have invaded this PNVT providing fuel for uncharacteristic and more frequent fire. Currently, the natural disturbance regime has been altered somewhat by the periodic occurrence of human-caused wildfires.

In the Desert Communities PNVT, projected warming and drying could enhance the invasion of nonnative plant species that are adapted to fire. These species grow quickly in the spring and then

dry and cure so that wildfire risks increase. The natural vegetation within this PNVT is not adapted to fire and can require long time periods to reproduce. Fire can greatly change the plant composition, and thus, change the desert plant communities so that birds and other wildlife species may be affected.

### **Riparian Gallery Forest PNVT**

The Riparian Gallery Forest PNVT occurs along perennial or intermittent streams and around springs and seeps. It covers approximately 12,400 acres and ranges in elevation from 2,000 to 8,000 feet (Forest Service, 2009a). The two major vegetation communities within it are cottonwood-willow and mixed broadleaf deciduous forests. The dominant woody vegetation varies according to elevation, substrate, stream gradient, and depth to groundwater. The juxtaposition of flood plains and stream terraces contribute to the mix of vegetative structures within the PNVT, including narrow stringers of mixed deciduous trees (gallery forest) and willow-, desert willow-, or mesquite-dominated shrublands. Common species include: Fremont cottonwood, narrowleaf, Gooding, and Bebb willow; Arizona sycamore; velvet and green ash; Arizona alder; Arizona walnut; and box elder. Herbaceous plants include several forbs, sedges, rushes, and grasses. Desert willow, mimosa, rubber rabbitbrush, and mesquite shrubs occur in dewatered areas.

Flooding and time between floods are the driving developmental forces in the Riparian Gallery Forest PNVT. In addition to periodic flooding, American Indians had an influence on vegetation composition and structure by favoring edible plants (e.g., mesquite), collecting firewood, and burning to flush animals and increase accessibility to open water and agricultural fields (LANDFIRE, 2007). These influences were likely limited to areas near perennial stream courses and not to areas adjacent to either intermittent water or springs and seeps imbedded in the upland vegetation (LANDFIRE, 2007). Outside of possible American Indian influence, wildland fires appear to have been infrequent in riparian communities dominated by cottonwood, willow, and mesquite species prior to invasion by tamarisk (Busch and Smith, 1993).

The Riparian Gallery Forest PNVT exhibits a high similarity to desired conditions for vegetation structure and fire regime. However, the spread of nonnative invasive plant species, soil compaction, and loss of vegetation due to visitor use are known threats to the health of this PNVT.

### **Ecosystem Resilience and Adaptation to Changing Climate Conditions**

Currently there appears to be broad agreement among climate modelers that the Southwestern United States is experiencing a drying trend that will continue well into the later part of the 21<sup>st</sup> century (Sprigg et al., 2000). Regional drying and warming trends have occurred twice during the 20<sup>th</sup> century (1930s Dust Bowl and the 1950s Southwest Drought), and may have been even more severe during what is known as the Medieval Climate Anomaly, an interval of warm, dry conditions with regional variability from A.D. 900 to 1350 (Hughes and Diaz, 1994). According to model scenarios, the slight warming trend observed in the last 100 years in the Southwest may continue into the next century, with the greatest warming to occur during winter. These climate models depict temperatures rising approximately 4 to 5 degrees Fahrenheit by 2030 and between 7 and 12 degrees Fahrenheit by 2090 (Seager et al., 2007). This trend would increase pressures on the region's already limited water supplies, as well as increase energy demand, alter fire regimes

and ecosystems, and create risks for human health and safety (Swetnam and Betancourt, 1998; Sprigg et al., 2000).

The potential ecological implications of climate change trends in the Southwest indicate:

- More extreme disturbance events, wildfires, intense rain and wind events, etc. (Swetnam et al., 1999).
- Greater vulnerability to invasive species, including insects, plants, fungi, and vertebrates. (Ryan et al., 2008).
- Long term shifts in vegetation patterns (Westerling et al., 2006; Millar et al., 2007).
- An anticipated shift in the geographic range of several tree and shrub species northward and upward in elevation (Shafer et al., 2001).
- Climate models suggest the reduced precipitation will act as a limiting factor to overall forest productivity (Forest Service, 2005).

Some scientists suggest that climate change presents an extreme challenge for establishing ecosystem resilience and adaptation because uncharacteristically rapid alteration of environments are possible and novel combinations of disturbances and nonnative biotic factors may occur and create conditions never before encountered by modern day land and resource managers (Fulé, 2008).

## **Environmental Consequences**

### **Vegetation Structure, Composition, and Fire Characteristics**

The environmental consequences of proposed vegetation and fire treatments were evaluated using three indicators that describe key PNV characteristics: desired conditions similarity index, open state proportions, and fire frequency. These indicators and the methods for calculating them are briefly explained in the paragraphs below. The full analysis can be found in the “Prescott National Forest Vegetation and Fire Ecology Specialist Report” (Forest Service, 2011b).

**Desired Conditions Similarity Index:** Computer models were used to gauge the similarity of future vegetation structure and composition to desired conditions descriptions for each PNV. Estimates of the current situation (year 0), short term outcomes (10 to 20 years), and long term outcomes (40 to 80 years) were calculated for each alternative. An 80-year timeframe was the upper limit chosen for the computer modeling—providing sufficient information to identify both short term and long term outcomes and trends; estimates of the outcomes beyond an 80-year timeframe were not calculated. Index values were used to summarize this information: values of 1 to 33 indicated a low similarity between estimates and desired condition descriptions; values between 34 and 66 indicated a moderate similarity; and values between 67 and 99 indicated high similarity between future conditions and desired conditions.

**Open State Proportions:** The amount of tree and shrub thinning and managed fire achieved under each alternative influences the attainment of open vegetation states (defined as less than 30 percent canopy cover) by altering existing horizontal and vertical vegetation structure and spacing. The proportion of open states provides an inference of the level of desired fire behavior, as open vegetation states promote surface fire, rather than active crown fire within woodland and forest vegetation types (Zimmerman, 2003). Surface fires typically burn at lower intensities because they consume less biomass than crown fires, resulting in less mortality to live vegetation

and less risk to life and property. This concept also applies to portions of grassland vegetation experiencing shrub and tree encroachment. Computer models were used to calculate the proportion of open state conditions expected in the short term (10 to 20 years) and long term (40 to 80 years) for each PNVT compared to the desired proportions. An 80-year timeframe was the upper limit chosen for the computer modeling based on professional judgment; estimates of the outcomes beyond an 80-year timeframe were not calculated.

**Fire Frequency:** For each PNVT, estimates of future fire frequency were calculated using the total area of each PNVT divided by the high end amount of the wildland fire treatments (prescribed fire and wildfire managed for resource benefits) proposed under a given alternative. This produced an estimate of how long it would take to burn each acre in the PNVT once given the proposed fire treatment rate (acres/year). The fire frequency estimate will vary depending on annual fire treatment rates and the size of the PNVT. An example equation is shown below:

$$PNVT \text{ area of } 100,000 \text{ acres} / 10,000 \text{ acres fire treatment per year} = a \text{ fire frequency of once every } 10 \text{ years, or } 1:10 \text{ years.}$$

The environmental consequences of proposed vegetation and fire treatments were compiled for individual PNVTS and then summarized to provide estimates of effects for all PNVTS combined. Descriptions of effects to individual PNVTS (as measured by the PNVT key indicators) begin with the Grassland PNVTS and table 5 below. The effects of the proposed treatments considering all PNVTS are discussed using a comparison between alternatives in a subsequent section “All PNVTS Combined.”

**Grassland PNVTS**

**Table 5. Grassland vegetation and fire indicator trends by alternative**

Indicator	PNVT	Desired Conditions	Alternative A	Alternatives B, D, and E	Alternative C
Similarity Index	Semi-Desert Grassland	High	Low Increases to Moderate	Low Increases to High	Low Increases to High Soonest
	Great Basin Grassland	High	High Declines to Moderate	High Stays High	
Open States	Semi-Desert Grassland	80%	23–35%	30–84%	44–86%
	Great Basin Grassland	93%	86–93%	86–95%	
Fire Frequency	Semi-Desert Grassland	1:10–15 yrs	1:138 yrs	1:19 yrs	1:15 yrs
	Great Basin Grassland	1:10–30 yrs	1:300 yrs	1:72 yrs	1:36 yrs

**Alternative A**

**Similarity Index:** In Great Basin Grasslands, the structural characteristics (mostly grass and forbs with an open canopy) would remain near desired proportions in the short term but would

show evidence of decline over the long term. Under current management direction there would be little to no reintroduction of fire to the landscape, leading to an increase in trees and shrubs from encroachment and a concurrent decrease in perennial grass cover.

Semi-Desert Grasslands are expected to achieve low to moderate levels of similarity to the desired vegetation structure and composition. Under current management direction, continued encroachment by trees and shrubs is expected to increase the tree and shrub density and canopy cover and to decrease perennial grass cover.

For both grassland PNVTs, increases in tree and shrub density would decrease moisture, nutrients, and sunlight that otherwise would be available to the native perennial grasses and forbs and lead to a decrease in perennial grass cover. This reduced perennial grass cover would deposit and incorporate less organic matter into the soil matrix and favor increased erosion, loss of surface and soil organics, and a decrease in hydrologic function. Fewer perennial grasses and forbs across the landscape would provide more opportunities for the spread of nonnative invasive plants. Changes in plant composition (native versus nonnative species) can affect the amount of fine fuels available which can result in undesired fire frequency and behavior.

The existing ecological conditions described above can adversely affect the quality and quantity of existing and potential habitat for pronghorn, the management indicator species (MIS) associated with the grassland PNVTs, and outdoor recreation experiences associated with the grassland PNVTs.

**Open States:** Alternative A proposes about 400 acres of wildland fire treatments (prescribed fire and wildfire managed for resource benefits) over 10 years in Great Basin Grasslands. With this level of treatment, the structural characteristics of mostly grass and forbs with open canopy would remain near desired proportions (86 to 93 percent).

Alternative A also proposes about 13,000 acres of wildland fire treatments (prescribed fire and wildfire managed for resource benefits) over 10 years in Semi-Desert Grasslands. At this level of treatment, Semi-Desert Grasslands would achieve only low levels of open canopy conditions. The current level of wildland fire treatments is not extensive enough to reduce the existing closed canopy state that tree and shrub encroachment has created over the last several decades. These higher proportions of canopy closure can adversely affect pronghorn herd movement and habitat use.

**Fire Frequency:** Estimated fire occurrence under this alternative would be about 10 times less frequent than these arid grassland systems are ecologically adapted to. Managed livestock grazing in these PNVTs is not effective at reducing and maintaining desired woody fuel levels. The lack of frequent fire in grasslands also affects plant productivity by precluding regular nutrient cycling between the organic material on the surface and the soil and roots of living plants below.

### **Alternatives B, D, and E**

**Similarity Index:** Under alternatives B, D, and E, Great Basin Grassland conditions would remain stable, retaining their current high similarity to desired conditions over both the short and long term.

In Semi-Desert Grasslands, the proposed range of restoration activity in alternatives B, D, and E (Objective 1) is expected to achieve a moderate to high level of similarity to vegetative desired

conditions over the short term and a high level of similarity in vegetation and fire characteristics over the long term. Expected trends in vegetation structure include an increase in both perennial bunchgrass cover and vigor and a decrease in shrub and tree density.

**Open States:** Alternatives B, D, and E propose 1,000 to 5,000 acres of wildland fire treatments (prescribed fire and wildfire managed for resource benefits) over 10 years in the Great Basin Grasslands (Objective 2). The structural characteristics of mostly grasses and forbs with open canopy would remain near desired proportions, similar to alternative A.

Alternatives B, D, and E also propose 25,000 to 65,000 acres of wildland fire treatments (prescribed fire and wildfire managed for resource benefits) over 10 years in the Semi-Desert Grasslands. As a result, the Semi-Desert Grasslands would achieve a range of open canopy conditions under these alternatives, depending on the extent of the treatments. At the high end of the proposed treatment levels, open canopy conditions would be close to desired proportions (table 5). Prescribed fire treatments are expected to reduce the existing closed canopy states that have resulted from shrub and tree encroachment and increase the proportions of grasses and forbs with open canopy.

For both grassland PNVTs, a higher proportion of open state conditions would reduce the chance of crown fire occurrence within the grassland PNVTs and reduce the likelihood of crown fires spreading to adjacent woodland PNVTs. A higher proportion of open states would also enrich pronghorn antelope habitat conditions for movement and forage.

**Fire Frequency:** Estimated fire occurrence under alternatives B, D, and E would be fairly close to desired frequency levels for Semi-Desert Grasslands and about five times more frequent for the Great Basin Grasslands than alternative A. Some potential, but uncertain, consequences of prescribed fire treatments may occur depending upon whether: (1) the necessary level of coordination with grazing permittees leads to desired fuel levels both before and after treatment and (2) postfire precipitation is adequate to encourage grass recovery and restore ground cover for inhibition of invasive plant species.

### **Alternative C**

**Similarity Index:** This alternative would restore the most grassland acres of any of the alternatives. Alternative C proposes 5,000 to 10,000 acres of wildland fire treatments (prescribed fire and wildfire managed for resource benefits) over 10 years in the Great Basin Grasslands (Objective 2). The current state of the Great Basin Grasslands is close to desired conditions, but under this alternative, they would continue to recover over both the short and long term.

Alternative C also proposes 65,000 to 85,000 acres of wildland fire treatments (prescribed fire and wildfire managed for resource benefits) over 10 years in the Semi-Desert Grasslands (Objective 1). The Semi-Desert Grasslands are expected to achieve a high level of similarity to vegetative desired conditions after only 10 years and this positive trend would continue over time. This is an increase in the rate of development toward desired conditions compared to alternatives A, B, and D.

**Open States:** In Great Basin Grasslands, the structural characteristics of mostly grasses and forbs with open canopy would remain near desired proportions, similar to alternatives A, B and D. Semi-Desert Grasslands would achieve the same or higher levels of open canopy conditions under alternative C compared to alternatives B and D. At the high end of the proposed treatment

levels, open canopy conditions would be close to desired proportions, and even at the low end, open canopy conditions would be closer to desired proportions than the low end of any of the other alternatives (table 5).

Alternative C achieves the highest proportion of open state conditions, thereby providing the highest quality and quantity of wildlife habitat among the alternatives. Alternative C also minimizes the threat of uncharacteristic and damaging crown fires occurring within the grassland PNVTs or spreading to adjacent woodland PNVTs.

**Fire Frequency:** Restoration treatments proposed under alternative C would establish and maintain fire frequencies that are the closest to desired conditions for the grassland PNVTs of any of the alternatives. However, the uncertainties associated with the timing and coordination of prescribed fire treatments discussed for alternatives B and D also apply to alternative C.

**Piñon-Juniper PNVTs**

**Table 6. Piñon-juniper vegetation and fire indicator trends by alternative**

Indicator	PNVT	Desired Conditions	Alternative A	Alternatives B, D, and E	Alternative C
Similarity Index	Juniper Grassland	High	Moderate Increases to High		
	Piñon-Juniper Shrub	High	Low Increases to Moderate		
	Piñon-Juniper Woodland	High	High Stays High		
Open States	Juniper Grassland	75%	43–60%		
	Piñon-Juniper Shrub	95%	32–52%		
	Piñon-Juniper Woodland	25%	25–39%		
Fire Frequency	Juniper Grassland	1:1–35 yrs	1:192 yrs	1:98 yrs	
	Piñon-Juniper Shrub	1:35–100 yrs	1:215 yrs	1:56 yrs	1:215 yrs
	Piñon-Juniper Woodland	1:35–200+ yrs	1:400 yrs		

**Common to All Alternatives**

**Similarity Index:** The vegetation and fire characteristics for the piñon-juniper PNVTs would either progress or remain close to desired conditions regardless of the range of restoration treatments proposed between the alternatives (table 6).

The Juniper Grasslands would achieve a high level of similarity to desired conditions, with a generally open landscape appearance where trees occur as individuals and occasionally in small

groups. Open areas would be a mixture of widely scattered shrubs with a dense cover of grasses and forbs that would support forage for grazing animals and a frequent surface fire regime.

The Piñon-Juniper Evergreen Shrub vegetation characteristics would achieve a moderate level of similarity to desired conditions, with many small groups and individual trees ranging from young to old and a moderate density of evergreen shrubs growing underneath. However, there would continue to be more area of closed canopy trees than desired on the landscape over the long term.

Computer modeling results indicate that treating additional areas in the Piñon-Juniper Evergreen Shrub PNVT, over and above those levels proposed in alternative A would not increase the similarity to desired conditions within the 80-year timeframe used in the simulation. The desired conditions include high proportions of late development open canopy trees with low to moderate density evergreen shrubs growing underneath. Current vegetation conditions are such that even 80 years is not enough time to grow and develop the mature and old-age piñon and juniper trees that are desired across this landscape. At best, forest restoration within this PNVT can be initiated, but not fully achieved, within 80 years, although it should be noted that there is no pre-determined date by which the desired conditions must be achieved. The inability to achieve a high level of similarity to desired conditions in the short term would adversely affect the quality and quantity of wildlife habitat associated with old tree features within this PNVT.

Conditions within the Piñon-Juniper Woodlands would remain stable, retaining their current high similarity to desired conditions over both the short and long term. Over the next 80 years, a slight but gradual increase in the amount of dense, old piñon-juniper forest occupying the landscape would occur. This increase in closed-canopy forest would move this PNVT even closer to desired conditions than currently exists, promoting this ecosystem's resilience to expected future climate shifts.

**Open States:** For the Juniper Grassland and Piñon-Juniper Evergreen Shrub PNVTs, all of the alternatives would create a more open state condition than currently exists but less open than the desired conditions (table 6).

More canopy closure than desired would have a negative effect on vegetation density, plant composition, and fire behavior in these two PNVTs. The consequence is an increased risk of direct and indirect mortality from future insect attacks, drought stress, and uncharacteristic wildfire occurrence.

These closed state conditions would increase the likelihood of damaging crown fires spreading to adjacent woodland and forest PNVTs. High-intensity fires or uncharacteristic fire occurrence can cause soils to become hydrophobic and repel water, thereby reducing the potential for water infiltration into the soil and increasing overland flow, erosion, soil loss, and sedimentation.

A high proportion of evergreen shrubs and trees relative to grasses and forbs in these PNVTs would also limit the rate at which organic matter is deposited on soil surfaces as ground cover and incorporated into the soil matrix. This condition favors increased erosion, loss of surface and soil organics, and a decrease in hydrologic function. Any increase in the amount of open space condition would contribute to the recovery of the impaired and unsatisfactory soil conditions currently found in the piñon-juniper PNVTs. Further discussion of this condition can be found in the "Impairments from Recreation and Management Activities" section in "Need for Change 2."

The lack of open canopy conditions may also adversely affect the visual quality experienced by forest visitors desiring open vistas and distant views.

For the Piñon-Juniper Woodland PNVNT, all of the alternatives would decrease the amount of open state condition than currently exists (table 6). This trend would move this PNVNT closer to the desired conditions.

#### Alternative A

**Fire Frequency:** Estimated fire occurrence under this alternative would be about six times less frequent than desired for Juniper Grasslands and two to six times less frequent than desired for Piñon-Juniper Evergreen Shrub vegetation. With limited reintroduction of fire in these two piñon-juniper PNVNTs, there are some lost opportunities to reduce tree and shrub density and canopy cover to desired levels and create openings for the establishment and growth of perennial grasses and forbs.

There is no difference between alternatives in the expected fire frequency for the Piñon-Juniper Woodland PNVNT. Fire in this PNVNT is less frequent than in the Juniper Grassland and Piñon-Juniper Evergreen Shrub types and variable depending on the amount and distribution of fine fuels across the ground that can promote or discourage fire spread. The estimated fire occurrence for the Piñon-Juniper Woodland PNVNT would be infrequent and within the desired range of once every 200 or more years.

#### Alternatives B, C, D, and E

**Fire Frequency:** There is no difference between alternatives A and C in the expected fire frequency for Piñon-Juniper Evergreen Shrub or between alternatives B, C, D, and E in the expected fire frequency for the Juniper Grasslands (table 6). Fire frequencies for the Piñon-Juniper Evergreen Shrub under alternatives B, D, and E would be closer to desired levels than under alternatives A and C but still only about one-third as often as desired for the Juniper Grasslands. Alternatives B, D, and E best approximate the desired frequencies for the Piñon-Juniper Evergreen Shrub vegetation, but this fire characteristic is achieved with no additional beneficial development of the desired vegetation characteristics described above.

#### Interior Chaparral PNVNT

**Table 7. Interior chaparral vegetation and fire indicator trends by alternative**

Indicator	PNVT	Desired Conditions	Alternative A	Alternatives B, D, and E	Alternative C
Similarity Index	Interior Chaparral	High	High Stays High		
Open States	Interior Chaparral	N/A	Open states are not a reasonable indicator of fire behavior for this PNVNT		
Fire Frequency	Interior Chaparral	1:35–100 yrs	1:97 yrs	1:46 yrs	1:75 yrs

**Common to All Alternatives**

**Similarity Index:** The vegetation and fire characteristics of Interior Chaparral are expected to remain very similar to desired condition descriptions for both the short and long term, regardless of the restoration treatments proposed under any of the alternatives (table 7). Between 89 and 93 percent of this PNVT would consist of shrubs that grow very closely together, 5 to 8 percent would consist of grass and open shrubs, and the remainder would consist of grass and forb regeneration.

The proximity of Interior Chaparral vegetation to human developments creates a concern over the threat of wildfire. To address this concern, priority would be given to implementing thinning treatments within wildland-urban interface areas to reduce the wildfire risk to people and structures.

**Open States:** Interior Chaparral is one of several mild climate scrubland communities found within the Southwest. One of the unifying characteristics of these scrublands is an abundance of shrubs species with a tendency for dense, compact crowns; small, hard, thick, evergreen leaves; and deep, wide-spreading root systems (Brown, 1994). These shrub species are usually well adapted to fire, and reproduce prolifically from heat scarified seed or sprout vigorously from enlarged root crowns. Closed-canopy conditions are usually achieved in 6 to 7 years postfire. As such, the proportion of open states to closed states is not a reasonable indicator of fire behavior and it was not evaluated for this PNVT.

**Fire Frequency:** Proposed restoration treatments under all alternatives would create and maintain fire frequencies that are within the desired range for Interior Chaparral ecosystems (table 7).

**Ponderosa Pine PNVTs**

**Table 8. Ponderosa pine vegetation and fire indicator trends by alternative**

Indicator	PNVT	Desired Conditions	Alternative A	Alternatives B, D, and E	Alternative C
Similarity Index	Pine-evergreen oak	High	Low Increases to Moderate		
	Pine-Gambel oak	High	Low Stays Low		
Open States	Pine-evergreen oak	84%	24–32%	22–34%	
	Pine-Gambel oak	83%	17–31%	18–36%	17–31%
Fire Frequency	Pine-evergreen oak	1:6–12 yrs	1:44 yrs	1:8 yrs	1:7 yrs
	Pine-Gambel oak	1:1–15 yrs	1:122 yrs	1:46 yrs	1:23 yrs

**Common to All Alternatives**

**Similarity Index:** Under all alternatives, short and long term desired condition similarity indices would have low to moderate similarity for Ponderosa Pine-Evergreen Oak forests and low similarity for Ponderosa Pine-Gambel Oak forests (table 8).

For Ponderosa Pine-Evergreen Oak forests, the landscape proportions of mature to old forest with widely separated trees and open canopy cover would increase from the current 3 percent to 27

percent but would not reach the desired proportion of 84 percent (Forest Service, 2011d) under any of the alternatives.

For Ponderosa Pine-Gambel Oak forests, the landscape proportions of mature to old forest with widely separated trees and open canopy cover would increase from the current 1 percent to 16 percent but would not reach the desired proportion of 79 percent (Forest Service, 2011b) under any of the alternatives.

None of the alternatives would achieve all of the desired conditions for vegetation structure and composition within the modeled 80-year timeframe. The current vegetation conditions are such that 80 years is not enough time to grow and develop the necessary amount of mature and old-age ponderosa pine trees that are desired across the landscape. Forest restoration efforts within these PNVTs can be initiated, and many desired conditions achieved, but some desired condition characteristics require 100 years or more time to develop.

**Open States:** Open state conditions would expand by one-half to one-third under all alternatives, but the ponderosa pine PNVTs would still only achieve a low level of open canopy compared to the desired level (table 8). There are slight differences among the alternatives, but these are ecologically insignificant. The range of mechanical thinning and prescribed fire treatments proposed would create openings between tree canopies and reduce the tree density for all size classes. An increase in the size and distribution of canopy openings would lessen the chance of wildfire spreading between tree crowns in treated areas.

The risk of uncharacteristic wildfire would remain in untreated areas of these PNVTs that have a high tree and shrub density. There would also be a concurrent risk of hydrophobic soils forming due to uncharacteristic fire occurrence. As noted above, these soils repel water and reduce the potential for water infiltration, which can contribute to increased overland flow, erosion, soil loss, and sedimentation.

All of the alternatives leave a greater percentage of closed state conditions than is desired on the landscape. The consequence of not achieving the desired level of open canopy conditions is an increased risk of direct and indirect mortality from future insect attacks, drought stress, and uncharacteristic wildfire occurrence. Such ecosystem alterations may adversely affect the quality and quantity of existing and potential habitat for northern goshawks, the MIS associated with the ponderosa pine PNVTs.

The lack of open canopy conditions may also adversely affect the visual quality experienced by forest visitors desiring open vistas and distant views.

### **Alternative A**

**Fire Frequency:** Alternative A proposes about 24,000 acres of wildland fire treatments (prescribed fire and wildfire managed for resource benefits) over 10 years. The estimated fire occurrence under this alternative would be four to seven times less frequent than desired for Ponderosa Pine-Evergreen Oak forests and eight times less frequent than desired for Ponderosa Pine-Gambel Oak forests. With limited reintroduction of fire in the ponderosa pine PNVTs, there are lost opportunities to reduce undesired tree and shrub density and canopy cover levels and to create openings for the establishment and growth of grasses and forbs. The risk of uncharacteristic wildfire in these PNVTs would remain where fuels have accumulated in the

absence of wildland fire treatments. This wildfire risk for these PNVTs is highest under alternative A.

**Alternatives B, D, and E**

**Similarity Index:** For Ponderosa Pine-Gambel Oak forests, the restoration activity proposed under alternatives B, D, and E (Objective 5) is expected to result in a moderate level of similarity to desired conditions if implemented at the high end of the proposed treatment range. However, as noted above, it would take over 80 years to achieve these results. Overall, alternatives B, D, and E would result in higher proportions of desired conditions for the ponderosa pine vegetation types compared to alternative A.

**Fire Frequency:** Alternatives B, D, and E propose a higher range of wildland fire treatments (Objective 5) than alternative A but a lower range than alternative C. Under alternatives B, D, and E, Ponderosa Pine-Evergreen Oak forests would achieve an expected fire frequency within the desired range of every 6 to 12 years. Ponderosa Pine-Gambel Oak forests would experience fire three times less often than desired. This range of treatment acres would reduce the risk of uncharacteristic wildfire in these PNVTs compared to alternative A but not as much when compared to alternative C.

**Alternative C**

**Similarity Index:** For Ponderosa Pine-Gambel Oak forests, the restoration activity proposed under alternative C (Objective 5) is expected to result in a moderate level of similarity to desired conditions if implemented at the high end of the proposed treatment range. Since there are more acres treated at the high end of the range in alternative C than in alternatives B and D, it achieves the same outcome, but the results are realized in 40 years rather than after 80 or more years (Forest Service, 2011b).

**Fire Frequency:** Alternative C proposes the highest range of wildland fire treatments (Objective 5) of any of the alternatives. Fire frequency in the Ponderosa Pine-Evergreen Oak forests would be similar to alternatives B and D and within the desired range of every 6 to 12 years. Fire occurrence in the Ponderosa Pine-Gambel Oak forests under alternative C would move the closest to the desired frequency of any of the alternatives (table 8). This alternative best approximates the desired frequencies for the ponderosa pine PNVTs, and the risk of uncharacteristic wildfire in these PNVTs would be the least of any of the alternatives due to the increased emphasis on treatment.

**Desert Communities PNVT**

**Table 9. Desert Communities vegetation and fire indicator trends by alternative**

Indicator	PNVT	Desired Conditions	Alternatives A, B, C, D, and E
Similarity Index	Desert Communities	High	High Stays High
Open States	Desert Communities	NA	Open States are not a reasonable indicator of fire behavior for this PNVT
Fire Frequency	Desert Communities	1:100–998 yrs	1:106 yrs

### Common to All Alternatives

**Similarity Index:** There are no proposed vegetation and fire treatments for this PNVT under the revised plan or its alternatives. All alternatives would achieve a high level of similarity to desired conditions for vegetation structure and composition of the Desert Communities PNVT over the short term (table 9). This means that under current management direction, between 95 and 99 percent of this PNVT would continue to consist of widely spaced, well developed cacti, succulents, trees, and shrubs and 1 to 5 percent of the PNVT would consist of young, post-disturbance grasses and forbs. Habitat conditions for desert species such as Sonoran desert tortoise would continue to be provided in sustainable proportions to reduce population viability concerns to a low risk level.

Over the long term, vegetation structure and composition of the Desert Communities PNVT is expected to trend slightly away from desired conditions due to the introduction and spread of nonnative plant species. Nonnative annual grasses (*Bromus* species) have been observed on occasion within this PNVT, but the spatial extent of such invasions is not known with certainty. The spread of nonnative grasses can increase fine fuel loads and increase the likelihood of severe fire effects to native vegetation structure and composition when wildfires do occur (McLaughlin and Bowers, 1982). These shifts in the vegetation structure and composition could adversely modify wildlife habitat.

The long term threats posed by the spread of nonnative grasses and increased wildfire risk in this PNVT would be addressed through specific plan components (i.e., 1987 plan amendment 14, Treatment of Noxious and Invasive Weeds; Proposed Plan Desired Condition-Vegetation-1, Objective-6, Guideline-Plants-2, Standard-Wildland Fire-2) that focus on the control and reduction of nonnative plants and human-caused wildfires.

**Open States:** Open state proportions were not evaluated for this PNVT. Desert Communities are usually dominated by desert plants with an overstory canopy cover ranging from 1 to 20 percent. The proportion of native grass cover is inherently low. Open canopy conditions prevail in this PNVT and fires that kill a high proportion of the overstory plants have been historically very rare or absent. As such, the proportion of open states is not a meaningful indicator of fire behavior.

**Fire Frequency:** There are no proposed fire treatments for this PNVT under the revised plan or its alternatives. Based on recent wildfire activity (1950 to present), estimated fire frequencies for this PNVT would be about once every 106 years. This estimate falls at the low end of the desired fire frequency range (averaging about once in 100 to 998 years).

The long term consequences to the Desert Communities PNVT from a fire regime at the low end of the desired range are not definitely known, but they are likely to include some shifts in species composition and abundance due to direct fire mortality in favor of species (including nonnative ones) that are adapted to more frequent fire occurrence. Historically, fires were very rare or absent in paloverde mixed-cacti desert ecosystems. If they did occur, it was only during conditions of extreme fire behavior after consecutive years of above average winter precipitation. These rare fires had tremendous influence on plant community structure and composition because the dominant overstory plants (e.g., giant saguaro, paloverde trees, cacti, mesquite, acacia, jojoba) are extremely susceptible to fires, even those of low intensity (LANDFIRE, 2007). These types of alterations to desert ecosystems create adverse effects to the quality and quantity of associated wildlife habitat and outdoor recreation experiences.

Alternatives B, C, D, and E include a monitoring strategy for assessing vegetation characteristics and disturbance trends that would inform future management decisions if current conditions within the Desert Communities PNVT become unfavorable or begin trending away from desired conditions.

**Riparian Gallery Forest PNVT**

**Table 10. Riparian Gallery vegetation and fire indicator trends by alternative**

Indicator	PNVT	Desired Conditions	Alternatives A, B, C, D, and E
Similarity Index	Riparian Gallery	High	Indicator trend data not available
Open States	Riparian Gallery	NA	Open states not evaluated for this PNVT
Fire Frequency	Riparian Gallery	1:600 yrs 1:20–50 yrs	1:76 yrs

**Common to All Alternatives**

**Similarity Index:** Computer modeling was not available to determine the current and projected future similarity of the vegetation structure and composition to the desired conditions for the Riparian Gallery Forest PNVT.

Based on literature available for warm desert riparian ecosystems, the vegetation structure and composition of the Riparian Gallery Forest PNVT is expected to retain a high level of similarity to desired conditions over the short term. Longer term trends and outcomes are uncertain and are dependent on the extent and severity of future nonnative plant invasions, potential soil compaction, erosion and vegetation loss from visitor use, and uncharacteristic fire.

Tamarisk dominated communities are known to accumulate fuels more rapidly than cottonwood-willow dominated riparian communities and consequently burn more frequently (about every 10 to 20 years). The native vegetation is usually replaced by the fire adapted tamarisk (Busch and Smith, 1993; Kerpez and Smith, 1987; Ohmart et al., 1977; Turner, 1974). Future nonnative plant invasion and spread that alters the composition and structure of the riparian vegetation will likely alter the fuel types and amounts and increase the odds for uncharacteristic wildfire occurrence within this PNVT. Subsequent losses or alterations to vegetation structure may increase the amount of soil exposure and subsequent erosion and sedimentation. These ecosystem alterations may adversely affect the quality and quantity of existing and potential habitat for macro-invertebrates (the MIS associated with the Riparian Gallery Forest PNVT), other riparian dependent species, and water- or riparian-based outdoor recreation experiences.

**Open States:** Open state proportions were not evaluated for the Riparian Gallery Forest PNVT.

**Fire Frequency:** No wildland fire treatments (prescribed fire and wildfire managed for resource benefits) are proposed for this PNVT under the revised plan or its alternatives. Based on recent wildfire activity (1950 to present), infrequent fires of low severity and occasionally mixed severity are expected to occur about once every 76 years throughout this PNVT over the short term. This estimate falls between estimates of the historic fire frequency for areas under American Indian influence (about once every 20 to 50 years) and estimates for areas not under American Indian influence (about once every 600 years) (LANDFIRE, 2007). Because the extent of historic

use by American Indian groups is unknown on the Prescott NF, it is assumed that a combination of these fire regimes occurs for the Riparian Gallery Forest PNVT.

As previously mentioned, the extent of future nonnative plant invasions will affect changes to fuel types and amounts, and likely increase the frequency of wildfire occurrence within this PNVT. Uncharacteristic fire occurrence in this PNVT (i.e., frequent high-intensity fire) can lead to soils becoming more water repellent (hydrophobic), and thereby, reducing the potential for water infiltration into the soil and causing increasing overland flow.

#### **Alternative A**

Alternative A would continue management under the direction set in the 1987 plan. The riparian area goals under current direction would include actions to bring all areas to a functioning condition. Although the Prescott NF has made progress toward this goal, undesirable conditions exist within the Riparian Gallery Forest PNVT, including the presence of tamarisk and other nonnative invasive plants. Additionally, mature and old trees that provide a multilayered canopy habitat for riparian associated bird species occur in proportions that are slightly less than desired.

Under alternative A, riparian areas would not benefit from the additional protection afforded by the management emphasis on dispersed recreation proposed in the action alternatives. The turbidity and reduced water quality that result from vegetation loss and sedimentation due to recreation and management activities would continue and could reasonably be expected to increase with increased visitation.

#### **Alternatives B, C, and D**

The objectives for riparian area restoration are the same for these three alternatives. Guidance under these alternatives would accelerate restoration activities for riparian areas, springs, and seeps by providing specific, time-bound objectives for their recovery. Between 10 percent and 40 percent of the impaired or at risk riparian areas would be improved within 1 to 5 years (Objective 19), in contrast to 10 acres over 10 years under the 1987 plan direction. This could result in restored conditions within the Riparian Gallery Forest PNVT in up to 26 sub-watersheds, depending on the final location and intensity of the restoration activities.

These areas would also indirectly benefit from increased recreation and vegetation management. Alternatives B, C, and D would reduce the trampling of riparian vegetation and degradation of streambanks by shifting recreation use away from these areas and on to more durable surfaces. Further analysis can be found in the “Impairments from Recreation and Management Activities” section in “Need for Change 2” and in the “Dispersed Recreation” section in “Need for Change 3.”

#### **Alternative E**

Alternative E, similar to the other action alternatives, would accelerate restoration activities for riparian areas, springs, and seeps by providing specific, time-bound objectives for their recovery. It provides guidance to implement projects to counter 1 to 3 critical threats to riparian system functionality, within 2 to 3 years of detection (Objective 19). This proactive approach focuses on identifying issues that cause impairments to riparian systems and restoring conditions within the Riparian Gallery Forest PNVT.

These areas would also indirectly benefit from increased recreation and vegetation management similar to that in Alternatives B, C, and D. Alternative E could reduce impacts from trampling and streambank degradation by shifting dispersed recreation use to managed sites with more durable surfaces.

**All PNVTs Combined**

**Table 11. All PNVTs vegetation and fire indicator trends by alternative**

Indicators	Alternative A	Alternative B	Alternative C	Alternative D
Similarity Index	Least development toward desired conditions	Moderate development toward desired conditions	Most development toward desired conditions	Moderate development toward desired conditions
Open States	Least Progress	Moderate Progress	Most Progress	Moderate Progress
Fire Frequency	Least Progress	Moderate Progress	Most Progress	Moderate Progress

**Alternative A**

Following the trends established under the 1987 plan direction, alternative A would restore conditions on the fewest acres of any of the alternatives (average of 8,862 acres per year). Alternative A would achieve some desired conditions for some of the PNVTs in the short term, but over the long term, the end result is the least restoration of vegetation and fire characteristics and the least similarity to desired conditions among all of the alternatives.

Alternative A would create the fewest short term impacts to forest visitors and local residents including smoke and areas of blackened or charred vegetation, and possible delays or denial of access due to temporary road, trail, and area closures from management activity. Alternative A would have the fewest short term impacts to available forage and yearly livestock authorizations due to the limited prescribed fire activity in the grassland, chaparral, and ponderosa pine PNVTs.

In the long term, alternative A achieves the smallest increase in perennial grass cover and open state conditions, leaving a greater threat of uncharacteristic and damaging crown fire occurrence within and between PNVTs. The lack of restoration of vegetation structure and composition would leave soil and watershed conditions mostly unaddressed and would provide the lowest quality and quantity of wildlife habitat compared to the action alternatives.

**Alternatives B, D, and E**

Alternatives B, D, and E propose a higher minimum level of restoration treatments (average of 11,350 acres per year) compared to alternative A. Treatment activity within each individual PNVT would also be higher under alternatives B, D, and E. The additional restoration efforts proposed across the landscape would result in moderate restoration of vegetation and fire characteristics and more similarity to desired conditions compared to alternative A.

Alternatives B, D, and E would create more short term impacts to forest visitors and local residents than alternative A, which would include smoke and areas of blackened or charred vegetation, and possible delays or denial of access due to temporary road, trail, and area closures from management activity. Compared to alternative A, additional short term impacts to available

forage and yearly livestock authorizations are expected because of the increase in prescribed fire activity in the grassland, chaparral, and ponderosa pine PNVTs under alternatives B, D, and E.

In the long term, alternatives B, D, and E achieve a greater increase in perennial grass cover and a higher proportion of open state conditions, compared to alternative A, and thereby, reducing the threat of uncharacteristic and damaging crown fires within and between PNVTs. This restoration of vegetation structure and composition would reduce soil erosion, increase water infiltration, and provide a higher quality and quantity of wildlife habitat compared to alternative A.

### **Alternative C**

Alternative C proposes the highest minimum level of restoration treatments (average of 16,250 acres per year) among all of the alternatives. Restoration efforts are focused on those vegetation types that currently show the greatest gap between the existing and desired conditions, and as a result, alternative C proposes more acres of fire treatments in the grassland and ponderosa pine PNVTs than alternatives B and D. The expected outcome is that alternative C would provide the most restoration of vegetation and fire characteristics and the most similarity to desired conditions among all of the alternatives.

Compared to the other alternatives, alternative C would create the most short term impacts to forest visitors and local residents including smoke and areas of blackened or charred vegetation, and possible delays or denial of access due to temporary road, trail, and area closures from management activity. Alternative C would also create the most short term impacts to available forage and yearly livestock authorizations from prescribed fire activity in the grassland, chaparral, and ponderosa pine PNVTs.

In the long term, alternative C achieves the greatest increase in perennial grass cover and the highest proportion of open state conditions, thereby reducing the threat of uncharacteristic and damaging crown fires within and between PNVTs. This restoration of vegetation structure and composition would reduce soil erosion, increase water infiltration, and provide the highest quality and quantity of wildlife habitat among the alternatives.

## **Ecosystem Responses to Changing Climate**

### **Common to All Alternatives**

The sustainability of several terrestrial ecosystems on the Prescott NF is at risk (especially for the grasslands and ponderosa pine PNVTs), and restoring their health and function is key to strengthening their resilience and adaptation capacity. In the coming years, it is expected that the Southwest will experience a shift in climatic conditions. Mean annual temperatures could increase 0.5 degrees Fahrenheit per decade, and summer heat waves could last 2 weeks or more. Winter temperatures would also be warmer, with a corresponding reduced snowpack. Overall, precipitation could decrease. Monsoon rains could arrive later in the summer, and a greater percentage of the precipitation could arrive in the form of high-intensity rain events (Forest Service, 2010a).

Indirectly, increasing temperatures, water shortages, and changing vegetative conditions will likely affect biodiversity and put pressure on plant and animal populations, distribution, viability, and migration patterns.

Under warmer and dryer climate conditions, the terrestrial ecosystems found on the Prescott NF would be susceptible to decreases in plant productivity from water limitations and increased heat; increases in insect attacks; colonization of invasive plant species; longer and more severe fire seasons; and changes in the timing, intensity, and frequency of other ecological disturbances (e.g., droughts, flash flooding, landslides, windstorms).

Grasses make use of moisture in the upper soil layers. Intense precipitation events may lead to increased runoff but decreased effective water infiltration (McAuliffe, 2003). This could decrease vigor of native plants and lead to increased colonization of nonnative invasive plant species.

Climate change is anticipated to shift the geographic range of several tree and shrub species northward and upward in elevation (Schafer et al., 2001). There may be increasing challenges to the regeneration of ponderosa pine trees within their current range, especially on warmer, drier areas such as south-facing slopes. It is possible that there may be some shifts in distribution between the three piñon-juniper PNVTs depending on amount and timing of precipitation and site specific conditions such as terrain and soils. In addition, the abundance and distribution of piñon trees may decrease from increased insect attack or lack of moisture. Insects and disease outbreaks, drought, and other stressors accompanying climate change may have future roles as large-scale disturbances which may result in type conversions or the creation of new PNVTs across the landscape (Fulé, 2008).

Hotter and drier environments are expected to increase the occurrence of wildfire as well as increase their size and severity (Westerling et al., 2006). Such weather driven fires are likely to occur in the infrequent fire vegetation types that comprise about 67 percent of the Prescott NF (e.g. Interior Chaparral PNV, Piñon-Juniper Evergreen Shrub PNV, and Piñon-Juniper Woodland PNV). Increasing the amount of vegetation and fire characteristics that are adapted to a more fire prone environment would enhance ecosystem resilience landscape-wide.

Restoration treatments that create more open conditions would enhance individual plant resilience to natural and human stressors, encourage persistence of native vegetation, and facilitate ecosystem transition from current to new climate conditions (Millar et al., 2007).

### **Alternative A**

Under the direction of the 1987 plan, alternative A has the least emphasis on vegetation management and ecosystem restoration. Ecosystems would show some development toward desired conditions from the vegetation and fire treatments, but the beneficial effects of these restoration efforts would be at greater risk of reversing due to the direct and indirect effects of climate change identified above. Alternative A provides the least amount of ecosystem resilience and capacity for plant communities to adapt to changing climate and a less aggressive strategy for treating nonnative invasive plants, compared to the action alternatives.

### **Alternatives B, D, and E**

Under alternatives B, D, and E, the increased prescribed fire activity in the grassland ecosystems is expected to discourage shrubby vegetation and encourage bunchgrasses. Nutrient cycling would also be enhanced. Tree and shrub thinning and prescribed fire activity in the ponderosa pine ecosystems would produce more of the desired structure and composition characteristics than alternative A. The more frequent application of prescribed surface fires compared to alternative A would help remove fuels and reduce the threat of large, destructive wildfires on the

landscape. Alternatives B, D, and E would also provide a more aggressive approach to controlling nonnative invasive plants than alternative A.

### **Alternative C**

Alternative C places the most emphasis on vegetation management and ecosystem restoration compared to alternatives A, B, D, and E. Alternative C would provide the most ecosystem resilience within the grassland and ponderosa pine PNVTs compared to the other alternatives due to the higher range of restoration treatment activities proposed. Alternative C offers the same direction for controlling nonnative invasive plants as alternatives B, D, and E, which is more aggressive than alternative A.

### **Cumulative Environmental Consequences**

Cumulative consequences are those consequences of reasonably foreseeable activities on non-Prescott NF lands that, in conjunction with management activities likely to occur on the Prescott NF, may intensify, negate, enhance, or otherwise affect the vegetation types and species' habitats of the Prescott NF. Below are considerations of consequences of activities that will likely occur on adjacent or nearby ownerships to the Prescott NF.

#### **Reducing Fuel Loads**

Research has shown that most pine forests in the Southwest are at much higher risk of high-intensity and severe fire than they were prior to European settlement. Several large, destructive wildfires in Arizona over the past several years have highlighted the interest and need to modify the structure, composition, and fuel load of several vegetation types on tribal, Bureau of Land Management, and Forest Service lands. The restoration of these landscapes was initiated after the Rodeo-Chediski Fire (2002) and will likely continue into the future, considering more recent large-scale wildfires including the Willow Fire (2004), the Cave Creek Complex (2005), and the Wallow Fire (2011) that each burned hundreds of thousands of acres of vegetation and habitat that is adjacent to or similar to that found on the Prescott NF.

#### **Restoring Desired Vegetation Structure and Composition**

Two national forests adjacent to the Prescott NF are proposing to carry out landscape scale restoration of ponderosa pine forests in northern Arizona. Restoration activities include the thinning of trees, prescribed fire treatments, and watershed and road restoration within 988,764 acres of the Coconino and Kaibab National Forests. Proposed treatments include more than 205,000 acres of prescribed fire treatments and more than 388,000 acres of thinning and watershed restoration treatments (Forest Service, 2011k).

#### **Common to All Alternatives**

Reducing fuel loads and modifying vegetation structure and composition under the framework of the revised plan, combined with ongoing or reasonably foreseeable activities on adjacent lands, would likely have these cumulative environmental consequences across the greater landscape:

- Move vegetation structure and diversity toward desired conditions by creating a mosaic of interspaces and tree groups of varying sizes and shapes;
- Move vegetation diversity and composition toward desired conditions by maintaining and promoting Gambel oak, aspen, and perennial grasses;

- Move toward having a resilient forest by reducing the potential for undesirable fire behavior and its effects;
- Move toward maintaining a mosaic of tree groups and interspaces with frequent, low severity fire by having a forest structure that does not support widespread crown fire;
- Improve forest health by reducing the potential for stand density related mortality and by reducing the level of insect attacks and tree pathogens; and
- Move toward a forest structure with all age and size classes represented to maintain northern goshawk and Mexican spotted owl habitat.

### **Alternative C**

Alternative C is expected to have the highest beneficial cumulative consequences because it proposes the highest amount of restoration activity in the vegetation types (the ponderosa pine and grassland PNVTs) that suffer the greatest risk to ecosystem sustainability. Alternatives B, D, and E would have moderate cumulative consequences, and alternative A would have the lowest.

## **Smoke and Air Quality**

### **Background**

In 1955, Congress passed the first Federal Clean Air Act (P.L. 84-159), with later amendments in 1967, 1970, 1977, and 1990. Although a Federal law, its implementation is largely left up to the individual states. The Arizona Department of Environmental Quality (ADEQ) has developed a state implementation plan (SIP) for achieving the goals of the Clean Air Act and statutes to regulate burning, including the use of wildland fire on Federal and State lands (Arizona Department of Environmental Quality, 2003 and 2004a). The two types of air quality impacts addressed by these laws and regulations are health hazards from pollutants and impacts to visibility in Class I Airsheds.

The Clean Air Act establishes National Ambient Air Quality Standards (NAAQS) for six principal pollutants that pose human health hazards: carbon monoxide, ozone, lead, nitrogen dioxide, particulate matter, and sulfur dioxide. Air quality is affected by pollutants that are generated locally, such as smoke from wildfires, but also by pollutants that flow into the area from other sources. This might include wood smoke from homes or prescribed fire and dust from rock quarries or roads. Long-range transport of pollutants from metropolitan areas and large industry many miles away is also possible.

Particulate matter is the primary pollutant of concern in smoke from wildland fires. The particles larger than 10 microns in size tend to settle out of the air, but the smaller particles (less than 2.5 microns in size) remain airborne and can cause respiratory problems. The public is also sensitive to the issue of nuisance smoke, defined by the Environmental Protection Agency (EPA) as smoke that interferes with a right or privilege common to members of the public. Public outcry regarding nuisance smoke often occurs long before smoke exposures reach levels that violate NAAQS (Achte-meier et al., 2001). This is of particular concern because nuisance smoke in and near communities adjacent to the Prescott NF was one of the concerns raised in the public comments during the plan revision process.

To protect visibility in areas of high scenic value, Congress designated all wilderness areas over 5,000 acres and all national parks over 6,000 acres as mandatory Federal Class I areas in 1977, subject to visibility protection requirements in the Clean Air Act. The national visibility goal of

the Clean Air Act is, “the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I areas in which impairment results from manmade air pollution.” Manmade sources of visibility impairment include industry, transportation, construction, mining, agricultural activities, and home heating. Prescribed fire also falls into this category; however, wildfires are considered to be natural sources of visibility impairment, and as such, their impacts are generally considered to be outside state control or prevention.

Additionally, the Regional Haze Rule, 40 CFR 51.308-309 (U.S. EPA, 1999), provides direction to the states for developing and adopting regional haze implementation plans. Under section 309, the State of Arizona has developed a state implementation plan (SIP) with long term strategies out to the year 2064 to make “reasonable progress in improving visibility in Class I areas inside the State and in neighboring jurisdictions” (U.S. EPA, 1999), and it focuses on anthropogenic sources of emissions. The Arizona SIP outlines an Enhanced Smoke Management Plan meeting criteria in the Regional Haze Rule that comprises a series of key policies and management practices to address visibility protection.

### **Affected Environment**

Air quality monitoring data has been collected in Yavapai County for three of the six criteria pollutants that pose a threat to human health (ground level ozone, particles larger than 10 microns, and particles less than 2.5 microns in size) on a limited basis since 1993. Monitoring sites have varied from year to year with no one location having a complete monitoring record (U.S. EPA, 2009a). Ground level ozone measurements have been collected from only one site in western Yavapai County. The annual average ozone concentration exceeded the national standard 7 out of 8 years during the period from 1997 to 2004. For both sizes of particulate matter (larger than 10 microns and less than 2.5 microns), several locations throughout Yavapai County were monitored, and the seasonally adjusted annual averages were far less than the national standard for each of the years 1990 to 2010.

The EPA has developed an air quality index (AQI) for reporting how clean or unhealthy the air is and the associated health effects that may be a concern to the general public or sensitive groups (e.g., children, older adults, or those suffering from asthma or lung disease). The index is calculated from raw measurements and converted into a separate AQI value for each pollutant (ground level ozone, particulate matter, carbon monoxide, and sulfur dioxide). The highest of these AQI values is reported as the AQI value for that day.

Air quality data used to calculate the AQI indicate that most residents of Yavapai County and visitors to the Prescott NF enjoy good air quality (see figure 2). Since 2001, 73 percent or more of the days monitored<sup>8</sup> were assigned to the “good” category of the EPA Air Quality Index. Good is the best rating, where air pollution poses little risk to human health. Less than 3 percent of days per year were rated in the “unhealthy for sensitive groups” category, and no days were rated “unhealthy,” “very unhealthy,” or “hazardous” (U.S. EPA, 2010). These air quality index ratings include emissions from Prescott NF prescribed fire activity that has averaged 7,640 acres per year under the direction of the 1987 plan.

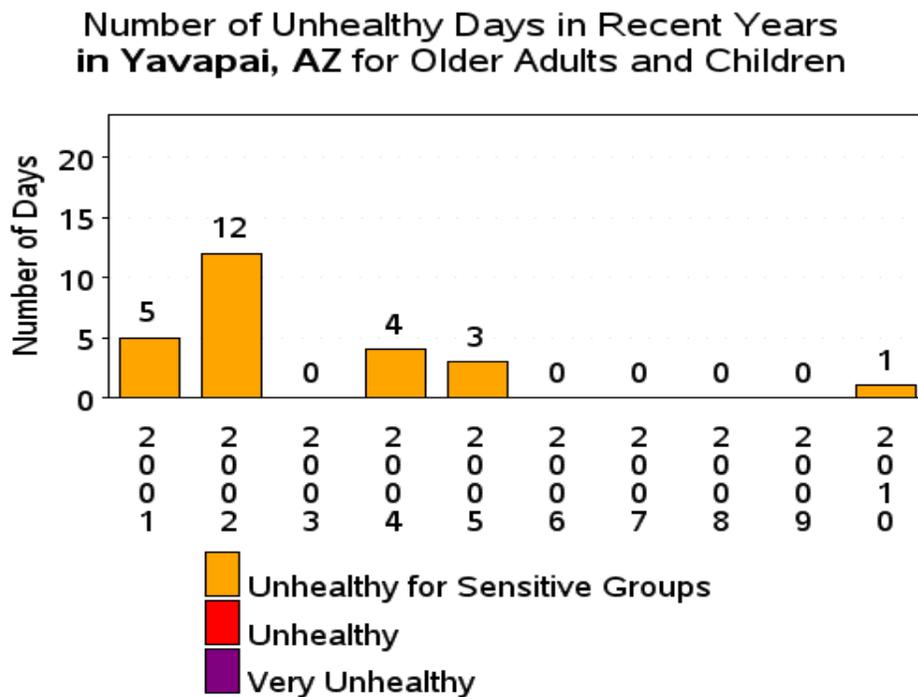
Threats to air quality in the form of particulate emissions can originate from many sources. The most prevalent ones include fossil fuel combustion, electricity generation, residential wood

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<sup>8</sup> Some counties may not measure every pollutant used to calculate the AQI, and the number of days each pollutant is measured may vary from one county to another.

combustion, wildland fires, and road dust (U.S. EPA, 2009b). In central and northern Arizona, the primary sources of particulate emissions are the activities associated with wildland fire management. Dust from rock quarries and roads has not been demonstrated to be a measurable contributor on a regional level to visibility in the Sycamore Canyon Wilderness and 15 other Class I areas located on the Colorado Plateau (ADEQ, 2003).

There are 12 mandatory Class I areas in Arizona, two of which—Sycamore Canyon Wilderness and Pine Mountain Wilderness—are within or adjacent to the Prescott NF. Visibility within the Class I areas adjacent to the Prescott NF is projected to steadily improve with implementation of regional guidelines and the Arizona SIP (Forest Service, 2009a).



**Figure 2. Yavapai County Air Quality Indices 2001-2010**  
Source: [www.epa.gov/aircompare/index.htm](http://www.epa.gov/aircompare/index.htm)

## Environmental Consequences

### Common to All Alternatives

Transient impacts to air quality from wildland fire are present in all alternatives. Most of the Prescott NF is occupied by fire adapted vegetation types (Forest Service, 2009c), and smoke from fires, regardless of ignition source or combustion stage, is inevitable. Under all alternatives, prescribed fire and wildfire managed for resource benefits would be coordinated with the ADEQ, as well as with adjacent agencies, to ensure that State or Federal standards for emissions are not exceeded.

Smoke from both prescribed fire and wildfire managed for resource benefits contributes to air quality impacts; however, it is expected that all alternatives would achieve the Prescott NF desired conditions for air quality. These desired conditions include: (1) smoke and dust levels do not exceed NAAQS and (2) Forest Service management activities do not diminish visibility within the Class I areas. It is important to note that it is not the total amount of emissions from a fire that have effects on human health, but rather the concentration of particulates in a given period of time. Atmospheric conditions during a fire, such as wind speed and direction or atmospheric stability, have a considerable influence on how particulate matter is distributed and its potential to affect public health.

Emissions from wildfires are considered to be natural events and are excluded from determinations of exceedances and NAAQS violations. On most wildfires, fire managers can influence the emission production through management decisions such as suppressing fires when small, performing burnout operations during optimal ventilation conditions, or limiting acreage burned when ventilation is poor. However, some wildfires burn with rates of spread and intensity levels that are largely outside the control of fire managers; these wildfires burn outside the historic range of variability, outside of proposed desired conditions for the vegetation type, and produce large quantities and concentrations of emissions.

Prescribed burning and vegetation thinning are often used to restore the fire regimes to a more natural frequency. They can also reduce the likelihood of high severity wildfires and contribute to a long term reduction in smoke emissions. These activities alter stand structure so that wildfires burn as surface fires in the accumulated litter and duff on the forest floor by reducing the overall amount of available fuel, removing mid-story vegetation that can act as a path for fire to reach the overstory, and opening up the canopy to inhibit the spread of fire among tree crowns. Surface fires typically produce less smoke because they consume less live biomass than crown fires, resulting in less overall impact to air quality.

### **Alternative A**

Under alternative A, removal or thinning of shrubs and trees would continue to occur on about 1,000 acres per year. About 7,835 acres per year would be treated using managed fire across all vegetation types. Alternative A would result in the fewest acres of ecosystem restoration. The estimated outcome is higher proportions of closed canopy vegetation and a higher likelihood of crown fire behavior and associated particulate emissions due to a greater overall fuel load and an increased presence of ladder fuels over the long term. This would result in the highest potential level of particulate emissions among all of the alternatives.

Alternative A lacks adequate plan components to address public concerns over nuisance smoke from managed fires. As a result, citizens are less aware of the timing, emission sources, and smoke dispersion patterns of prescribed fire and wildfire managed for resource benefits, along with information on the role and benefits of fire as a landscape process. This leads to increased complaints about nuisance smoke, visibility, potential health hazards, and less understanding and acceptance of wildland fire as an ecosystem management tool. With less public support for the use of wildland fire, land managers face more challenges and fewer options for achieving desired ecosystem conditions.

### **Alternatives B and E**

Alternatives B and E would increase the amount of thinning and managed fire occurring across the landscape. Managed fire would range from an about 10,600 to 25,300 acres per year on average. Removal or thinning of trees and shrubs would range from about 750 to 6,500 acres per year on average. With more prescribed fire proposed than alternative A, these alternatives would create more nuisance smoke and emissions in the short term in order to provide more open canopy conditions. These conditions would produce a lower likelihood of crown fire behavior and associated particulate emissions due to a lower overall fuel load and a decreased presence of ladder fuels over the long term. This would result in expected future emission levels that are less than alternative A.

Alternatives B and E address public concerns over nuisance smoke that were identified during the plan revision process. Plan components propose more emphasis on making citizens aware of the timing, emission sources, and smoke dispersion patterns of prescribed fire and wildfire managed for resource benefits, along with information on the role and benefits of fire as a landscape process. These are expected to improve community public relations and education to advance public acceptance of the use of wildland fire and tolerance for smoke.

In addition, where practical, wildland-urban interface (WUI) areas would be given high priority for fuel reduction treatments using mechanical methods, domestic animals, or a combination, in lieu of prescribed fire. These treatments would result in fewer emissions and less nuisance smoke near homes and businesses, while still reducing the risk of wildfire to life and property.

### **Alternative C**

Alternative C would emphasize more managed fire and thinning compared to alternative A and a higher minimum range of managed fire and less thinning overall compared to alternative B. Estimated prescribed fire and wildfire managed for resource benefits would range from about 15,500 to 22,800 acres per year on average. Estimated thinning treatments would range from about 750 to 4,000 acres per year on average. With more prescribed fire proposed than alternatives A and B, this alternative would create more nuisance smoke and emissions in the short term in order to provide more open canopy conditions. These conditions would produce a lower likelihood of crown fire behavior and associated particulate emissions due to a lower overall fuel load and a decreased presence of ladder fuels over the long term. This would result in expected future emission levels that are the lowest among all of the alternatives.

The response to public concerns over nuisance smoke and WUI treatments in alternative C is the same as that described for alternatives B and E.

### **Alternative D**

Alternative D would place less emphasis on managed fire than either alternative B or C and would provide direction for the same range of thinning as alternative C. Estimated prescribed fire and wildfire managed for resource benefits would range from about 10,600 to 18,800 acres per year on average. Estimated thinning treatments would range from about 750 to 4,000 acres per year on average. This alternative contains the lowest range of treated acres among the three action alternatives but still represents an increase over alternative A. Alternative D would produce less nuisance smoke and emissions in the short term compared to alternatives B and C. In the long

term, this would lead to future fire behavior that could be expected to produce emission levels that are greater than alternatives B and C and less than alternative A.

The response to public concerns over nuisance smoke and WUI treatments in alternative D is the same as that described for alternatives B and E.

### **Cumulative Environmental Consequences**

Cumulative consequences are those consequences of foreseeable activities on non-Prescott NF lands that, in conjunction with management activities likely to occur on the Prescott NF, may intensify, negate, improve, or otherwise affect air quality of the Prescott NF.

Reducing fuel loads and modifying vegetation structure and composition using prescribed fire are activities proposed on tribal, Bureau of Land Management, and Forest Service lands adjacent to the Prescott NF (these have been described previously in “Cumulative Environmental Consequences” section for vegetation and fire). Below are considerations of consequences of activities that will likely occur on adjacent or nearby ownerships to the Prescott NF.

#### **Common to All Alternatives**

- Air quality impacts from smoke are transient in nature because changing meteorological conditions limit how much smoke the airshed can absorb at any point in time without violating NAAQS or visibility thresholds.
- Through implementation of the Enhanced Smoke Management Program, a component of the Arizona SIP, cumulative effects from wildland fire that are under the control of Federal and State land managers, are mitigated to keep air quality across Arizona within desired conditions. These desired conditions include keeping emissions below the NAAQS, protecting visibility in Class I Areas, and promoting public support for wildland fire management programs.

### **Terrestrial Species Diversity and Viability**

#### **Background**

This section evaluates and discloses the potential environmental consequences to terrestrial species that may result from the adoption of a revised land management plan for the Prescott NF. It provides a summary of terrestrial species viability assessments and examines in detail consequences to federally listed and proposed species and critical habitat, Forest Service regionally sensitive species, migratory birds, eagles, and management indicator species. Environmental consequences to aquatic and riparian associated species are disclosed in “Need for Change 4.”

#### **Terrestrial Species Viability**

An assessment of species diversity for the Prescott NF was completed as part of the “Prescott National Forest Ecological Sustainability Report” (Forest Service, 2009a). From an initial list of 815 species, 121 species (terrestrial, aquatic, and riparian species) were determined to have a potential viability concern. The species identified included: 11 mammals, 33 birds, 3 reptiles, 2 amphibians, 12 fish, 4 invertebrates, and 56 plants. Species viability assessments for those 121 species were prepared according to Forest Service policy (FSM 2670) and documented in three specialist reports (Forest Service, 2011d, 2011i, and 2011m).

Viability risks to terrestrial species were based on assessments of:

- Availability and current conditions of the habitat or habitat features with which the species are typically associated;
- Population occurrence and distribution; and
- Threats from Forest Service management actions expected to occur within the planning area<sup>9</sup>. The results of these assessments provided a determination of no, low, or some risk to viability for each species evaluated.

As part of the plan revision process, coarse filter plan components (i.e., desired habitat conditions statements) were developed that describe the desired outcomes and conditions for terrestrial vegetation, riparian habitats and features, and aquatic habitats and features within the planning area. For species determined to be at no or low risk, meeting and maintaining these desired conditions within the planning area would provide for the viability of those species. For those species determined to be at some risk, additional fine filter plan components (e.g., standards, guidelines, and objectives) were developed to lessen population viability risks to a low level.

Of the 121 species indicating a potential viability concern, 92 terrestrial species were assessed including 54 plants, 10 mammals, 27 birds, and 1 reptile. Forty-one species were found to have no risk, 27 have low risk to their viability, and 24 were found to have some additional risk to their population viability. The other remaining 29 species are addressed in the “Aquatic and Riparian Species Viability” section in “Need for Change 4.”

Table 12 lists the terrestrial species for which there is a viability concern and the corresponding Prescott NF plan components (coarse or fine filter) needed to reduce those population viability concerns to a low risk level.

**Table 12. Prescott NF plan components that address terrestrial species viability concerns**

Viability Filter Category	Taxon	Associated Plan Components	Species
Coarse filter plan components alone are sufficient to reduce viability to a level of no or low risk	Plants	Desired Conditions-Vegetation-1, 3, 4, 5	Tonto Basin agave, Phillips’ agave, Mt. Dellenbaugh sandwort, Greene milkweed, Creeping milkvetch, Utah bladder fern, Metcalfe’s ticktrefoil, Rock fleabane, Flagstaff pennyroyal, Eastwood alumroot, New Mexico alumroot, Flagstaff beardtongue, Oak Creek triteleia
	Mammals	PNVT Desired Conditions	Gunnison’s prairie dog, plains harvest mouse
	Birds		Gilded flicker, Gila woodpecker, elf owl, Lucy’s warbler, purple martin, Grace’s warbler, juniper titmouse, Gray vireo, piñon jay, Virginia’s warbler, western burrowing owl, western grasshopper sparrow

<sup>9</sup> “Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area...” 36 CFR § 219.19 (1982).

Viability Filter Category	Taxon	Associated Plan Components	Species
Coarse filter plan components (various desired condition statements) plus fine filter plan components are necessary to reduce viability to a level of no or low risk	Plants	Standard-Plants-1, Standard-Recreation-1, Standard-Locatable Minerals-2, Guidelines-Plants-1, 2, 3, 5, 6, Guideline-Range-4, Guideline-Recreation-5, Guideline-Locatable Minerals-2	Arizona wild buckwheat, Basin bladderpod, White Mountain bladderpod, Mearns lotus, Maccougal's bluebells, Skunk-top scurfpea, Verde breadroot, Arizona phlox, Hualapai milkwort, Mearns sage, Black dropseed, Southwestern ringstem, Heathleaf wild buckwheat, Ripley's wild buckwheat
	Mammals	Guidelines-Wildlife-2, 3, 6, 8, 10, Objectives-25 to 28	Pale Townsend's big-eared bat, pocketed free-tailed bat, pronghorn antelope
	Birds	Guidelines-Wildlife-1, 2, 4, 5, 7	American peregrine falcon, Mexican spotted owl, red-faced warbler, Cordilleran flycatcher, Bendire's thrasher, northern goshawk
	Reptiles	Guidelines-Wildlife-1, 2	Sonoran desert tortoise

**Affected Environment**

The Prescott NF is home to a variety of habitats for terrestrial plants and animals. At the lowest elevation, the primary vegetation includes cactus desert and semi-arid grasslands. As the elevation increases, extensive evergreen shrublands (chaparral) become common, followed by piñon pine and juniper savannas and woodlands. Above that, ponderosa pine forests dominate the landscape. The 10 potential natural vegetation types (PNVTs) found on the Prescott NF have been fully described in the “Affected Environment” section for vegetation and fire in “Need for Change 1.” Additional affected environment descriptions are provided below for those habitat elements within a PNVT or those habitat features that meet the life history requirements of a given species or group of species.

**Federally Listed Species**

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) under authority of the Endangered Species Act of 1973 (ESA) (P.L. 93-205), as amended. Pursuant to Section 7 (2)(a) of the ESA, a biological assessment was prepared to assess the effects of implementing the “Prescott National Forest Land and Resource Management Plan” selected alternative on endangered or threatened species and to ensure that proposed actions in the selected alternative would not jeopardize the continued existence of listed species. All federally listed, proposed, and candidate species and designated and proposed critical habitats that the USFWS has identified in its Southwestern Region threatened/endangered species list <sup>10</sup> were considered in this analysis. The terrestrial species that occur on the Prescott NF are shown in table 13.

<sup>10</sup> [www.fws.gov/southwest/es/EndangeredSpecies/EndangeredSpecies\\_Lists/](http://www.fws.gov/southwest/es/EndangeredSpecies/EndangeredSpecies_Lists/)

**Table 13. Federally listed species critical and occupied habitat**

Common Name	Scientific Name	Status	Habitat Extent on the Prescott NF	Critical Habitat
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened <sup>1</sup>	26,448 acres	Yes
Sonoran desert tortoise	<i>Gopherus morafkai</i>	Candidate <sup>2</sup> Sensitive <sup>3</sup>	5,919 acres	No

<sup>1</sup> Listed threatened under the ESA: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

<sup>2</sup> Listed candidate, ready for proposal for listing under the ESA.

<sup>3</sup> The species is listed on the Regional Forester’s Sensitive Species List for the Southwestern Region of the Forest Service.

**Mexican Spotted Owl and Critical Habitat**

*Distribution* – Populations of Mexican spotted owls (*Strix occidentalis lucida*) are distributed from southern Utah and central Colorado, south through the mountains of Arizona, New Mexico, and western Texas, into northern Mexico (Fish and Wildlife Service, 1995). The geographic range of Mexican spotted owl (MSO) populations within the United States is divided into six ecological management units or EMUs (Fish and Wildlife Service, 1995, 2012). The Prescott NF lies completely within the Basin and Range West EMU. Known nesting sites on the Prescott NF include areas near Mingus Mountain, in Prescott Basin, and at Crown King for a total of 15 protected activity centers (PACs).

*Habitat* – Mexican spotted owls are known to occur on the Prescott NF in ponderosa pine-Gambel oak forests where habitat features such as medium/large trees, dense overstory, and woody debris including snags and downed logs occur. Existing habitat on the Prescott NF totals 26,448 acres.

There are three designated MSO critical habitat areas that coincide with 44,814 acres of Prescott NF lands. The Upper Gila Mountain unit (UGM-13) includes a portion of the Prescott NF in the Sycamore Canyon Wilderness. However, none of the Prescott NF acres that occur within this unit qualify as recovery or protected habitat as defined in the revised MSO Recovery Plan (Fish and Wildlife Service, 2012).

The other two critical habitat areas associated with the Prescott NF are located on the Bradshaw Ranger District. The Basin and Range West units (BRW-2 and BRW-3) are found near Prescott Basin and Crown King, respectively. Per the Federal Register publication designating critical habitat, “WUI project areas, State and private lands are not designated as critical habitat” (Fish and Wildlife Service, 2004). For the BRW-2 unit, the acres associated with the Boundary WUI project area have been excluded from designation. For the BRW-3 unit, the Crown King/Ash Creek WUI project area acres are also exempt from designation.

Therefore, within the three designated critical habitat units on the Prescott NF, the total area of protected habitat is limited to 4,058 acres; and the total area of forested nest/roost recovery habitat is limited to 6,231 acres. The acres of riparian recovery habitat within the critical habitat have not been estimated at this time.

*Risk Factors* – Primary threats to MSO on the Prescott NF include uncharacteristic, high-severity wildfire, recreation, mining and grazing activities; and from residential development and fire-fuels hazard mitigation activities within the wildland urban interface.

### **Sonoran Desert Tortoise**

*Distribution* – Within the United States, the range of the Sonoran population of desert tortoise is limited entirely to Arizona. Distribution in Arizona occurs south and east of the Colorado River and is largely defined to the north by the limits of the Sonoran Desert (Fish and Wildlife Service, 2010). Desert tortoise occurrence on the Prescott NF is known for the south end of the Bradshaw Ranger District near the town of Cleator. One unconfirmed sighting of a tortoise of unknown species on the Mayer-Goodwin Road has also been reported. No formal surveys have been done to determine the full extent of the species or its habitat on the Prescott NF.

*Habitat* – This species is most closely associated with low density shrub vegetation types of the Sonoran and Mojave deserts. Habitat commonly consists of steep, rocky slopes and bajadas as well as paloverde-mixed cacti plant associations. Availability of shelter burrow habitat is important as tortoises require loose soil to excavate burrows below rocks and boulders but also use rock crevices and occasionally burrow under vegetation. Habitat on the Prescott NF is restricted to the Desert Communities PNV (5,919 acres) which show high levels of similarity to desired conditions.

*Risk Factors* – A number of habitat related risk factors are identified for this species. Invasion of nonnative plants leading to a change in frequency, duration, intensity, and magnitude of wildfires in desert habitats is described as the most significant habitat modification factor. Off-highway vehicles in desert tortoise habitat can result in damage to soil, increased erosion, and lead to spread of invasive species. Livestock grazing has the potential to damage lower elevation tortoise burrows (Fish and Wildlife Service, 2010). There are no fire or vegetation treatments (i.e., plan objectives) proposed for the Desert Communities PNV in any of the alternatives.

### **Regionally Sensitive Species**

The Regional Forester's sensitive species program is the Forest Service's dedicated initiative to conserve and recover plant and animal species according to Agency policy found at FSM 2670. The Prescott NF improves habitat and restores ecosystems for sensitive species through vegetation treatments and management practices. Sensitive species are those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by the following:

- Significant current or predicted downward trends in population numbers or density; and
- Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

The Regional Forester's sensitive species list from 2007 was updated in 2013. Between draft and final versions of this EIS additional analysis was conducted for several species new to the list. Table 14 reflects the 2013 list of regionally sensitive species that are known or are likely to occur in terrestrial habitats within the planning area.

The occupied acreage estimates reported in table 14 are based upon the habitat elements within potential natural vegetation types (PNVTs) or habitat features that meet the life history requirements of the species.

**Table 14. Regionally sensitive species occupied habitat**

Common Name	Scientific Name	Status	Habitat Extent on the Prescott NF
<i>Animals:</i>			
American peregrine falcon	<i>Falco peregrinus</i>	Sensitive	Rock features – cliffs/ledges: 8,829 acres
Northern goshawk	<i>Accipiter gentilis</i>	Sensitive	Ponderosa pine forests: 54,011 acres
Pale Townsend’s big-eared bat	<i>Corynorhinus townsendii pallescens</i>	Sensitive	Rock features – cliffs/ledges: 8,829 acres
<i>Plants:</i>			
Greene milkweed*	<i>Asclepias uncialis</i>	Sensitive	Grasslands: 202,004 acres
Hualapai milkwort	<i>Polygala rusbyi</i>	Sensitive	Grasslands: 202,004 acres; also Verde Formation
Metcalfe’s ticktrefoil	<i>Desmodium metcalfei</i>	Sensitive	Ponderosa pine forests: 54,011 acres
Flagstaff beardtongue*	<i>Penstemon nudiflorus</i>	Sensitive	Ponderosa pine forests: 54,011 acres Limestone and sandstone outcrops
Rock fleabane*	<i>Erigeron saxatilis</i>	Sensitive	Rock features – cliffs/ledges: 8,829 acres
Flagstaff pennyroyal	<i>Hedeoma diffusum</i>	Sensitive	Rock features – cliffs/ledges: 8,829 acres
Mt. Dellenbaugh sandwort	<i>Arenaria aberrans</i>	Sensitive	Moist, north-facing slopes
Eastwood alum-root	<i>Heuchera eastwoodiae</i>	Sensitive	Moist, north-facing slopes
Tonto Basin agave	<i>Agave delamateri</i>	Sensitive	Cobbly ridges/hills
Phillips’ agave	<i>Agave phillipsiana</i>	Sensitive	Cobbly ridges/hills
Arizona phlox	<i>Phlox amabilis</i>	Sensitive	Cobbly ridges/hills
Mearns sage	<i>Salvia dorrii ssp. mearnsii</i>	Sensitive	Cobbly ridges/hills; also Verde Formation

Common Name	Scientific Name	Status	Habitat Extent on the Prescott NF
Heathleaf wild buckwheat	<i>Eriogonum ericifolium</i>	Sensitive	Verde Formation: 5,249 acres
Ripley's wild buckwheat	<i>Eriogonum ripleyi</i>	Sensitive	Verde Formation: 5,249 acres
Verde breadroot*	<i>Pediomelum verdiensis</i>	Sensitive	Verde Formation: 5,249 acres

\*Species added to Regionally sensitive species list between DEIS and FEIS

### Rock Features - Cliffs/Ledges

*Associated Species* – American peregrine falcon (*Falco peregrinus*), Pale Townsend's big-eared bat (*Corynorhinus townsendii pallascens*), Rock fleabane (*Erigeron saxatilis*) and Flagstaff pennyroyal (*Hedeoma diffusa*).

*Distribution/abundance* – **American peregrine falcon** breeds in western North America. Most breeding in Arizona occurs on the Mogollon Rim, Grand Canyon, and Colorado Plateau (Arizona Game and Fish Department, 2002b). Known breeding is reported for the Prescott NF. Two nest sites near Thumb Butte and Granite Mountain are monitored on-forest; the last confirmed fledging of young occurred in 2006.

The geographic range for **Pale Townsend's big-eared bat** extends from southern California, east to western Texas, and south to northern Mexico. In Arizona, the species is widespread (Arizona Game and Fish Department, 2003f). This species appears to be relatively common at suitable roosting sites on the Prescott NF. Abandoned mines used by **Townsend's big-eared bats** occur on all three ranger districts, with the majority of them on the Bradshaw RD.

**Flagstaff pennyroyal** is endemic to Coconino, Mohave, Pima, and Yavapai Counties, Arizona, with 56 occurrences. The total distribution range is 290 miles; in south-central Coconino County there are 43 occurrences, ranging 24 miles; in northeast Mohave County, there is 1 occurrence; in northern Pima County there is 1 occurrence; and in northeastern Yavapai County, there are 20 occurrences, ranging 18 miles (Arizona Game and Fish Department, 2003d). The remaining five records have insufficient locality data. Populations of **Rock fleabane** are less abundant being endemic to Coconino, Gila, and Yavapai Counties, Arizona.

*Habitats* – Suitable habitat in Arizona for **American peregrine falcon**, and **Townsend's big-eared bat** consists of steep, sheer cliffs and ledges to caves and mines. Suitable habitats for the Prescott NF were derived by modeling slope associated with digital elevation models (DEMs), with slopes greater than 65 percent selected to represent cliffs and ledges. Approximately 8,829 acres of cliffs and ledges habitat are estimated for the Prescott NF.

**Flagstaff pennyroyal** and **Rock fleabane** prefer shaded cliffs and ledges within canyons and on rock outcrops.

*Risk Factors* – Primary threats to rock features, such as cliffs and ledges, include some sort of human presence or activity that either alters the character or nature of the features or, by mere presence, renders the features unavailable for a particular species' use such as nesting, roosting, or rooting. Site-specific plant and animal species needs would be addressed where the types of

human activity in or on these rock features are regulated through permit, which defines appropriate operating parameters for the activity relevant to the purpose and the resources of concern. There are no proposed treatments or management actions (i.e., plan objectives) relevant to these habitat features in any of the alternatives.

### **Ponderosa Pine Forests**

*Associated Species* – Northern goshawk (*Accipiter gentilis*), Metcalfe’s ticktrefoil (*Desmodium metcalfei*), and Flagstaff beardtongue (*Penstemon nudiflorus*).

*Distribution* – In North America, **goshawks** breed throughout most forested areas, from Alaska east to eastern Canada, south to New England, and in southern New Mexico and northern Mexico (NatureServe, 2010). In Arizona, goshawks are found in high, forested mountains and plateaus statewide, usually above 6,000 feet elevation (Arizona Game and Fish Department, 2003e). On the Prescott NF, six to eight sites were monitored from 2002 to 2005, with nine post-fledgling family areas (PFAs) monitored in 2009. Successful fledgling at monitored sites has been low.

**Metcalfe’s ticktrefoil** has a wide range from Arizona to New Mexico and south into Sinaloa, Mexico, ranging over 800 miles. There are 15 documented occurrences in Arizona including 1 locality in southern Coconino County and 1 in southern Yavapai County. The one occurrence in Yavapai County is southeast of Crown King in the Bradshaw Mountains on the Prescott NF.

**Flagstaff beardtongue** ranges from western New Mexico (Sandoval and Bernalillo counties) to most of central and northwestern Arizona (Apache, Coconino, Gila, Navajo, and Yavapai counties). Several specimens have been collected from the Prescott NF.

*Habitats* – **Northern goshawk** nesting habitat consists of mature and old growth forest stands with relatively high canopy closure. The northern goshawk is associated with the ponderosa pine PNVTs and tree features for every aspect of its life history from nesting, to roosting, to foraging. Goshawks are known to occur on all three of the ranger districts of the Prescott NF including areas near Mingus Mountain, Camp Wood, Prescott Basin, and Crown King. Existing nesting habitat for this species is estimated at 50,489 acres, consisting of ponderosa pine stands with medium and large trees with open and closed canopies. Existing foraging habitat for goshawks includes approximately 3,522 acres of seedling/sapling and small trees with open canopies in both ponderosa pine PNVTs.

Populations of **Metcalfe’s ticktrefoil** tend to occur within ponderosa pine forests along washes, in substrates that include limestone, granite, and limy shale. Elevation ranges between 2,700 feet and 8,000 feet with a mean elevation of 5,350 feet.

**Flagstaff beardtongue** is found on scattered limestone and sandstone outcrops within ponderosa pine forests with relatively undisturbed habitats that include alligator juniper, Gambel oak, and blue grama. Elevation ranges from 4,500 to 7,000 feet.

*Risk Factors* – Primary threats to **northern goshawks** include activities that remove older, larger trees and simplify stand structure; removal of dead and down trees; and stand-replacement wildfire. Management concerns also include grazing that reduces or eliminates understory vegetation and human disturbance during nesting (Arizona Game and Fish Department, 1999).

Most populations of **Metcalfe’s ticktrefoil** and **Flagstaff beardtongue** are recorded from habitats where fire is common, but the effects of fire on the species are not well known. One

population of **Flagstaff beardtongue** has responded favorably to low intensity prescribed fire on the Kaibab NF. Both species are at risk from trampling by livestock or off road vehicle use.

### Grasslands

*Associated Species* – Hualapai milkwort (*Polygala rusbyi*) and Greene milkweed (*Asclepias unicalis*)

*Distribution/abundance* – **Hualapai milkwort** is endemic to Maricopa, Mohave, and Yavapai Counties, Arizona, with 91 occurrences documented. The total distribution range is 237 miles; in north Maricopa County, there are 4 occurrences, ranging 15 miles; in central Mohave County, there are 5 occurrences, ranging 19 miles; and in northeast and central Yavapai County, there are 78 occurrences, ranging 102 miles. Twenty occurrences for the species are spread over the Prescott NF, ranging 50 miles; there are 6 occurrences in the vicinity of Cottonwood and 14 in the vicinity of Paulden.

**Greene milkweed** occurs over a large geographical area (Wyoming to New Mexico), but it is currently only known from about 25 to 30 localities. In Arizona, it is known from Coconino, Pima and Santa Cruz Counties. It exhibits a natural rarity and low population sizes. There are no documented surveys for the species in Yavapai County (Dr. Marc Baker, personal communication 2014). Greene milkweed can be easily overlooked by surveyors, due to its extremely small size, early bloom period, and the lack of widespread botanical focus.

*Habitats* – Populations of **Hualapai milkwort** tend to occur in grasslands and on ridgetops and open mesas with substrates including powdery gypsiferous limestone of tertiary lakebed deposits (Verde Formation), red-wall limestone, and limestone-sandstone. **Greene milkweed** is most commonly associated with grasslands, growing on lower hill slopes and at the base of mesas, canyons, and bluffs in areas within or adjacent to madrean evergreen woodland communities. It is most often found on bare, open patches of soil between clumps of grasses within these habitats.

*Risk Factors* – **Greene milkweed** does not tolerate competition from weedy annuals. Its responses to fire and grazing are unknown, but it may not tolerate factors that cause general habitat degradation. There are few threats to populations of **Hualapai milkwort** within the Prescott NF. Severe degradation of grasslands caused by overgrazing is the most viable threat, followed by off-road vehicle damage. At least some populations of the species occur in areas of the Verde Formation, and thus, should be included within the conservation of that habitat.

### Moist, North-facing Slopes

*Associated Species* – Mt. Dellenbaugh sandwort (*Arenaria aberran*) and Eastwood alum-root (*Heuchera eastwoodiae*)

*Distribution/abundance* – **Mt. Dellenbaugh sandwort** is endemic to Apache, Coconino, Gila, Mohave, and Yavapai Counties with 29 documented occurrences. The total distribution range is 257 miles. In central Coconino County, there are 7 occurrences, ranging 53 miles, and in central Yavapai County there are 13 occurrences, ranging 62 miles. Six locations are found on the Prescott NF ranging 29 miles, with three locations within 1 mile of each other.

**Eastwood alum-root** is endemic to Coconino, Gila, Maricopa, and Yavapai Counties, Arizona, with 50 documented occurrences. The total distribution range is 158 miles; in east-central Coconino County, there is 1 occurrence; in north, central, and west Gila County, there are 4

occurrences, ranging 70 miles; in east Maricopa County, there is 1 occurrence; throughout Yavapai County, there are 43 occurrences, ranging 98 miles. Thirty-three occurrences for the species are widespread over the Prescott NF, ranging 49 miles.

*Habitats* – Populations of these species tend to occur on north and northeast-facing slopes and along ridges; with substrates including basalt, granite, Quaternary alluvial, rich organic soil, and sandy soils. Elevation ranges between 4,200 feet and 7,870 feet with a mean elevation of 6,035 feet.

*Risk Factors* – Most populations are recorded from habitats where fire is common, but the effects of fire on the species are unknown. Being primarily herbaceous, these plants are probably grazed by cattle; however, they often occur in microhabitats that are inaccessible to livestock.

### **Cobbly Ridges/Hillsides**

**Associated Species** – Tonto Basin agave (*Agave delamateri*), Phillips' agave (*Agave phillipsiana*), Arizona phlox (*Phlox amabilis*), and Mearns sage (*Salvia dorrii* ssp. *mearnsii*).

*Distribution/abundance* – Populations of **Tonto Basin agave** are largely clonal and thought to have originally been cultivated by pre-European cultures (Hodgson, 1999). The species is endemic to Coconino, Gila, Maricopa, Pinal, and Yavapai Counties, Arizona, with 103 documented occurrences. The total distribution range is 112 miles. In Coconino County, there are 4 localities in the southern portion, ranging only 3 miles; and in Yavapai County, there are 36 occurrences in the eastern portion, ranging 37 miles. Five locations are listed for the Prescott NF ranging 38 miles, with two locations within 5 feet of each other.

Populations of **Phillips' agave** are largely, if not entirely, clonal and were likely brought into the region as cultivars (Hodgson, 2001). The species is endemic to Yavapai, Coconino, and Gila Counties, Arizona, with 38 documented occurrences. The total distribution range for *Agave phillipsiana* is 195 miles. In Coconino County, there are 15 localities in the northwest portion ranging 35 miles; in Yavapai County, 21 localities in the northeast to the south-central portion, ranging 55 miles. Individuals per site vary from one to several with probably fewer than 100 individuals known for the species.

Within the Prescott NF, clones of this species occur primarily south of Wilhoit along the Hassayampa River and its tributaries. Twelve occurrences are spread over a distance of less than 3 miles, with some within 130 yards of one another.

**Arizona phlox** is endemic to Coconino, Maricopa, Mohave, and Yavapai Counties, Arizona, with 52 occurrences listed. The total distribution range is 230 miles; throughout Coconino County there are 17 occurrences, ranging 170 miles; in north Maricopa County, there is 1 occurrence; in north central Mohave County, there are 7 occurrences, with a range of 100 miles; and throughout Yavapai County, there are 27 occurrences, ranging 81 miles. Nine occurrences for the species are known across the Prescott NF, ranging 46 miles. Arizona phlox are probably common in Prescott NF, but the similarity between it and its close relatives makes identification very difficult. It differs from its closest relative only in the length of its stamens and styles.

**Mearns sage** is endemic to Yavapai County, Arizona, with 74 occurrences documented. The total distribution range for Verde Valley sage is 42 miles; with 38 occurrences of the species spread over Prescott NF, ranging 38 miles; 29 occurrences are near Paulden; and 9 occurrences are in the vicinity of Cottonwood.

*Habitats* – These species occur on cobbly ridges and hillsides in open areas, with substrates that include cobbly granite, limestone, sandstone, basalt rocks, or mixtures of sandstone and limestone alluvium. Elevation ranges between 1,200 feet and 8,970 feet with a mean elevation of 3,650 feet.

*Risk Factors* – Primary threats to the species occupying cobbly ridges and hillsides include some sort of human presence or activity that alters the character or nature of the feature such as heavy equipment disturbance or off-highway vehicle activity. At least some populations of Mearns **sage** occur in areas of the Verde Formation, and thus, should be included within the conservation of that habitat.

### **Verde Formation**

*Associated Species* – Heathleaf wild buckwheat (*Eriogonum ericifolium*), Ripley's wild buckwheat (*Eriogonum ripleyi*) and Verde breadroot (*Pediomelum verdiensis*) occur exclusively on Verde Formation soils within the Prescott NF; Mearns sage and Hualapai milkwort, as previously described, also occur in the Verde Formation but not exclusively.

*Distribution/abundance* – **Heathleaf wild buckwheat** is endemic to Mohave and Yavapai Counties, Arizona, with 25 documented occurrences. The total distribution range is 136 miles, with 1 locality in the northern portion of Mohave County and the remaining 22 localities in the eastern portion of Yavapai County, ranging 19 miles. One location is in the White Hills, southeast of Cottonwood on the Prescott NF. In terms of number and distribution of populations, this may be the rarest species that occurs on the Prescott NF.

**Ripley's wild buckwheat** is endemic to Maricopa, Mohave, and Yavapai Counties, Arizona, with 44 occurrences listed. The total distribution range is 200 miles; in north-central Maricopa County, there are 7 occurrences, ranging 6 miles; in northern Mohave County, there is 1 occurrence; and in northwest and east-central Yavapai County, there are 28 localities, ranging 100 miles. The remaining eight collections have insufficient locality data. Six occurrences for the species are spread over the Prescott NF ranging 25 miles, with five within 1 mile of each other and all within the Verde Formation.

**Verde breadroot** is known to occur in Arizona at four sites in Coconino County and 12 sites in Yavapai County. Eight locations are known on the Prescott NF all within the Verde Formation.

*Habitats* – The Verde Formation is composed of tertiary lakebed deposits of powdery, calcareous, and gypseous soils from secondary deposition of limestone and dolomite alluvium, often mixed with red-brown clayey and sandy soils. Areas of the Verde Formation within the Prescott NF are limited in both acreage and geography, occurring along the easternmost boundary of the forest. Elevation ranges between 3,500 feet and 5,807 feet with a mean elevation of 4,635 feet.

*Risk Factors* – Since individuals are restricted to the Verde Formation, the areas in which plants occur are restricted geographically. Plant densities tend to be low on these soils, with few large shrubs and cacti, making the sites attractive to off-highway vehicles. Outside of the Prescott NF, the Verde Formation habitat is threatened by gypsum quarries, urban development, utility rights-of-way, and off-highway vehicle use. Combinations of these land uses threaten the viability of populations on forest.

## **Migratory Birds and Eagles**

### **Background**

Section 3(e) of Executive Order (EO) 13186 requires Federal agencies to design migratory bird habitat and population conservation principles into Agency plans and planning processes and coordinate with other agencies and non-Federal partners in planning efforts.

The viability analysis process described in the “Terrestrial Species Viability” section included consideration of the U.S. Fish and Wildlife Service National Birds of Conservation Concern (BOCC) in accordance with the International Migratory Bird Act. The BOCC species that either migrate through or breed in the planning area were determined from lists associated with U.S. Fish and Wildlife Service Bird Conservation Regions (BCR). The Prescott NF is associated with three BCRs (Fish and Wildlife Service, 2008a). Ecosystem components (including vegetation type and structure and water availability) were evaluated for sustainability and were primary factors used to determine a species’ viability. All species were evaluated in the coarse filter/fine filter evaluations, and viability risks were determined from availability and condition of individual species’ habitat, population evaluation, and effects from Prescott NF management actions.

Under the authorities of 50 CFR Part 22, the bald eagle and golden eagle are protected by the Bald and Golden Eagle Protection Act of 1962 (Eagle Act) (P.L. 87-884) and the Migratory Bird Treaty Act of 1918 (MBTA) (16 U.S.C. 710). The MBTA and the Eagle Act protect bald and golden eagles from a variety of harmful actions and impacts. The U.S. Fish and Wildlife Service developed National Bald Eagle Management Guidelines to advise land managers under what circumstances the protective provisions of the Eagle Act may apply to their activities. A variety of human activities can potentially interfere with eagles, affecting their ability to forage, nest, roost, breed, or raise young. The guidelines are intended to help minimize such impacts to bald eagles, particularly where they may constitute “disturbance,” which is prohibited by the Eagle Act.

The Eagle Act, as amended, prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs.

The act provides criminal and civil penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle.. [or any golden eagle], alive or dead, or any part, nest, or egg thereof.”

The act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” “Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available:

- injury to an eagle;
- a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or
- nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if upon the eagle’s return, such alterations agitate or bother an eagle to a degree that

injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

**Table 15. Migratory bird and eagle species analyzed**

Common Name	Scientific Name	Status	Habitat Extent on the Prescott NF
Migratory birds	60 species	MBTA	Varies by species
Bald eagle	<i>Haliaeetus leucocephalus</i>	Sensitive, Eagle Act	3,356 acres
Golden eagle	<i>Aquila chrysaetos canadensis</i>	Eagle Act	8,829 acres

### Migratory Birds

Sixty species of migratory birds are expected to occur or could potentially occur within the various habitats (PNVTs) or habitat features associated with the Prescott NF. Fourteen species of migratory birds are addressed in detail commensurate with their status associated with Federal or Forest Service designation. Habitat types and features associated with the remaining 46 species are also addressed and considered in the “Prescott National Forest Plan Revision Terrestrial Wildlife Specialist Report” (Forest Service, 2011e).

### Eagles

**Golden eagles** typically nest in rock outcrops or on ledges on cliffs. Suitable habitats for the Prescott NF were derived by modeling slope associated with digital elevation models (DEMs), with slopes greater than 65 percent selected to represent cliffs and ledges. Approximately 8,829 acres of cliffs and ledges habitat are estimated for the Prescott NF. The only confirmed nest is on the north side of Woodchute Mountain with suitable habitat occurring on all three districts of the Prescott NF. They forage primarily within 8 to 12 square miles of the nest site. Typical prey includes medium sized mammals including jack rabbits, ground squirrels, and prairie dogs. Other prey may include turkeys, new born ungulates, or domestic pets. Projects occurring in the upland portions of the landscape may present occasions for impacts to golden eagles including disturbance from machinery, people, smoke, and animals. Most impacts or changes would occur within foraging habitat. Changes to foraging habitat would simply change the available prey for golden eagles and would not be considered to “disturb” eagles enough to warrant a “take.”

**Bald eagles** are known to occur along the Verde River on the Verde and Chino Valley Ranger Districts and at Lynx Lake on the Bradshaw Ranger District. In the winter months, bald eagles roost along the Verde River as well as on the slopes adjacent to Goldwater Lake, a city of Prescott park surrounded by Prescott NF land. Bald eagles are primarily tied to nesting or roosting near water, their primary foraging habitat for waterfowl and fish. They are also known to be opportunistic scavengers. Water in the arid southwestern habitats of the Prescott NF also attracts numerous people for various recreation activities. Due to the limited availability of water associated habitats, occasions for eagle-human conflicts are present year round.

### Management Indicator Species

#### Background

The National Forest Management Act (NFMA) regulations require that “Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired nonnative

vertebrate and invertebrate species in the planning area.” The 2012 Planning Rule adopting the 1982 Planning Rule provisions to implement the NFMA requires that management indicator species (MIS) be identified as part of the forest plan. MIS serve multiple functions in forest planning: focusing management direction developed in the alternatives, providing a means to analyze effects among alternative on biological diversity, and serving as a reliable feedback mechanism during forest plan implementation. The latter is accomplished by monitoring population trends in relationship to habitat changes (1982 Planning Rule Provisions 219.19 (a)(6)).

Management indicator species (MIS) is a concept adopted by the Agency to serve, in part, as a barometer for species viability at the planning area level. The role of MIS in meeting viability mandates complements that of several other approaches, particularly management of sensitive species.

The Prescott NF followed the process and procedures outlined for MIS selection in the “Forest Level Analysis of Management Indicator Species” (Forest Service, 2010b). **Pronghorn antelope** was chosen an indicator because it demonstrates a strong and/or predictable response to proposed management activities within the grasslands PNVTs including prescribed fire; shrub and tree thinning/removal; road and/or trail maintenance; and watershed or rangeland improvements. By monitoring pronghorn habitats and populations, the health and productivity of grassland ecosystems can be assessed. **Northern goshawk** was chosen as an indicator because it demonstrates a strong and/or predictable response to proposed management activities within the ponderosa pine PNVTs including prescribed fire; timber harvest; shrub and tree thinning/removal; and road and/or trail maintenance. By monitoring Northern goshawk habitats and populations, the health and productivity of ponderosa pine forest ecosystems can be assessed. Also chosen as an indicator were **Aquatic macro-invertebrates** (see the “Management Indicator Species” section in “Need for Change 4”).

**Table 16. Management indicator species and occupied habitat**

Common Name	Scientific Name	Management Indicator	Current Habitat Extent on the Prescott NF
Pronghorn Antelope	<i>Haliaeetus leucocephalus</i>	Grassland PNVTs	202,004 acres
Northern Goshawk	<i>Accipiter gentilis</i>	Ponderosa pine PNVTs medium/large trees	50,489 acres nesting
Northern Goshawk	<i>Accipiter gentilis</i>	Ponderosa pine PNVTs seedling/sapling, small/open	3,522 acres foraging
Aquatic Macro-invertebrates <sup>1</sup>	<i>Suite of species</i>	Perennial streams	193 miles

<sup>1</sup> See the “Aquatic and Riparian Species Viability” section in “Need for Change 4.”

**Pronghorn**

*Distribution* – Pronghorn antelope are distributed from southeastern Washington, west to western North Dakota, south through Nevada and eastern Colorado to northern Mexico (O’Gara, 1978). In Arizona, they are found in the north-central portion of the State, with small herds scattered also in

the southeast (Arizona Game and Fish Department, 2009b). This species is described as common on the Prescott NF.

*Habitats* – Herds in north-central Arizona are found in a variety of grassland habitats, ranging from desert grasslands to forest and mountain meadows (Arizona Game and Fish Department, 2009b). Development of private lands has removed primary habitat and forced herds into less favorable habitats where predation rates are higher. Overall population trends on the forest vary among hunt units, but based on data compiled from AZGFD surveys for hunt units encompassing the herds on the Prescott NF, pronghorn numbers appear to be decreasing (Forest Service, 2010b).

Pronghorn habitat includes grassland dominated portions of the Semi-Desert, Great Basin, and Juniper Grassland PNVTs where shrub/tree cover is less than 10 percent. Existing habitat is estimated at 202,004 acres.

*Risk Factors* – Movement and population interactions are limited by fencing and highway development. Habitat loss is occurring due to urban development. Tree and shrub encroachment into grasslands is impacting habitat quality (Arizona Game and Fish Department, 2009b).

### **Northern Goshawk**

*Distribution* – In North America, **goshawks** breed throughout most forested areas, from Alaska east to eastern Canada, south to New England, and in southern New Mexico and northern Mexico (NatureServe, 2010). In Arizona, goshawks are found in high, forested mountains and plateaus statewide, usually above 6,000 feet elevation (Arizona Game and Fish Department, 2003e). On the Prescott NF, six to eight sites were monitored from 2002 to 2005, with nine post-fledgling family areas (PFAs) monitored in 2009. Successful fledgling at monitored sites has been low.

*Habitats* – **Northern goshawk** nesting habitat consists of mature and old growth forest stands with relatively high canopy closure. The northern goshawk is associated with the ponderosa pine PNVTs and tree features for every aspect of its life history from nesting, to roosting, to foraging. Goshawks are known to occur on all three of the ranger districts of the Prescott NF including areas near Mingus Mountain, Camp Wood, Prescott Basin, and Crown King. Existing nesting habitat for this species is estimated at 50,489 acres, consisting of ponderosa pine stands with medium and large trees with open and closed canopies. Existing foraging habitat for goshawks includes approximately 3,522 acres of seedling/sapling and small trees with open canopies in both of the ponderosa pine PNVTs.

All 14 prey species listed for the northern goshawk in the “Management Recommendations for Northern Goshawks” (MRNG) (Forest Service, 1992) are associated with medium/large tree vegetative structural stages. Medium/large trees are important habitat components to 13 of the 14 prey species for maintaining sustainable populations. Canopy openings are important for maintaining sustainable populations for 8 of the 14 prey species listed in the MRNG. Herbaceous and shrub components are important for 13 of the 14 prey species. Ten of the 14 prey species listed in the MRNG are associated with early seral stages including seedling/saplings and small trees. All 14 prey species need an interspersed of vegetative structural stages to maintain sustainable populations.

*Risk Factors* – Primary threats to **northern goshawks** include activities that remove older, larger trees and simplify stand structure; removal of dead and down trees; and stand-replacement wildfire. Management concerns also include grazing that reduces or eliminates understory vegetation and human disturbance during nesting (Arizona Game and Fish Department, 1999).

## Environmental Consequences

### Federally Listed Species

**Table 17. Federally listed species habitat trends by alternative**

Species	Trends	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Mexican Spotted owl	Existing: 26,448 acres	Decreases to 25,507 acres	Decreases to 22,564 - 25,016 acres Increase in habitat quality and features			
Sonoran desert tortoise	Existing: 5,919 acres	Stable trend: No change in habitat quality or quantity				

### Mexican Spotted Owl and Critical Habitat

#### Common to All Alternatives

*Recovery Plan Guidance* – For all alternatives, designing and implementing projects using both the revised MSO recovery plan and best available science would be expected to lead to improved habitat conditions for the species. This combination of approaches would provide the flexibility necessary to manage for the recovery of the species, which could eventually have beneficial effects for individual MSO.

All alternatives would provide the “primary constituent elements” of critical habitat including:

- a range of tree species with an average diameter greater than 12 inches;
- shade canopy covering 40 percent or more of the habitat;
- snags with an average diameter greater than 12 inches; and
- various prey species habitat components.

#### Action Alternatives B, C, D and E

All action alternatives include treatment objectives that support the attainment of desired conditions for wildlife species and their habitats. Moving the ecosystem components of the ponderosa pine-Gambel oak PNVT toward desired conditions would be expected to improve MSO habitat across the landscape. For example, desired conditions and guidelines for snags would ensure the presence of snags across the landscape. Increasing the abundance and distribution of large trees across the landscape would provide additional nesting habitat for MSO. Reducing the amount of canopy closure and increasing the amount of understory vegetation would improve habitat for MSO prey species across the landscape. Improving these two facets of the MSO habitat would be expected to have beneficial impacts to the species on the Prescott NF. Although the relative proportion of ponderosa pine-Gambel oak PNVT with medium/large trees and closed canopy slightly decreases in all alternatives, the improved quality of foraging habitat in the medium/large trees with open canopy may have an overall beneficial effect to MSO. The most important benefit of the proposed treatments within the ponderosa pine-Gambel oak PNVT is the reduced risk of high severity, landscape scale, stand-replacing wildfires that could eliminate MSO habitat.

For all of the action alternatives, in the process of implementing projects/activities, some tree habitat features would be negatively impacted for a short term. However, moving toward the desired conditions for the Ponderosa Pine-Gambel Oak PNVN would provide additional tree habitat features across the landscape as young and mid-size/age trees are cultivated to grow into larger and/or older trees in the long term.

Future site-specific projects and activities with potential to impact MSO or its habitat would be developed consistent with the direction provided in Guide-WL-1, including breeding season timing restrictions and other relevant mitigations to minimize or eliminate adverse effects to MSO and its habitat. This guideline applies to all program areas including: recreation management; transportation, minerals, or land acquisition management; rangeland management; wildland fire and fuels management; forestry and forest health; watershed and soils management; wilderness and special areas management; and wildlife, fish, and rare plants management.

The implementation of plan components related to vegetation and fire treatments, watershed and soils management, and wildlife, fish, or rare plants management may have short term adverse effects to ponderosa pine forest habitat, but would result in long term beneficial effects to maintaining or improving proposed critical habitat and species populations on the forest.

Plan components related to recreation management, and lands, minerals, transportation and special uses management may have both short- and long term adverse effects to Mexican spotted owl and Mexican spotted owl critical habitat. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for Mexican spotted owl and Mexican spotted owl critical habitat.

## **Sonoran Desert Tortoise**

### **Common to All Alternatives**

Sonoran desert tortoise habitat (i.e., Desert Communities PNVN) on the Prescott NF currently exhibits high similarity to desired conditions and is expected to remain near desired conditions over the next 40 to 80 years. No change in habitat quantity is expected from implementation of plan direction under any of the alternatives.

While Sonoran desert tortoise is protected under the ESA as a candidate species, there is no species-specific direction for the tortoise at this time. For all of the alternatives, the various guidelines for sensitive species would be expected to maintain or improve ecosystem features of the desert communities habitat associated with desert tortoise habitat needs. Sensitive species guidelines would include developing breeding season timing restrictions and other project design features to alleviate impacts from disturbance from resource management activities occurring within Desert Communities PNVN. Wildlife guidelines would provide for following current AZGFD handling guidelines for any tortoises encountered during project implementation.

The implementation of plan components related to wildland fire and fuels management, and watershed and soils management may have some short term adverse effects to Sonoran desert vegetation but would result in long term beneficial effects to maintaining habitat and Sonoran desert tortoise populations on the forest.

Plan components related to rangeland management, recreation management, transportation, minerals, or land acquisition may have both short and long term adverse effects to Sonoran desert tortoise populations. All of the alternatives would result in a “Not Likely to Jeopardize” determination for Sonoran desert tortoise.

**Regionally Sensitive Species**

**Table 18. Regionally sensitive species trends by alternative**

<b>Trend</b>	<b>Alternative A</b>	<b>Alternatives B, D, and E</b>	<b>Alternative C</b>
Habitat trends for species associated with <b>rock features</b>	No change from existing habitat of 8,829 acres		
Habitat trends for species associated with <b>ponderosa pine</b>	Projected future habitat: 62,125 to 62,761 acres An increase from existing habitat of 54,011 acres		
Habitat trends for species associated with <b>grasslands</b>	164,351 acres Decrease from existing 202,004 acres	177,486 to 196,930 acres Decrease from existing 202,004 acres	196,930 to 203,983 acres Decrease from existing 202,004 acres
Habitat trends for species associated with <b>moist, north-facing slopes</b>	No change from existing habitat acres of unknown quantity		
Habitat trends for species associated with <b>cobbly ridges /hillsides</b>	No change from existing habitat acres of unknown quantity		
Habitat trends for species associated with <b>Verde Formation</b>	No change from existing habitat of 5,249 acres		

**Common to All Alternatives**

The implementation of vegetation treatments guided by plan components; recreation management; watershed management; wildlife, fish, or rare plants management; or land acquisition in any of the alternatives may have short term indirect effects on terrestrial habitat or species populations but would produce long term benefits to the maintenance and improvement of habitats and species populations on the Prescott NF. Future projects implemented under any alternative may render a “May impact individuals, but is not likely to result in a trend toward Federal listing or loss of viability” determination.

Habitats for species associated with rock features, moist, north-facing slopes, cobbly ridges and hillsides, and the soils of the Verde Formation are not expected to change across alternatives.

For all of the alternatives, the various guidelines for sensitive species described in the “Terrestrial Species Viability” section would be expected to maintain or improve the habitats associated with species needs.

### **Alternative A**

*Species viability and diversity* – Alternative A mitigates the least amount of risk to landscape level habitat conditions using restoration methods (e.g., prescribed fire, tree and shrub thinning, brush crushing). Species associated with grasslands and ponderosa pine forests are most vulnerable because current habitat conditions in these PNVTs are the least similar to desired conditions.

Activities near plant species of viability concern would be assessed for potential impacts as site-specific projects were carried out.

### **Alternatives B, D, and E**

*Species viability and diversity* – Alternatives B, D, and E propose a range of restoration treatments to landscape level habitat conditions that equals or is greater than alternative A. Proposed average annual treatment levels range from 10,600 to 25,300 acres using managed fire and between 750 and 6,500 acres using mechanical methods across all vegetation types.

Some species depend on specific ecological characteristics such as cliffs, caves, trees, cavities, specific soils, or rock formations. Distribution of these characteristics would be retained due to guidelines. In addition, migration and other habitat for pronghorn would be improved by removing trees and brush using various treatment methods. Alternatives B, D, and E call for 15,000 to 90,000 acres of habitat improvement plus treatment of two or three areas of migration habitat. In addition, movement of pronghorn would be enhanced by modification or removal of 3 to 5 miles of fence. Alternatives B and D would improve from 3 to 15 water developments for wildlife; alternative E would improve up to 25 existing and 5 new water developments for wildlife.

Activities near plant species of viability concern would be guided by Desired Conditions and Guidelines-Plants-1 to 6.

### **Alternative C**

*Species viability and diversity* – Alternative C proposes a higher range of restoration treatments to landscape level habitat conditions than alternatives A and B. Proposed average annual treatment levels range from 15,500 to 22,800 acres using prescribed fire and between 750 and 4,000 acres using mechanical methods. More restoration activities would occur in the grasslands and ponderosa pine forests under this alternative compared to alternatives A and B.

Species distribution associated with specific ecological characteristics, such as cliffs, caves, trees, cavities, specific soils, or rock formations, would improve due to the same desired conditions and guidelines as alternative B and D. Higher emphasis would be placed on improving migration and other habitat for pronghorn. Alternative C calls for 50,000 to 85,000 acres of habitat improvement and treatment of three to six areas of migration habitat. In addition, movement of pronghorn would be increasingly enhanced by modification or removal of 10 to 15 miles of fence. Finally, from 5 to 15 water developments for wildlife would be improved as part of alternative C. These proposed additional treatments are higher than those proposed under alternative B and D.

**Migratory Birds and Eagles**

**Table 19. Migratory bird and eagle species effects by alternative**

Species	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Migratory bird species	Per MBTA, EO13186, and 2008 MOU, priority migratory bird species would be considered in any project implemented under any alternative.				
Eagle species	No programmatic “take” of eagles or their nest sites.				

**Common to All Alternatives**

**Migratory birds** – In accordance with the Migratory Bird Treaty Act, Executive Order 13186, and the MOU signed December 2008, the revised plan and its alternatives were evaluated for their effects on migratory birds. A total of 92 species of migratory birds were assessed for their potential to occur on the PNF (Forest Service, 2011s). For any projects implemented under any alternative of this plan, priority migratory bird species would be assessed in future project planning and analysis. Most birds’ habitats would be accommodated indirectly through vegetation treatments that target restoration of vegetation structure and composition. Four important bird areas (IBAs) lie near the Prescott NF (Forest Service, 2011e). Guideline-Wildlife-2 would require site-specific projects to consider these IBAs and the conservation issues for these areas in project level NEPA under the Migratory Bird Treaty Act. Habitat conditions on adjacent IBAs would be expected to improve as landscapes are restored to desired conditions.

**Eagles** – There would be no programmatic take of eagles under any of the alternatives. For alternative A, the requirement to comply with current laws would ensure that projects and activities within and adjacent to nest or roost sites would be designed to avoid causing any “take” under the Eagle Act. For alternatives B, C, and D, the wildlife guideline (Guideline-Wildlife-2) requiring design features and mitigation measures for compliance with other laws including the Eagle Act, ensures that there would not be any “take” of eagles under the Eagle Act. Implementation of Guideline-Wildlife-5 would provide additional protection of all known eagle nest sites.

**Alternative A**

**Migratory birds** – Treating the least number of acres, proposing the least recreation projects, and proposing few projects for watershed or wildlife, this alternative would have the lowest potential for disturbance impacts to migratory birds or their habitats.

**Alternatives B and E**

**Migratory birds** – Treating a moderate number of acres, proposing a moderate range of recreation projects, and proposing a moderate range of projects for watershed or wildlife, these alternatives would have more potential for disturbance impacts to migratory birds or their habitats than alternative A and less potential for impacts than alternative C.

**Alternative C**

**Migratory birds** – Treating the highest number of acres, proposing a moderate range of recreation projects, proposing a moderate range of projects for watershed, and proposing the most

projects for wildlife, this alternative would have the highest potential for disturbance impacts to migratory birds or their habitats.

**Alternative D**

**Migratory birds** – Treating a moderate number of acres, proposing the most recreation projects, and proposing a moderate range of projects for watershed or wildlife, this alternative would have a potential for disturbance impacts to migratory birds or their habitats similar to alternative B.

**Management Indicator Species**

**Table 20. Management indicator species trends by alternative**

Species	Trends	Alternative A	Alternatives B, D, and E	Alternative C
Pronghorn Antelope	Trends in species populations	Static to decrease	Static or possible increase	Probable increase
	Trends in species habitat from 202,004 acres	Decrease in quantity; some improvement in quality 164,351 acres	Slight decrease in quantity; moderate improvement in quality 177,486–196,930 acres	Slight increase in quantity; most improvement in quality 196,930–203,983 acres
Northern Goshawk	Trends in species populations	Increase in population	Greater increase in population	
	Trends in species nesting habitat from 50,489 acres	Similar increase in quantity and improvement in quality for all alternatives 62,125–62,761 acres		
	Trends in species foraging habitat from 3,522 acres	Increase in quantity; improvement in quality. 17,524 acres	Greater increase in quantity; greater increase in quality. 18,651–22,518 acres	

**Common to All Alternatives**

**Pronghorn antelope** – All alternatives include some plan direction to improve the quality of pronghorn habitat on available Prescott NF lands. As the non-Prescott NF habitat becomes less available, Prescott NF habitat for pronghorn will become more crucial to providing for the species. Improving the habitat quality and managing for their habitat needs physically, spatially, and temporally, will provide the best possible opportunity for contributing to the habitat needs for pronghorn on the Prescott NF.

**Northern goshawk** – All alternatives would provide increases in the amount and quality of goshawk habitat available on Prescott NF lands. Over the next 20 years, additional nesting habitat for the goshawk would occur from increases in the abundance and distribution of medium to large trees growing within the ponderosa pine PNVTs. Proposed vegetation treatments (Objective-5) that reduce canopy closure and increase understory vegetation would improve habitat for

goshawk prey species across the landscape. Improving these two facets of the goshawk habitat would be expected to have beneficial impacts to the species on the Prescott NF.

For all of the alternatives, the various guidelines for sensitive species would be expected to maintain or improve tree features associated with goshawk habitat needs. Sensitive species guidelines include developing breeding season timing restrictions and other project design features to alleviate impacts from disturbance from timber harvest, prescribed burning, and other resource management activities.

Salafsky et al. (2005) suggested that prey density was an important limiting factor of goshawk productivity. Later, studies showed that increased prey density resulted in increased goshawk reproduction in ponderosa pine (Salafsky, et al., 2007). Dewey and Kennedy (2001) reported that significantly heavier nestlings from nests with supplemental food had higher survival rates than nestlings in control nests. In 1996, Ward and Kennedy reported that although there was no significant difference in nestling sizes due to additional food availability, they did document higher nestling survival due to increased time spent at the nest by females which consequently provided protection from predators. Wiens et al., (2006) reported that food availability was the primary factor limiting juvenile survival and recommended forest treatments that provide forest structural conditions that allow goshawks to access their prey within breeding areas. Reynolds and others Forest Service researchers (2013) identified the importance of the grass-forb-shrub prey base and how restoring the grass-forb-shrub structural component of frequent-fire forests leads to more robust food webs for the northern goshawk.

Reducing canopy cover and increasing understory vegetation would improve habitat for goshawk prey species including small mammals and small birds across the landscape. Moving acres into the seedling/sapling and small tree vegetative structural stages would create an interspersed of structural stages across the landscape. The diversity of habitats associated with the assortment of vegetative features would support a greater selection of prey species. This would provide conditions supporting a full complement of prey species and habitat less susceptible to catastrophic fire and insect and disease impacts. By providing a diverse suite of prey species, the goshawk prey base would be more consistent and resilient to impacts from climate, disease, predation, and prey species population fluctuations.

*Implications for population trends* – All alternatives improve acres of nesting habitat for the goshawk. The difference among the alternatives is not substantial. Population trends might be expected to increase as a result of the increase in nesting habitat acres and improvement in nesting habitat conditions.

#### **Alternative A**

**Pronghorn antelope** – Alternative A continues the current management as directed in the 1987 plan. Plan direction for managing pronghorn habitats and populations is vague or generally lacking other than two guidelines directing that all water developments and fencing on NFS lands meet wildlife standards and consider local species needs.

*Implications for population trends* – This alternative improves the least acres and structures for pronghorn. Population trends are expected to remain static or possibly decline under this alternative as Prescott NF lands do not provide enough alternate habitats for pronghorn displaced from non-Forest Service lands.

**Goshawk** – Alternative A continues the current management as directed in the 1987 plan. An estimated five-fold increase in prey species habitat (seedling/sapling and small tree with openings vegetation stages) would provide an increase in goshawk nestling condition, parental protection, and juvenile survival.

*Implications for population trends* – The anticipated increase in acres and improvement in habitat quality for prey species would be expected to result in a positive population trend for the goshawk.

### **Alternatives B, C, D, and E**

**Pronghorn antelope** – For alternatives B, C, D, and E, several plan components are specifically designed to improve pronghorn habitat conditions (Objectives 25 to 27). Where suitable habitat occurs, Objective 28 would also improve pronghorn habitat quality. By following Guideline-Wildlife-3, fence specifications, fawning habitat needs, migration corridors, and general habitat improvement would be part of project design and implementation where pronghorn occur and pronghorn habitat needs on Prescott NF lands should be addressed.

*Implications for population trends* – Alternatives B and D improve moderate amounts of habitat and structures (e.g., fencing and wildlife water developments) for pronghorn habitat. Alternative E also improves a moderate amount of habitat but more structures for pronghorn habitat. Population trends might be expected to remain static or possibly increase with these alternatives as Prescott NF lands provide alternate habitat for pronghorn displaced from non-Forest Service lands. Alternative C improves the most habitat and the most structures for pronghorn. Population trends might be expected to possibly increase with this alternative as Prescott NF lands provide alternate habitats for pronghorn displaced from non-Forest Service lands.

**Goshawk** – An estimated five-fold to six-fold increase in prey species habitat (seedling/sapling and small tree with openings vegetation stages) would provide a greater increase in goshawk nestling condition, parental protection, and juvenile survival than compared to alternative A.

*Implications for population trends* – The larger increase in acres and more extensive improvement in habitat quality for prey species under alternatives B, C, D, and E would be expected to result in a more positive population trend for goshawk compared to alternative A.

### **Cumulative Environmental Consequences**

Cumulative consequences are those consequences of foreseeable activities on non-Prescott NF lands that, in conjunction with management activities likely to occur on the Prescott NF, may intensify, negate, improve, or otherwise affect the vegetation types and species' habitats of the Prescott NF. Below are considerations of consequences of activities that will likely occur on adjacent or nearby ownerships to the Prescott NF and their corresponding effects listed by species.

#### **Common to All Alternatives**

**Mexican spotted owl** – Private lands are interspersed with Prescott NF lands that contain restricted habitat and protected activity centers (PACs). Activities including residential development, mining, and timber harvest have occurred on private lands and are expected to continue at some level, thereby elevating the importance of Prescott NF lands in providing

suitable MSO habitat. Private, State, and BLM Federal lands located outside, but adjacent to, the Prescott NF appear to lack potential suitable MSO habitat. Three national forests are adjacent to the Prescott NF and contain suitable habitat and designated critical habitat within the Basin and Range-West Recovery Unit (Tonto NF) and Upper Gila Recovery Unit (Coconino, Kaibab, and Tonto NFs). The Kaibab and Coconino NFs are currently undergoing analysis for forest plan revision. Regulatory requirements under ESA and NMFA apply, thereby ensuring adequate levels of MSO habitat.

**Sonoran desert tortoise** – Occurrence and known range of Sonoran desert tortoise in Arizona occurs largely outside Prescott NF lands, which contains only one recorded observation of this species and less than 6,000 acres of desert habitat. Lands containing suitable habitats within the distribution of this species in Arizona are under a wide variety of ownerships (Arizona Game and Fish Department, 2010b). Those in proximity to the Prescott NF include portions in private, State, BLM, and the Tonto NF. Status and future condition of habitats on private lands are unknown. The species is classified as Tier 1A (species of greatest conservation need) by the State of Arizona and managed by BLM as a sensitive species (Bureau of Land Management, 2010); therefore, it receives management consideration on lands under both jurisdictions. The species is managed as regionally sensitive species on the Tonto NF; therefore, this species' habitats and populations are expected to be maintained.

**American peregrine falcon** – Since the nationwide ban on DDT, the threat of pesticide impacts to this species has decreased, and populations show increases in Arizona over the past several decades. Distribution of recorded peregrine falcon breeding is scattered across most of Arizona, with exception of the southwest corner of the State (Corman and Wise-Gervais, 2005). Land ownership where nesting occurs varies widely among Federal and non-Federal entities, with breeding reported for Kaibab, Coconino, and Tonto NFs in addition to the Prescott NF (Arizona Game and Fish Department, 2002b). Current and future status of disturbance at potential roost sites on non-Federal lands is unknown. Because the species has management status (regionally sensitive species) on adjacent national forests, it is expected that some level of protection from disturbance of known nest sites would occur on these lands.

**Northern goshawk** – Distribution of recorded goshawk breeding is restricted mainly to upper elevation forested portions of the State, with most concentrated on the Kaibab Plateau and Mogollon Rim (Corman and Wise-Gervais, 2005). Land ownership where nesting has been reported is largely associated with national forest lands. Because the species has management status on adjacent national forests, it is expected that habitat maintenance as well as protection from disturbance of known nest sites would occur on these lands.

**Pale Townsend's big-eared bat** – Townsend's big-eared bat roosting habitat is scattered throughout central Arizona and is expected to occur on both Federal and non-Federal lands outside the Prescott NF. Inventory and remediation of abandoned mines that pose a potential safety and water quality hazard is identified as a management priority on BLM lands in Arizona, including priorities identified within the Hassayampa watershed (Bureau of Land Management, 2010). Townsend's big-eared bat roosting habitat is also expected to occur on adjacent national forest lands that include the Kaibab, Coconino, and Tonto NFs. The Kaibab and Coconino NFs are currently undergoing forest plan revision and have considered Townsend's big-eared bats during the revision process. Because this is a regionally sensitive species applicable to all three national forests, management consideration would be provided to preclude a trend toward Federal listing.

**Pocketed free-tailed bat** – Distribution of this species as described by Hoffmeister (1986) indicates that the Prescott NF is located at the northern extent of this species' range in Arizona. Lands to the east, west, and south of the Prescott NF consist of non-Federal, BLM, NPS, and FS ownerships. The species has been reported on NPS lands and is listed as a BLM sensitive species in Arizona (Bureau of Land Management, 2010) and FS sensitive species for the Prescott and Tonto NFs. Current and future status of disturbance at potential roost sites on non-Federal lands is unknown. Because the species has management status on adjacent Federal lands, it is expected that some level of protection from disturbance of known sensitive roost sites would occur on these lands.

**Plain's harvest mouse** – Distribution of this species' observations as displayed by Hoffmeister (1986) indicates that plains harvest mouse distribution in Arizona is patchy, with potential isolated populations. Sightings in central Arizona are restricted to central and eastern portions of Yavapai County. Areas outside the Prescott NF containing potential habitat include non-Federal, BLM, and Coconino NF lands. Portions of historical habitat in Chino Valley have been converted for agriculture, residential, or urban development, thereby decreasing habitat availability. Structural condition of Semi-Desert Grassland vegetation on BLM and Coconino NF lands are likely to be similar to those described for the Prescott NF with increased shrub and tree component. Because the plains harvest mouse is a Southwestern Region Regional Forester's Sensitive Species known to occur on the Coconino NF, it is expected that provisions to support species habitats and populations will be included as elements of forest plan revision.

**Verde Formation plants** – Land ownership of the soils forming the Verde Formation is primarily private with some State and Federal ownership including the Prescott and Coconino NFs. Habitat conservation efforts on Federal lands that would reduce the risk of gypsum mines, pipelines, power poles, and nonnative invasive plants threats within the Verde Formation would be beneficial for the species that occur there.

## Need for Change 2

*Retain or improve watershed integrity to provide desired water quality, quantity, and timing of delivery.*

This section summarizes the current hydrological environment and soil conditions on the Prescott NF and the consequences to each of implementing the revised plan or its alternatives. It has been organized by the concerns identified in "Need for Change 2" in chapter 1. These include avoiding impacts to watershed function from recreation and management activities; restoring or maintaining the function of riparian areas, seeps, and springs; improving water quality and quantity for municipal watersheds and wildlife habitat; and improving watershed resilience to changes in climate. The full analysis can be found in the "Prescott National Forest Plan Revision EIS Hydrology and Soils Specialist Report" (Forest Service, 2011f). Initial findings reported in the "Ecological Sustainability Report" (Forest Service, 2009a) on the sustainability and risks to watersheds within the planning area are also included as part of this effects analysis.

## Background

Watershed integrity is a measure of a watershed's functional capacity. The functional conditions of a watershed affect the water quality, quantity, and timing of delivery downstream. In addition to the surface flow that sustains riparian and aquatic habitats, functioning watersheds also recharge the groundwater that feeds seeps and springs. Watershed condition on the Prescott NF

varies depending on the amount of disturbance that has occurred within the area and the effect of the disturbance on the natural integrity of the sub-watershed as a whole. Human-caused disturbances that can adversely affect a watershed’s condition within the Prescott NF include location of National Forest System (NFS) and non-system roads, trails, recreation sites, grazing, prescribed fire, and timber harvest. The severity of effects is influenced in part by the local terrain, fire regime, precipitation, and potential geological hazards. Changes in watershed condition are reflective of changes in the long term reliability of a watershed to provide the expected water quality and quantity.

In response to a 2006 review of the Forest Service watershed program, a National Watershed Condition Team was formed to develop a nationally consistent, science-based approach to classify the condition of all NFS watersheds and to develop outcome-based performance measures for watershed restoration. The result was the six-step Watershed Condition Framework. The Watershed Condition Classification (WCC) system (Forest Service, 2011o) is the first step in this process.

The WCC system uses 12 watershed condition indicators to assess and classify the overall state of each sub-watershed. These indicators and their attributes represent the underlying factors that affect soil and hydrologic function. Most of the indicators can be affected through management actions to maintain or improve watershed condition. This structure provides for a direct linkage between the classification system and management or improvement activities the Forest Service conducts on the ground.

Each of the individual indicators were assessed and then all were combined to produce an overall score which falls into one of three classes:

- Class 1 - Functioning watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning properly.
- Class 2 - At-risk watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning at risk of impairment.
- Class 3 - Impaired watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning in an impaired condition.

The Prescott NF land base falls within portions of eight sub-basins; each sub-basin is comprised of a number of watersheds, and watersheds are further divided into sub-watersheds. The Prescott NF overlaps with portions of 22 watersheds and 127 sub-watersheds. The hierarchical relationship of these hydrologic units is displayed below in table 21.

**Table 21. Hierarchy of hydrologic units intersecting with the Prescott NF**

River Basin 3 <sup>rd</sup> level	Sub-basin 4 <sup>th</sup> level	Watersheds 5 <sup>th</sup> level	Sub-watersheds 6 <sup>th</sup> level
Bill Williams River	Big Sandy	1	3
	Burro Creek	2	3
	Santa Maria	2	16
Verde River	Big Chino Wash	4	25

River Basin 3 <sup>rd</sup> level	Sub-basin 4 <sup>th</sup> level	Watersheds 5 <sup>th</sup> level	Sub-watersheds 6 <sup>th</sup> level
	Upper Verde	5	34
	Lower Verde	1	7
Lower Gila / Agua Fria Rivers	Agua Fria	5	30
	Hassayampa	2	9
	<b>Totals</b>	<b>22</b>	<b>127</b>

Prior analysis for the “Ecological Sustainability Report” (Forest Service, 2009a) was performed at the sub-basin and watershed levels. The watershed analysis for the forest plan revision supplemented this analysis with data from the newer dataset developed for the WCC system, which uses the sub-watershed hydrologic unit as the basis for observing and tracking changes in watershed conditions over time.

Ninety-seven of the 127 sub-watersheds were analyzed, and of these, 5 are made up entirely of National Forest System lands and another 32 are at least 90 percent administered by the Forest Service. They vary from about 7,000 to over 48,000 acres in size, although in many cases, only a portion covers the Prescott NF.

**Table 22. Overall condition class ratings on the Prescott NF**

Condition Class	Number of Watersheds	Number of Sub-watersheds	Forest Service Acres	Non-FS Acres	Total Acres
1 - Functioning	1	12	147,564	171,151	318,715
2 - At Risk	21	83	1,076,526	618,247	1,694,773
3 - Impaired	0	2	32,407	18,405	50,812

Source: Forest Service, 2011f and Forest Service, 2011p

As shown above (table 22), 86 percent of the 97 sub-watersheds were rated overall as being in an at-risk condition. At the next higher scale, 21 of the 22 watersheds also received an overall at-risk rating, the exception being Lower Big Chino.

In 4 of the 21 at-risk watersheds, there has been a decline in the number of aquatic species that were historically present (table 23). Native fish populations within the Lower Colorado River sub-region have experienced declines in their distribution because of loss or modification of habitat, and from competition and predation by introduced nonnative species. Only 9 of the 15 native fish species known to historically occur in the sub-region currently occur within the Prescott NF.

**Table 23. Aquatic species no longer present**

Sub-basin	Watershed	Historically Occurring Species No Longer Present
Agua Fria	Ash Creek/Sycamore Creek	Gila topminnow northern Mexican gartersnake
Upper Verde River	Cherry Creek	Colorado pikeminnow Loach minnow Razorback sucker Spikedace
	Grindstone Wash	Colorado pikeminnow Razorback sucker
Lower Verde River	Fossil Creek	Gila trout

Source: Forest Service, 2009a

## Impairments from Recreation and Management Activities

### Affected Environment

The individual watershed condition indicators in the WCC system that best reflect the consequences of recreation use and management are: riparian/wetland vegetation, roads and trails, and soils. The indicators soils, fire regime or wildfire, forest cover, and rangeland vegetation best illustrate the effects of management activities such as prescribed fire use, vegetation treatments, and livestock grazing. The water quality condition indicator is also influenced in part by the recreation use and management activities on the Prescott NF and is examined in further detail in the “Water Quality” section in “Need for Change 2.”

All 97 sub-watersheds were rated on these indicators using the same three classes as the overall assessment: functioning, at-risk, or impaired. Table 24 below shows the number of sub-watersheds in each condition class for the condition indicators most closely associated with recreation use and management activities. The definitions for each assessment class are provided in the discussion of the indicators below. For a more complete discussion of the watershed condition classification process and the indicators used, please reference the “Watershed Condition Classification Technical Guide” (Forest Service, 2011o).

**Table 24. Sub-watershed conditions by selected WCC indicator**

Condition Class	WCC Indicator						
	Water Quality	Riparian Vegetation	Roads and Trails	Soils	Fire Regime	Forest Cover	Rangeland Vegetation
Functioning sub-watersheds	68	28	0	6	3	39	2
At-risk sub-watersheds	23	52	12	46	91	4	34
Impaired sub-watersheds	6	17	85	45	3	54	61

Source: Forest Service, 2011p

Recreation use on the Prescott NF tends to be concentrated in areas with a close proximity to surface water. Such concentrated use typically results in the trampling and collapse of streambanks, damage to riparian vegetation, and soil compaction, leading to increased rates of erosion and sedimentation.

As shown in table 24, the riparian/wetland vegetation condition indicator rated approximately 30 percent (28 of 97) of the sub-watersheds as functioning, 54 percent as at-risk, and about 16 percent as impaired. Properly functioning riparian/wetland areas contain needed vegetation to stabilize streambanks, reduce erosion and improve water quality, filter sediment, improve groundwater recharge, provide habitat, and support biodiversity. In those at risk, disturbance partially compromises the properly functioning condition of native vegetation attributes in riparian corridors or along wetlands and water bodies. In the impaired sub-watersheds, a large percent of the native vegetation attributes along riparian corridors, wetlands, and water bodies are not functioning properly.

Roads—and to a lesser extent, trails—are the most significant source of increased sediments into stream channels on the Prescott NF. Hard surface roads create linear features with impermeable surfaces that have low roughness. Many roads and trails on the Prescott NF are located in proximity to surface water and concentrate runoff into these drainages, increasing sediment transport, and reducing infiltration rates. The extent of these impacts on the Prescott NF has been captured in the WCC roads and trails condition indicator which rated 12 of the 97 sub-watersheds (12 percent) as being at-risk (table 24). In these sub-watersheds, there is a moderate chance that the stream channels and flows, sediment amounts, water quality, and riparian conditions have been substantially altered due to the density and distribution of the roads and trails. The remaining 88 percent were rated as impaired, meaning that there is a higher probability that the hydrologic conditions have been substantially altered by the roads and trails.

As noted above, unmanaged recreation use can contribute to the degradation of soil conditions through erosion, compaction, and displacement. Degraded soil conditions can contribute to poor ratings for other watershed condition indicators such as water quality, riparian or rangeland vegetation, and forest cover due to increased sedimentation and the inability to support vegetation.

Findings from the ESR analysis (Forest Service, 2009a) shows that the uplands within 15 of the 22 watersheds have reduced watershed condition integrity due to departed soil conditions (table 25). The problem is compounded in five of these watersheds by departed conditions for upland vegetation.

**Table 25. Reduced watershed condition integrity**

<b>Sub-basin</b>	<b>Watershed</b>	<b>Reduced Watershed Integrity Due to Soil or Vegetation</b>
Agua Fria River	Ash Creek / Sycamore Creek	Soils
	Bishop Creek	Soils
Big Chino Wash	Lower Big Chino Wash	Soils
	Lower Partridge Creek	Soils
	Middle Big Chino Wash	Both
	Williamson Valley Wash	Soils
Big Sandy River	Muddy Creek	Both
Burro Creek	Boulder Creek	Both
	Upper Burro Creek	Both
Santa Maria River	Sycamore Creek	Soils
	Cherry Creek	Soils
	Granite Creek	Both
Upper Verde River	Grindstone Wash	Soils
	Hell Canyon	Soils
	Sycamore Creek	Soils

Source: Forest Service, 2009a

In addition to the watershed scale analysis, the soils were evaluated by PNVT for the ESR. It was determined that about 48 percent of the soil on the Prescott NF was functioning properly (i.e., within its ecological capability to sustain biological productivity, maintain environmental quality, and promote plant and animal health), and its ability to sustain outputs was high. Thirty-five percent of the soil was classified as impaired, with a reduced ability to function properly, and 17 percent was in unsatisfactory condition, meaning that it was unable to sustain outputs or naturally recover from impacts (table 26).

The greatest extent of soil in satisfactory condition was found within the Interior Chaparral PNVT (287,055 acres). In contrast, the three Piñon-Juniper PNVTs (Piñon-Juniper Evergreen Shrub, Piñon-Juniper Woodland, and Juniper Grassland) comprising more than half of the acreage on the Prescott NF, have a relatively low percentage of satisfactory soil conditions. The Juniper Grassland component has the greatest extent of soil in unsatisfactory condition for any vegetation type (85,110 acres), and the Piñon-Juniper Evergreen Shrub component has almost 278,000 acres classified as impaired or unsatisfactory, the most of any PNVT. Additionally, the grassland PNVTs (Semi-Desert Grassland and Great Basin Grassland) contain approximately 150,000 acres of soil in impaired or unsatisfactory condition (table 26).

**Table 26. Soil Conditions by PNVT**

Potential Natural Vegetation Type	Total Acres	Satisfactory Soil Condition	Impaired Soil Condition	Unsatisfactory Soil Condition
All PNVTs	1,247,328	48%	35%	17%
Semi-Desert Grassland	125,712	11%	85%	4%
Great Basin Grassland	38,389	<1%	46%	54%
Juniper Grassland	137,274	13%	25%	62%
Piñon-Juniper Evergreen Shrub	463,296	40%	46%	14%
Interior Chaparral	315,445	91%	8%	<1%
Ponderosa Pine-Evergreen Oak	63,539	92%	8%	<1%
Ponderosa Pine-Gambel Oak	49,052	90%	10%	<1%
Piñon-Juniper Woodland	36,263	25%	45%	30%
Desert Communities	5,919	57%	43%	<1%
Riparian Gallery Forest	12,439	20%	54%	26%

Source: Forest Service, 2009a; and EIS table 3

The analysis for the ESR examined the soil conditions associated with the different PNVTs and focused on soil productivity. The analysis for the WCC system employed a different methodology that examined conditions at the sub-watershed scale and considered erosion and contamination in addition to soil productivity. In the WCC analysis, functioning soils were defined as showing minor or no alteration to reference soil condition, including erosion, productivity, and chemical characteristics. For those at risk, a moderate amount of alteration to reference soil condition is evident and the overall soil disturbance is characterized as moderate. Impaired soils display significant alteration to reference soil condition and the overall soil disturbance is characterized as extensive.

Using the WCC indicator for soils, only 7 percent of the sub-watersheds (representing 3 percent of the acreage) were rated as functioning, 47 percent were rated at-risk, and 46 percent were rated impaired (table 24). The greater extent of at-risk and impaired soils in the WCC compared to the extent of impaired and unsatisfactory soils in the ESR analysis reflects the different methodology and definitions used. The additional factors of erosion and contamination considered in the WCC analysis are important factors in evaluating the health of the soils and help to provide a more complete representation of conditions at the sub-watershed scale.

Soils may respond to high-intensity fires by becoming hydrophobic (i.e., water repellent), thereby reducing the potential for water infiltration into the soil and increasing overland flow. The fire regime or wildfire indicator addresses the potential for altered hydrologic and sediment patterns due to altered fire frequency and severity. Three percent of the sub-watersheds were rated as functioning, 94 percent were rated at-risk, and 3 percent were rated as impaired for this indicator. The functioning sub-watersheds have a low likelihood of losing defining ecosystem components because of the presence or absence of fire. The likelihood rises to moderate for at-risk sub-watersheds and to a high likelihood for those classified as impaired.

The forest cover condition indicator rated 40 percent of the 97 sub-watersheds as functioning, 4 percent as being in at-risk condition, and 56 percent as impaired (table 24). These ratings are based on the amount of land in the sub-watershed that is cut over, denuded, or deforested. For functioning sub-watersheds, this is less than 5 percent; for at-risk sub-watersheds, it is between 5 and 15 percent. Impaired sub-watersheds are those where more than 15 percent of the land is deforested. Extensive loss of forest cover affects runoff, erosion, sediment supply, bank stability, large woody debris retention, and stream temperature relationships.

The rangeland vegetation indicator showed that 63 percent of the sub-watersheds were impaired and 35 percent were at-risk (table 24). Only two of the 97 sub-watersheds were deemed functioning for this indicator. This indicator addresses impacts to soil and water relative to the vegetative health of rangelands. In sub-watersheds that have been rated as impaired for rangeland vegetation, the composition of the vegetation has been greatly reduced or unacceptably altered compared to the natural potential of the area. In areas rated as at-risk, the vegetation has a slight to moderate deviation from natural potential.

## **Environmental Consequences**

### **Common to All Alternatives**

All of the alternatives propose both wildland fire and mechanical vegetation treatments that would benefit watershed integrity. The common impacts to watershed integrity from vegetation management activities include soil erosion, soil compaction, sedimentation, interruption in the timing of peak flows, and increased water yield in sub-watersheds. The degree of impact depends on site-specific features such as the erosion potential of the soil, steepness of slopes, susceptibility to slope movement or landslides, and spatial extent and intensity of the activity. The short term impacts on the watershed condition from these activities can often be mitigated and are outweighed by the long term benefits from the improvements to the structure and composition of the vegetation and the reestablishment of a disturbance regime. The restoration of desired vegetation conditions contributes to improved water quality, and thus, improved aquatic habitat quality by reducing the amount of runoff and associated sedimentation and turbidity. Sedimentation and turbidity can degrade the quality of the existing and potential aquatic and riparian habitat and work against habitat restoration and species recovery efforts.

Livestock grazing has occurred in this area since the late 1800s (Forest Service, 2009a). Both cattle and sheep have grazed portions of the Prescott NF; however, there is currently no permitted sheep or goat grazing on the forest. Historic grazing levels have been documented to be a source of impact to water resources (Wildeman and Brock, 2000). Site-specific concerns, including impacts to riparian areas and springs, currently exist. These impacts include erosion, sedimentation, soil compaction, loss of wildlife and fish habitat, decreased water quality, and lowered water tables. When the impacts of livestock grazing range are substantial, modifications in the timing or amount of grazing activity can reduce the overall impact in critical areas. Currently active grazing allotments do not vary across alternatives, and all alternatives are evaluated with the same set of desired conditions.

The number of vacant allotments that are retained for potential restocking does not vary by alternative. Any actual reissuance of permits to restock any of the retained vacant allotments will be evaluated through site-specific NEPA analyses. Because vacant allotments that are retained have not been used for many years and will not be restocked without further analysis, there is no change in the risk from grazing to watershed resources from the forest plan decision.

**Alternative A**

Alternative A continues the current management as directed in the 1987 plan. Current trends would restore the fewest acres using managed fire and mechanical vegetation treatments, and produce an increase in the backlog of maintenance needs on trails. The result would be the slowest rate of improvement in watershed function among the alternatives and no plan emphasis for watershed restoration. The rate of progress in addressing vegetation structure and recreation impacts under alternative A is slower than the rate at which these impacts to the watershed have been accumulating. It can be reasonably assumed that in the absence of a change in management direction these impacts will continue to accumulate into the future.

The goals in the 1987 plan for providing for increased waterflow via large-scale chaparral removal (e.g., Battle Flat project) are outdated but would remain in place under alternative A. Vegetation manipulation such as chaparral removal can increase streamflow, but research has shown that it takes extensive vegetation manipulation to increase water yield, and that the increase is predominantly during flood events (Schmidt and Wellman, 1999 from Forest Service, 2008a). Projects such as the Battle Flat treatment represent an inefficient approach toward improving watershed integrity that is not enough to reverse the decline in watershed function on the forest.

The current levels of prescribed burning and mechanical vegetation treatment have been inadequate to affect a recovery in watershed function across the forest. Most of the sub-watersheds on the forest are currently in an at-risk condition and the continuation of management direction under alternative A would not provide the guidance necessary for measurable improvement.

Areas displaying current poor conditions for soil and forest cover such as Grindstone Wash and Hell Canyon watersheds in the Upper Verde sub-basin would be unlikely to recover function. Watersheds with a substantial number of sub-watersheds in at-risk or impaired condition, such as Williamson Valley Wash in the Big Chino Wash sub-basin, would likely trend downward into further impairment. Static and downward trending watershed conditions would complicate efforts to provide habitat for, and maintain viable populations of, federally listed aquatic and riparian species.

Assessment for the WCC also shows that Grindstone Wash is in an at-risk condition for riparian/wetland vegetation. Due to its popularity, unmanaged dispersed camping in this area could be reasonably expected to trend this condition from at-risk to impaired for some or all of the sub-watersheds. Further loss of riparian vegetation function could contribute to accelerated erosion, leading to more sedimentation, increased turbidity, and reduced water quality.

**Alternative B**

The vegetation restoration objectives in alternatives B and E (Objectives 1 to 5) contain guidance that would increase the use of both wildland fire and mechanical treatments on the forest compared to alternative A, which in turn would improve the condition of sub-watersheds. Conditions indicators for soils, forest cover, and rangeland vegetation, which all have over 50 percent of their watershed acreage classified as impaired, could all be reasonably expected to trend upward as a result of increased vegetation management. The vegetation treatments in alternatives B and E would improve watershed integrity more than alternatives A and D but less than alternative C.

The higher range of piñon-juniper acres treated in alternatives B and E Objective 3 could benefit Grindstone Wash and Hell Canyon watersheds in the Upper Verde sub-basin in particular. Both of these watersheds contain a high percentage of piñon-juniper vegetation types (89 and 98 percent, respectively) as well as an impaired rating for soil in all of their sub-watersheds. They also each contain a high percentage of acres rated as impaired for forest cover and rangeland vegetation. Vegetation treatments in piñon-juniper types can reduce tree and shrub density and canopy cover to levels that allow for the creation of openings for the establishment and growth of perennial grasses and forbs. As these vegetative communities recover with annual treatments, soils would move toward a satisfactory condition. As organic matter and ground cover increase, the three primary soil functions of stability, hydrology, and nutrient cycling would recover in these treated areas. Improvements in vegetation and soil conditions would improve the quality of the potential habitat for Colorado pikeminnow and razorback sucker populations, aiding any future reintroduction efforts.

Alternatives B and E also provides guidance to double the number of acres of grassland on which wildland fire is used for treatment (Objectives 1 and 2), compared to alternative A. The Cherry Creek watershed in the Upper Verde sub-basin, which contains approximately 30,000 acres of Semi-Desert Grasslands, stands to benefit the most from this increase as all seven sub-watersheds within Cherry Creek have been rated impaired for rangeland vegetation. The increase in treatment acres could be expected to trend the rangeland vegetation indicator toward better conditions as the restoration of the desired fire regime would encourage grass recovery and restore ground cover for the inhibition of invasive plant species.

Black Canyon Potential Wilderness Area is located within this watershed and would be recommended for designation under this alternative. Within recommended wilderness areas, there may be concerns about the ability to perform vegetation management. Mechanical treatments in these areas are implemented at the discretion of the forest supervisor and should be consistent with the preservation of the wilderness character of the area.

Watershed conditions would also benefit from more active management of dispersed recreation in alternative B, which would reduce erosion and sedimentation from poorly maintained trails, improve stream or drainage crossings, and lessen the amount of soil compaction and vegetation loss in riparian areas. The recreation guidance in alternative B would improve watershed integrity more than alternatives A, C, and E but less than alternative D.

Alternative B would reduce the impacts to watershed integrity from dispersed recreation use. The alternative would provide direction (Objective 8) to create new designated dispersed camping areas outside of the Prescott Basin in locations where soil compaction and vegetation loss are occurring due to recreation use. The potential location that stands to benefit the most would be Grindstone Wash watershed, near the upper Verde River in the Upper Verde sub-basin. The functional condition of the riparian vegetation in all six sub-watersheds has been compromised by disturbance. By containing dispersed camping within designated sites, managers can target mitigation efforts to reduce the amount of soil compaction and vegetation loss in this and other areas and trend the vegetation toward a properly functioning condition.

Alternative B would also provide stronger direction to reduce the impacts to watershed integrity from trail use (Objectives 16, 17, 20, and 22). In 85 of 97 sub-watersheds analyzed, there is a high probability that stream channels and flows, sediment amounts, water quality, and riparian conditions have been substantially altered due to the density and distribution of the roads and

trails. The reduction of the trails maintenance backlog would be emphasized, as would specific projects targeted toward mitigating road and trail impacts on watershed integrity, such as rehabilitating unauthorized roads or trails and improving stream and drainage crossings.

The watersheds that would most benefit from these actions would be Williamson Valley Wash in the Big Chino Wash sub-basin and Sycamore Creek watershed in the Santa Maria River sub-basin. Both of these watersheds have over 90,000 acres rated impaired on the roads and trails condition indicator. Alternative B and the other action alternatives would provide a greater emphasis on managing motorized recreation in this area than is contained in current direction. These watersheds are located in the Williamson Valley South Management Area, where the primary focus is on motorized recreation opportunities. Motorized recreation focused projects could mitigate the effects of increased surface flow due to the increase of hard surface area within a watershed. This mitigation could reduce peak flow during high-intensity rain events and help to regulate the timing of water delivery by increasing infiltration rates and groundwater recharge. These types of projects could also improve water quality by controlling erosion and reducing soil loss into watercourses, thereby decreasing turbidity.

### **Alternative C**

Alternative C is similar to alternatives B and D in the protections and benefits provided to watershed integrity (Objectives 18 to 22). They differ in emphasis, with alternative C focusing more on the restoration of vegetation and habitat and less on recreation. The result is that, among the three action alternatives, alternative C would have the greatest long term benefit on vegetation and wildlife habitats but the least reduction of recreation impacts. It would improve watershed integrity the most of all of the alternatives.

Alternative C proposes almost three times as many acres of fire treatments in the grassland vegetation types as alternatives B, D, and E (Objectives 1 and 2). The emphasis is placed on those vegetation types that currently show the greatest gap between the existing and desired conditions. Although overall soil conditions for the pine vegetation types are generally satisfactory, the grassland vegetation types show a large percentage (92 percent) in impaired or unsatisfactory condition as determined by the ESR analysis (Forest Service, 2009a). This would provide the most benefit to the Ash Creek/Sycamore Creek watershed in the Agua Fria sub-basin, Cherry Creek watershed in the Upper Verde sub-basin, and Lower Big Chino watershed in the Big Chino Wash sub-basin due to their high percentage of acres (19 to 34 percent) in grassland and generally poor soil conditions as rated by the WCC indicator. Condition indicators for soils, fire regime, forest cover, and rangeland vegetation could all be reasonably expected to trend upward in these watersheds as a result of the increased treatments.

Overall, alternative C would provide the greatest potential improvement due to vegetation management. This would entail more soil recovery and improved watershed function in the grassland than the other alternatives and at least as much improvement in the piñon-juniper vegetation types as alternatives B, D, and E (Objective 3). There would be no concerns about vegetation management actions in potential wilderness as there are no areas recommended for designation in alternative C. The greater long term benefits would come at the cost of increased short term disturbance, but recovery from prescribed fire is expected to occur within 3 to 5 years.

The Ash Creek/Sycamore Creek watershed in the Agua Fria sub-basin contains 3 miles of occupied critical habitat for the endangered Gila chub (Forest Service, 2011i). Expected

improvements in the Ash Creek/Sycamore Creek watershed conditions under alternative C could contribute more than any of the other alternatives to the maintenance of viable populations of Gila chub.

Grindstone Wash watersheds in the Upper Verde sub-basin contain about 28 miles of unoccupied critical habitat for the listed razorback sucker, loach minnow, and spikedace, and there are over 3 more miles of historic habitat in the Cherry Creek watershed in the Upper Verde sub-basin (Forest Service, 2011i). The expected improvements in these watersheds could improve the quality of potential habitat and contribute more than any of the other alternatives to the maintenance of viable populations of razorback sucker, loach minnow, and spikedace.

Alternative C provides the same direction as alternatives B and D to improve stream crossings and reduce impacts to watersheds from roads and trails (Objectives 16, 17, 20, and 22), but places less of an emphasis on reducing the maintenance backlog on trails (Objective 9). Alternative C also contains the same direction as alternative B and E with regard to designating dispersed camping areas (Objective 8). The consequences to watershed integrity from alternative C would be similar to those from alternative B but would differ in that there would be a smaller reduction in the erosion and sedimentation caused by poorly maintained trails. It is expected that trail maintenance projects that contribute to improvements to watershed integrity would be given priority, but alternative C would only reduce the trail maintenance backlog by 35 to 50 percent over 10 years, compared to a 50 to 70 percent reduction under alternatives B and D. Thus, alternative C would provide more recreation mitigation than alternatives A and E but less than alternatives B and D.

#### **Alternative D**

As noted above, alternative D is similar to alternatives B and C in the protections and benefits provided to watershed integrity (Objectives 18 to 22). Alternative D focuses more on recreation and less on the restoration of vegetation and habitat. The result is that it would have similar long term benefits to vegetation and wildlife habitats as alternative B but would provide more mitigation for recreation impacts. Alternative D would improve watershed integrity more than alternative B but less than alternative C.

Alternative D proposes the same minimum levels of vegetation treatment as alternative B, but the upper ends of the treatment ranges for the piñon-juniper and chaparral vegetation types are lower (Objectives 3 and 4). The effect would be that any particular watershed may be less likely to receive a vegetation treatment. As with alternative B, Grindstone Wash and Hell Canyon watersheds could still be the most likely to benefit due to their high percentage of piñon-juniper vegetation types and impaired rating for soil in all of their sub-watersheds. Fritsche B and Muldoon Potential Wilderness Areas are located within these watersheds and would be recommended for designation under this alternative. Within recommended wilderness areas, management actions such as vegetation treatments are implemented at the discretion of the forest supervisor and should be consistent with the preservation of the wilderness character of the area.

The consequences with respect to recreation impacts would be similar to alternative B, with a greater reduction in the soil compaction, vegetation loss, erosion, and sedimentation caused by dispersed recreation. Alternative D contains the same direction as alternatives B and C to improve stream crossings and reduce erosion and sedimentation from roads and trails (Objectives 16, 17, 20, and 22), and places the same emphasis on reducing the maintenance backlog on trails as

alternative B (Objective 9). However, under alternative D there would be guidance to create more designated dispersed camping areas and improve more trailheads (Objectives 8 and 11). This could result in a greater increase in watershed integrity as more areas are managed to mitigate the soil compaction and vegetation loss associated with unregulated dispersed camping.

Grindstone Wash watershed also contains Muldoon Potential Wilderness Area. Under alternative D, Muldoon would be recommended for wilderness designation, and management actions would be implemented at the discretion of the forest supervisor. Vegetation treatments in the areas that could indirectly improve the quality of razorback sucker, loach minnow, and spokedace habitat might not be authorized if they are deemed incompatible with the wilderness character of the area. Developed recreation facilities and designated dispersed camping sites would be precluded from the boundaries of the area because they would negatively impact the wilderness character of the area.

Alternative D also contains provisions to create new trails, decommission existing trails that are unneeded, and rehabilitate unauthorized routes that cause resource damage (Objective 17). This would benefit watershed integrity by redirecting users off of user-created trails and roads and on to system trails and roads that have been designed to accommodate use and minimize erosion. As with alternative B, the watersheds that would most benefit from these actions would be Williamson Valley Wash and Sycamore Creek (Santa Maria).

### **Alternative E**

The vegetation restoration objectives in alternative E (Objectives 1 to 5) contain the same guidance as alternative B. Condition indicators for soils, forest cover, and rangeland vegetation, which all have over 50 percent of their watershed acreage classified as impaired, could be reasonably expected to trend upward as a result of increased vegetation management. The vegetation treatments in alternatives B and E would improve watershed integrity more than alternatives A and D but less than alternative C.

As with alternative B, Grindstone Wash and Hell Canyon watersheds could benefit from the higher range of piñon-juniper acres treated in Objective 3, and the Cherry Creek watershed stands to benefit the most from the increase in wildland fire treatment in grasslands. The improvements in vegetation and soil conditions expected from these treatments would improve the quality of the potential habitat for Colorado pikeminnow and razorback sucker populations, aiding any future reintroduction efforts.

Alternative E provide the same dispersed recreation guidance in Objectives 8 and 16 as alternative B, and watershed conditions would benefit from this more active management. Objective 22 is also the same between these alternatives and would improve stream or drainage crossings and lessen the amount of soil compaction and vegetation loss in riparian areas. The consequences to watershed integrity from alternative E would differ slightly from alternatives B, C, and D due to the removal of language in Objective 9 that addresses trail deferred maintenance. This lack of emphasis could contribute to the erosion and sedimentation caused by poorly maintained trails. Overall, the recreation guidance in alternative E would improve watershed integrity more than alternative A, but less than alternatives B, C, and D.

Objective 18 in alternative E uses new language to establish the extent of the objective and clarify that the emphasis is on high-priority watersheds. Although the minimum number of projects was changed from 20 across the forest to 5 in each high-priority watershed, the intent of the objective

has not been changed, and it can be reasonably assumed that over a 10-year period this would not cause a noticeable change to the consequences described for the other action alternatives.

Alternative E provides different direction for Objective 20 than that found in alternatives B, C, and D. Whereas the other action alternatives propose maintaining or repairing 20 to 100 miles of roads or trails, alternative E focuses on repair and relocation and does not include routine maintenance towards meeting this objective. In this respect, the guidance in alternative E could be reasonably expected to trend the watershed towards desired conditions at a faster rate than the other alternatives. The Ash Creek/Sycamore Creek watershed is the largest watershed where all of the subwatersheds have been rated poor with regard to impacts from roads and trails; it would be the watershed most likely to benefit from this direction.

### **Cumulative Environmental Consequences**

Watershed integrity is affected by management activities that occur both on the Prescott NF and on adjacent land under private, State, or other Federal management. The consequences of these actions are cumulative across boundaries. These cumulative actions could produce positive results such as increased infiltration and aquifer recharge rates, as would be the case with vegetation management, or they could have negative impacts such as an increase in the rate and amount of erosion and sedimentation, as with cumulative impacts from recreation or livestock grazing. It is not possible to assess cumulative watershed effects analysis at this scale of strategic planning; however, detailed quantitative cumulative watershed effects analyses would be completed at the project level.

Reasonably foreseeable management activities on private, State, or other Federal land would be similar to vegetation management performed on the forest—prescribed burning to restore fire disturbance regimes or the thinning or removal of juniper to increase herbaceous growth—with short term impacts and long term benefits similar to those described above. Private landowners may implement these actions in conjunction with USDA Natural Resources Conservation Service (NRCS) programs to restore watershed health and function or to improve grazing lands.

Recreation and management actions pertaining to watershed restoration on adjacent national forests would also be similar to actions taken by the Prescott NF. The Coconino, Kaibab, and Tonto NFs all share common watersheds with the Prescott, and the combined and coordinated efforts in these areas would trend watersheds toward functional condition at a faster rate than current management direction. Specific management direction for these adjacent national forests can be found in their respective forest plans.

Unregulated off-highway vehicle (OHV) use on neighboring lands could increase erosion and sedimentation from poorly maintained or impromptu roads and trails. These paths are often located in riparian areas or straight up steep slopes, compounding the potential for soil displacement. Although the impacts would have little direct effect if they were downstream from the forest, they could still have a detrimental effect on the overall health of the watershed. Although there are restrictions in place for cross-country use of OHVs on adjacent national forests, there is no consistent regulation to prevent these impacts on State and private land.

## Riparian Areas, Seeps, and Springs

### Affected Environment

Riparian ecosystems comprise the transition area between the aquatic ecosystem (including the stream channel, lakebed, water, biotic community, and habitat) and the adjacent terrestrial system. Healthy riparian corridors act as buffers between these two environments, metering the water yield for late season streamflows. A reduction in the functional capability of a riparian area can lead to higher flow rates within stream channels. Higher flow rates have a greater capacity for erosion and sediment transport within the stream system, and significant increases in the volume and duration of peak flows can adversely impact channel stability and aquatic habitat. Riparian vegetation also serves to create roughness that reduces stream velocity and stabilize streambanks, thus the removal of riparian vegetation can lead to bank erosion during high streamflows (Neary et al., 2010).

There are approximately 80 miles of perennial streams on the Prescott NF. Other than the Verde River, most perennial streams experience spatially interrupted surface flow, especially during periods of drought. The climate is variable in nature, and the Prescott NF can experience consecutive years of low rainfall and extended droughts, as well as years with high amounts of precipitation and associated flooding. Observed temperature and precipitation levels are strongly correlated with altitude, with higher elevations experiencing cooler temperatures and receiving more precipitation. The combination of high-intensity rainfall events, lack of natural groundcover, and steep slopes often generates high magnitude storm events that transform stream channel morphology and associated riparian habitat.

The location of springs and seeps are a result of both precipitation and geologic structure and are generally found where an impervious geologic stratum intersects the land surface. Watersheds that receive higher amounts of precipitation and contain geologic strata with relatively low permeability (e.g., granitic/metamorphic with lower degrees of fracturing) have a higher incidence of small local springs. Lake Pleasant, Upper Hassayampa, and Big Bug watersheds in the upper portion of the Bradshaw Mountains are in this category (Forest Service, 2009a). Cherry Creek, which drains the east side of Mingus Mountain, also has a high density of springs and seeps. Watershed areas with more permeable substrates may contribute to groundwater recharge which percolates deeper at the point of infiltration and surfaces at springs a further distance from the upland areas of precipitation. In these cases, the location of the springs is often downstream from the national forest such as the Verde River headwater springs near the confluence with Granite Creek (Forest Service, 2009a).

Groundwater use on the Prescott NF is limited to special-use permittees, developed campgrounds, and administrative sites. The permittees include those who hold grazing permits and have wells, tanks, or other developed waters to support their operations. Other permits for water development have been issued to the Arizona Game and Fish Department (AZGFD) for the installation of water sources to support wildlife.

The Prescott NF has 563 springs and seeps inventoried in the National Hydrologic Dataset. Overall, at the sub-basin level the forest administers about 13 percent of the land area containing 32 percent of the known springs and seeps. Three sub-basins, the Agua Fria, Big Chino Wash, and Hassayampa, contain the majority of these hydrologic features. In the Big Chino Wash and Hassayampa sub-basins, Prescott NF land constitutes 16 percent and 13 percent of the land area, respectively, and contains 83 percent and 59 percent of the springs and seeps (Forest Service,

2009a). Within these two sub-basins, the seeps and springs are disproportionately clustered on the Prescott NF, and thus, are susceptible to cumulative effects from actions on adjacent lands.

## **Environmental Consequences**

### **Alternative A**

Alternative A would continue management under the direction set in the 1987 plan. The result would be the status quo—a situation that was identified by the public and forest managers as in need of a change. Although there is direction to restore watershed condition and improve riparian areas, there are few time specific statements of measurable results that respond to these goals.

Flood plains and wetlands would be addressed by avoiding “adverse impact to the public, Government facilities and all uses” (Forest Service, 1987, p. 14). This “adverse impact” is not defined, so it is unclear if the focus of this goal is supposed to be public safety or the health and function of the watershed. This direction appears weak and vague when compared to the direction contained in the action alternatives to the plan to “(m)aintain or enhance... water dependent ecosystem sites containing seeps and springs” in Objective 23. The focus of 1987 plan direction is reactive, not proactive, and provides no guidance for restoring current departed conditions. Under alternative A, recovery of seeps and springs would occur at a slower rate than under the action alternatives. Based on historic trends, the rate of recovery under alternative A would be equivalent to about 25 to 50 percent of the rate under the action alternatives.

The riparian area goals under current direction would include improvement and maintenance to bring all areas to a functioning condition. Although the Prescott NF has made progress toward this goal, nearly two-thirds of the sub-watersheds are classified as at-risk for riparian/wetland vegetation, and the rate of improvement has made inadequate progress toward correcting this situation. At best, alternative A would maintain the status of the 28 sub-watersheds rated functioning for the riparian/wetland vegetation condition indicator (table 24). However, lack of strong direction and time-bound objectives could lead to a further decline in the number of properly functioning sub-watersheds.

Under alternative A, riparian areas and water dependent ecosystems would not benefit from the additional protection afforded by the increased dispersed recreation management proposed in the action alternatives. The turbidity and reduced water quality that result from vegetation loss and sedimentation would continue and could reasonably be expected to increase with increased visitation. The increases in infiltration and groundwater recharge rates from the increased vegetation treatments in the action alternatives would also be absent under current direction.

### **Alternatives B, C, and D**

The objectives for riparian area and water dependent ecosystem restoration are the same for all three of these alternatives. Guidance under these alternatives would accelerate restoration activities for riparian areas, springs, and seeps by providing specific, time-bound objectives for their recovery. Between 10 and 40 percent of the impaired or at-risk riparian areas would be improved within 1 to 5 years (Objective 19), in contrast to 10 acres over 10 years under 1987 plan direction. This could result in functional improvement in up to 26 at-risk sub-watersheds, depending on the final location and intensity of the restoration activities. The number of seeps or springs maintained or enhanced over the next 10 years would at least double from the previous 10, from 12 to 25, and could be as high as 55 groundwater dependent sites (Objective 23). This

could result in improved function and a better condition class rating for impaired and at-risk sub-watersheds in the Big Chino Wash and Hassayampa River sub-basins.

These areas would also indirectly benefit from the increased recreation and vegetation management in the action alternatives. All of the alternatives would reduce the trampling of riparian vegetation and the degradation of streambanks by shifting recreation use away from these areas and on to more durable surfaces. Vegetation treatments would improve the infiltration in the treated areas which would increase the aquifer recharge rate and maintain the continuity of supply for seeps and springs. As noted above, there is no change from current management direction proposed for livestock grazing in any of the alternatives that were considered in detail.

### **Alternative E**

Alternative E, similar to the other action alternatives, would accelerate restoration activities for riparian areas, springs, and seeps by providing specific, time-bound objectives for their recovery. Objective 23 is the same in alternative E as in the other action alternatives; therefore, the effects could be reasonably assumed to be the same.

However, alternative E uses a different metric for Objective 19 than the other action alternatives, stating that the forest will “implement projects to counter 1 to 3 critical threats to riparian system functionality” rather than “improve 10 to 40 percent of improperly functioning or at-risk riparian areas.” This change was made to shift towards a proactive approach to improve riparian areas as opposed to a reactive approach. This proactive approach could result in a functional improvement for more sub-watersheds than the other alternatives, although a direct comparison of extent is not possible.

Alternative E also contains an objective (Objective 31) not present in the other alternatives that provides direction to apply for in-stream flow water rights. Securing these water rights would help to provide for channel and floodplain maintenance and the recharge of riparian aquifers, benefiting the riparian areas associated with the surface flows and the groundwater dependent seeps and springs in the surrounding areas.

### **Cumulative Environmental Consequences**

The cumulative effects of management activities and the expansion of urban populations in vicinity of the Prescott NF indicate a trend toward increased pressure to develop more groundwater resources. The results are increased risks of damage to groundwater quality, lowered groundwater tables, reduced base flows, loss of seeps and springs, and shifts in riparian species.

Water balance calculations indicate that about 1 to 2 percent of annual precipitation infiltrates and recharges the Little Chino and Big Chino aquifers, and about 4 percent of the annual precipitation is captured in the Verde Valley aquifer. This amount has probably been reduced since the predevelopment period before 1940 (Blasch et al., 2006), and continued future development in the Verde Valley and Paulden areas could further lower these recharge rates. The primary cause in this reduction would be the increase in hard surface area, leading to a loss of precipitation from increased runoff and decreased infiltration. The Big Chino aquifer has been reported as providing more than 80 percent of the flow for the Verde River headwater springs (Wirt et al., 2005). Potential groundwater withdrawals from the Big Chino aquifer authorized by the Arizona Ground Water Transportation Act, along with potential new consumptive uses in the area, could potentially and substantially affect streamflows in the Verde River and headwater tributaries.

These aquifers receive most of their recharge from higher altitudes, predominantly land administered by the National Forest System. Overdraft of the regional aquifers is occurring as groundwater outflows from all three sub-basins are greater than inflows (Arizona Department of Environmental Quality, 2009). Most groundwater use occurs outside the forest boundary but affects the groundwater within Prescott NF lands. Aquifer depletion and drawdown from private wells would cumulatively add to the minor consequence of livestock wells and developed waters on the Prescott NF that have a similar effect.

## **Water Quality**

### **Affected Environment**

Overall, the Prescott NF water quality is considered to be good to excellent. Ratings for the WCC condition indicator water quality showed approximately 70 percent (68 of 97) of the sub-watersheds were classified as functioning (table 24). In these sub-watersheds, there is little to no impairment to beneficial uses of the water bodies and no documented water quality concerns such as excessive sediment or pollution. The 23 sub-watersheds that received an at-risk rating display minor impairment to the beneficial use of their water bodies, and the 6 impaired sub-watersheds show significant impairment to beneficial uses of the water bodies.

Areas of greatest concern in the WCC analysis are the Black Canyon Creek watershed in the Agua Fria sub-basin and the Cherry Creek watershed in the Upper Verde sub-basin. However, there are stream segments within four sub-basins—Agua Fria, Hassayampa, Upper Verde, and Lower Verde—that currently do not meet State and National water quality standards and are classified by the Arizona Department of Environmental Quality as impaired. Overall trends in water quality are considered to be upward or improving.

Water quantity and timing are affected by the climate on the Prescott NF. Precipitation is generally bimodal, with most occurring during the summer monsoons and winter frontal storms. Water yield varies by sub-basin, and the watersheds associated with the Bradshaw Mountains receive proportionately more precipitation per acre than areas at lower elevations. Because of the relatively higher precipitation in the central highlands, Prescott NF lies within some of the most important water producing watersheds in Arizona. These high levels of precipitation contribute substantially to surface flows, groundwater recharge, and the maintenance of seeps and springs. In natural stream systems with a steady base flow, long term recharge is assumed to be in balance with spring and stream discharge from the aquifer. These areas also provide drinking water sources for wildlife as well as municipalities downstream. Within several watersheds of the Agua Fria, Hassayampa, and Santa Maria River sub-basins the Prescott NF lands provide a high water yield potential relative to the overall sub-basin area.

In 2008, the Arizona Department of Environmental Quality included 126 miles of stream courses (including perennial, intermittent, and ephemeral reaches) on the Prescott NF in their most recent water quality assessment. The water quality was assessed by comparing existing conditions with the desired conditions set by the State of Arizona, under authority of the Clean Water Act of 1972 (P.L. 92-500).

**Table 27. Prescott NF water quality by ADEQ assessment category**

Category	Water Quality	Miles	Percent
1	Achieved all standards	34	27
2	At least one standard achieved, others inconclusive	29 <sup>1</sup>	23
3	Insufficient data for assessment		
4	Impaired or threatened, further analysis not required	43	34
5	Impaired or threatened, further analysis is required	20	16

Source: Forest Service, 2008b

<sup>1</sup> Categories 2 and 3 were combined in reference (Forest Service, 2008b)

Approximately 34 miles (27 percent) were rated category 1, meaning that they achieved all standards. Another 29 miles (23 percent) were rated as category 2 or 3, due to a lack of data needed to determine suitability for all designated uses. Of these 29 miles, less than 4 miles did not meet standards for a designated use. Two lakes, Granite Basin Lake and Lynx Lake, are listed in the assessment as requiring additional monitoring.

The remaining 63 miles (50 percent) are classified as impaired category 4 or 5, meaning that the segment is impaired or threatened for at least one designated use and may require further analysis. Causes for impairment include metal leaching from historic mining operations in the Hassayampa River sub-basin and water turbidity in most of the Verde River between Perkinsville Bridge and the Tonto NF boundary. Remediation projects and additional assessments in these watersheds are ongoing.

## Environmental Consequences

### Alternative A

Alternative A would continue management direction under the guidance of the 1987 plan. The result would be that water quality would continue to follow the current upward trend, with no change in the rate of this improvement. There would be no expected changes to the quantity or timing of waterflows.

Site-specific remediation would continue under the direction of the current plan. These would include efforts such as the work completed in July of 2007 on Turkey Creek in the Black Canyon Creek watershed to remove tailings from the flood plain, cap tailings with vegetation, and control the escape of pollutants from shafts and adits. Ongoing remediation efforts treating the McClellur Mine tailings in the Upper Hassayampa River watershed will result in continued improvement for this category 4 area.

The result of alternative A would be that water quality issues would continue to be addressed in a reactive, site-specific manner as opposed to using a proactive strategy with plan level emphasis. Alternative A does not contain the specific guidance for mitigating road and trail impacts to watershed integrity (Objectives 16, 17, 20, and 22) as the action alternatives, and thus, would continue to improve the water quality at the current rate of progress.

### **Alternatives B, C, D, and E**

All of the action alternatives would result in an accelerated rate of improvement in the quality, quantity, and timing of water on the Prescott NF. Water quality, quantity, and timing are directly related to the condition and function of the watershed and would benefit from the plan components focused on watershed integrity and function. The current trend in improvement of water quality would be accelerated by the vegetation treatments and recreation management proposals contained in these alternatives.

On the Prescott NF, the largest contributors to water quality degradation include past mining activities, livestock grazing, roads, and ground disturbances created by inappropriate and illegal OHV use such as cross-country travel and motorized use of nonmotorized trails. There is no change from current management direction proposed for mining or livestock grazing in any of the alternatives that were considered in detail. All of the action alternatives contain guidance for mitigating road and trail impacts to watershed integrity (Objectives 16, 17, 20, and 22), and the environmental consequences were disclosed in the “Impairments from Recreation and Management Activities” section in “Need for Change 2.” As previously noted, the difference in the trail maintenance for alternative C would be negligible with regard to impact on water quality. However, Objective 9 in alternative E does not address deferred trail maintenance; therefore, it can be reasonably assumed that there would be no improvement to water quality associated with this objective in alternative E. The action alternatives also contain specific standards (Standards-Watersheds-1 to 3) protecting watersheds from gas, oil, and other contaminants to water quality. Although these contaminants are not large contributors to water quality degradation, they represent a source of contamination that can be feasibly contained.

All of these alternatives would trend toward desired conditions in upland vegetation, which would help maintain water quantity and quality and provide timing that is commensurate with natural geomorphology. In grasslands and piñon-juniper evergreen shrub vegetation types, slowing or reversing tree and shrub encroachment would result in increased herbaceous ground cover, which in turn would improve water infiltration and aquifer recharge rates. Increased infiltration helps to capture some of the water that would be otherwise lost downstream. The groundwater accumulated in the aquifer can act as a buffer, helping to even out the timing of water delivery and providing a more consistent streamflow.

### **Cumulative Environmental Consequences**

Cumulative effects include activities on the Prescott NF as well as other public and private lands. Urbanization near and adjacent to the forest can contribute to cumulative watershed effects and is of particular concern. Although development on inholdings and land adjacent to the forest has slowed recently, as economic conditions improve there will likely be renewed interest in these areas. Development has the potential to negatively affect water quality downstream through a variety of means, including runoff leading to increased erosion and sediment, pollutants from vehicles, and increased nutrient loading. However, there are also risks to water quality associated with agricultural use such as accelerated erosion, increased sediment, or biological contamination from livestock grazing in riparian areas.

The Kaibab NF completed their revised plan in February 2014, and the Coconino NF is currently revising their plan. Both of the forests have developed plan guidance to trend watersheds and water quality toward identified desired conditions, and along with the Tonto NF, are also using the “Watershed Condition Framework” to assess watershed conditions, identify priority

watersheds, and focus watershed restoration efforts. This will have a positive effect on water quality, especially in watersheds shared across boundaries with these other national forests.

## **Watershed Resilience to Climate Change**

### **Affected Environment**

Most of the watersheds on the Prescott NF are at risk of functional impairment, and restoring their health and function is crucial to strengthening their resilience. Resilience is the ability of a watershed to adapt to changes without a loss of function. In the coming years, it is expected that the Southwest will experience a shift in climatic conditions. Mean annual temperatures could increase 0.5 degrees Fahrenheit per decade, and summer heat waves could last 2 weeks or more. Winter temperatures would also be warmer, with a corresponding reduced snowpack. Overall, precipitation could decrease. Monsoon rains could arrive later in the summer, and a greater percentage of the precipitation could arrive in the form of high-intensity rain events (Forest Service, 2010a).

### **Environmental Consequences**

#### **Common to All Alternatives**

Changes in climate may directly affect watershed conditions on the Prescott NF by reducing base flows for surface waters, resulting in less water available for groundwater recharge. Changes in climate could also indirectly affect watershed conditions through an increase in the frequency and severity of wildfire or an increase in recreation use during both peak and off-peak seasons. More frequent and severe fire and increased year round recreation use would impact watershed conditions by accelerating vegetation loss, increasing erosion and sedimentation, and decreasing infiltration and aquifer recharge rates.

The treatment of Juniper Grassland and Piñon-Juniper Evergreen Shrub vegetation types would modify tree and shrub density and allow for increased herbaceous ground cover, encouraging water infiltration and improved resilience to potentially more frequent, high-intensity rain events. Modifying vegetation structure and composition to more open conditions would allow individual plants to better compete for limited water and would facilitate ecosystem transition from current to new conditions (Millar et al., 2007). Improving at-risk and improperly functioning riparian areas could benefit deep rooted riparian vegetation and improve resiliency to some flood events. The modification methods employed across all alternatives include the use of wildland fire and mechanical treatments. Landscape scale application of wildland fire enhances resistance to loss and facilitates natural (evolutionary) adaptation and migration as climate changes (Fulé, 2008; Hurteau and Brooks, 2011).

Predicted higher mean annual temperatures and milder winters could lead to a shift in vegetation patterns and open up new areas to native and nonnative invasive plant species. Of particular concern to watershed resilience is tamarisk, which is currently found in riparian areas below 3,200 feet in elevation. Tamarisk has a detrimental effect on watershed function; it out competes native riparian vegetation and reduces in-stream flow by increasing the vegetation evapo-transpiration rate. The increase in temperature could allow these plants to expand to higher elevations or to survive through the winter with more vigor. This, in turn, could lead to more sub-watersheds trending from functioning to at-risk.

Improvements to watershed function will increase the resilience of the affected ecosystems. Watersheds that are at risk of functional impairment (class 2) are less able to adapt to changes such as increased peak flows and shifts in water delivery and, in the absence of management action, are more likely to become impaired (class 3) due to these factors. Watershed improvement activities such as treatments that increase vegetative ground cover; repair of roads or trails that impact watershed integrity; or restoration and maintenance of seeps and springs would strengthen watershed function and resiliency.

#### **Alternative A**

As noted in the “Impairments from Recreation and Management Activities” section (see “Need for Change 2”), the rate of improvement in watershed function under alternative A would be the slowest among the alternatives, and there would be no plan emphasis for watershed restoration. Under this direction, resilience to climate change would not likely be emphasized. Watersheds would continue to show some improvement in function, but the rate of progress is slower than the rate at which impacts to the watershed have been accumulating. Thus, the improvements would be at greater risk of reversing due to the potential effects of climate change. Alternative A provides the least amount of resilience and capacity for plant communities to adapt to changing climate and a less aggressive strategy for treating nonnative invasive plants. It is likely that this would result in the fewest number of class 2 at-risk watersheds improving their function and may result in more watersheds becoming class 3 impaired.

#### **Alternative B**

Under alternative B, watershed conditions could be reasonably expected to trend upward as a result of increased vegetation management. All of the action alternatives have the same minimum number of acres treated in Juniper Grassland and Piñon-Juniper Evergreen Shrub vegetation types, but alternatives B and E provide direction for a higher maximum (Objective 3). They have a greater potential to improve watershed function, and thus, strengthen resilience at a quicker rate than alternatives A and D but not as quickly as alternative C. Alternative B also contains a more aggressive approach to controlling nonnative invasive plants than alternative A or alternative E (Objective 6). The result would be a greater probability that at-risk class 2 watersheds would be better able to adapt to changes such as increased peak flows and shifts in water delivery. There would also be less chance that some of these at-risk watersheds lose functionality and become class 3 impaired watersheds.

#### **Alternative C**

Alternative C could be reasonably expected to improve watershed function and resilience at the quickest rate of all of the alternatives, due to its emphasis on vegetation management and ecosystem restoration. Alternative C contains the same direction for controlling nonnative invasive plants as alternatives B and D. The result would be that alternative C has the highest probability of at-risk class 2 watersheds developing the resilience to adapt to changes such as increased peak flows and shifts in water delivery. It would also provide the lowest probability of at-risk watersheds losing functionality and becoming class 3 impaired watersheds.

#### **Alternative D**

Alternative D would provide a slower rate of improvement to watershed function than alternatives B and C but would strengthen resilience more than alternatives A and E, due to more

acres of vegetation treatment than alternative A and more mitigation of recreation impacts than either of these two alternatives. Alternative D contains the same direction for controlling nonnative invasive plants as alternatives B and C, which is more aggressive than alternatives A and E. The result would be that alternative D has a greater probability of at-risk class 2 watersheds developing the resilience to adapt to changes such as increased peak flows and shifts in water delivery than alternative A. However, it could be reasonably expected that watershed resilience would be more likely to develop, and to develop more quickly, under alternatives B or C. Under any of the action alternatives, at-risk class 2 watersheds are more likely to improve their functional condition and less likely to become impaired class 3 watersheds than under alternative A.

### **Alternative E**

Alternative E would provide the slowest rate of improvement to watershed function of the action alternatives but would strengthen resilience more than alternative A. Alternative E contains the same direction for vegetation treatments as alternative B (Objectives 1 through 5) but is less aggressive in treating nonnative invasive plants; alternatives B, C, and D direct the control or eradication of 75 to 95 percent of nonnative invasive plant species; while alternative E requires only treatment of at least 50 percent. Alternative A has no specific plan direction for the treatment or control of nonnative invasive plants. The result would be that alternative E has a greater probability of at-risk class 2 watersheds developing the resilience to adapt to changes such as increased peak flows and shifts in water delivery than alternative A but not as likely or as quickly as under alternatives B, C, or D.

### **Cumulative Environmental Consequences**

Cumulative effects take into account the actions of the Prescott NF as well as activities on other public and private lands. Changes in climate will affect both the Prescott NF and adjacent lands, and the previously mentioned cumulative factors that affect watershed integrity and function, such as vegetation treatments and recreation impacts, would also affect the resilience and adaptability of the watershed.

In addition, watershed function can also be affected by control measures, or the lack thereof, implemented on invasive plants populations on adjacent lands. A lack of tamarisk control efforts in shared watersheds creates a risk that it could spread from adjacent lands onto the forest. This could compromise watershed function and reduce ecosystem resilience and adaptability. The threat is particularly acute if the population is upstream of forest land; in-stream flow is a common method of seed transport for tamarisk and other invasive species.

### **Need for Change 3**

*Provide sustainable and diverse recreation opportunities that consider population demographic characteristics, reflect desires of local communities, avoid overcrowding and user conflicts, and minimize resource damage.*

This section addresses the issue of providing recreation opportunities that meet user expectations, and summarizes the current recreation environment on the Prescott NF and the consequences to recreation of implementing the revised plan or its alternatives. The full analysis can be found in the “Prescott National Forest Plan Revision EIS Recreation Specialist Report” (Forest Service, 2011g).

## Affected Environment

*The Prescott's unique mix of climate zones provide for "cool zone" heat relief from the Arizona sun in the summer and a "warm zone" in the winter. The forest offers short duration day use recreation on trails supported by development that provides staging areas and resource protection. Adventure activities are strategically managed to be compatible with one another to preserve the natural setting and the ecosystems of the forest.*

### *Prescott National Forest Recreation Niche*

As noted in the Prescott National Forest Recreation Niche statement (Forest Service, 2006), the mild climate encourages year round recreation on the forest. The primary activities center around day use and include viewing scenery; driving for pleasure; and trail use by off-highway vehicles (OHVs), hikers, bicyclists, and horseback riders. Most of the visitors are local, from Yavapai or Maricopa County. The majority of the forest is located within Yavapai County, and the southern portion of the forest is adjacent to Maricopa County and less than 90 miles from the Phoenix metropolitan area.

Developed sites on the Prescott NF include campgrounds, picnic areas, lake access, equestrian areas, rental cabins, and a recreational shooting range. The forest also contains almost 800 miles of both motorized and nonmotorized trails and over 100,000 acres of designated wilderness. The Prescott NF strives to offer a range of opportunities for recreation experiences. Recreation experiences are shaped by the activity performed and the setting in which it is pursued. Examples of different experiences include camping within a developed campground, driving for pleasure along a dirt road, or horseback riding within a designated wilderness. The Prescott NF cannot directly create or provide experiences, although through differences in management and level of development it can provide a range of settings in which to pursue different activities, and thus, provide the opportunity for these experiences.

## Visitors to the Prescott NF

The most recent data available indicates the Prescott NF received approximately 1,278,600 visits during Fiscal Year 2007 (Forest Service, 2009d). A majority of visitors to the Prescott NF are male (57 percent), predominately Caucasian (98 percent), and non-Hispanic (96 percent). About one-third of visitors are under the age of 16, another third are between 16 and 49, and one-third are 50 years or older. Primary activities on the forest include hiking/walking, viewing natural features/scenery, driving for pleasure, and relaxing. According to National Visitor Use Monitoring Results (NVUM) gathered in 2007 and published in 2009, the largest percentage of respondents who provided zip code information was from Yavapai County, accounting for 61 percent of the survey respondents. Twenty-six percent of the visitors were from Maricopa County, and only one percent of the visitors were from the Flagstaff area (Forest Service, 2009c). All of the other visitors were from throughout the Nation.

Visitors can find information about the Prescott NF on the forest Web site or in venues on and around the forest. Information sharing has been focused on traditional onsite and face-to-face methods of communication, and the Prescott NF has been slow to take advantage of electronic media. Visitor information, maps, and brochures are available during office hours at the district offices in Prescott, Chino Valley, and Camp Verde. In addition, there are bulletin boards and

informational signs at developed sites and a uniformed presence, in the form of staff and volunteers, throughout the forest.

### **Recreation Use on the Prescott NF**

Visitor numbers at Prescott NF developed recreation sites have remained stable or increased slightly over time. Between 2002 and 2007, information on numbers of users paying fees at developed sites ranged from a low of 204,900 in 2005 to a high of 219,300 in 2004 (Forest Service, 2009c). The developed recreation facilities have remained in good condition and between 2002 and 2010, the maintenance backlog was reduced 88 percent, from just over \$1,000,000 to just over \$120,000. However, the backlog of needed maintenance can build up as visitation increases; this is referred to as deferred maintenance. Deferred maintenance tends to accrue the quickest at developed sites that are operating at or over capacity for a majority of their season.

The current capacity of developed recreation day-use sites is adequate for the levels of visitation; almost 93 percent of visitors to developed day-use sites rated crowding as a 6 or less on a scale of 1 to 10, with 10 representing “overcrowded” and one representing “hardly anyone there.” The overnight developed sites such as campgrounds appear to be under greater pressure from visitation; only 59 percent of visitors to overnight developed sites rated crowding as a six or less on the same scale. Still, visitors to both day use and overnight developed sites generally expressed satisfaction with the facilities, with 88 percent indicating that they were either somewhat or very satisfied with the condition and cleanliness (Forest Service, 2009d).

Outside of the Prescott Basin, a person can generally camp in any location on the forest that is not a developed recreation site; this is often called dispersed camping. However, areas that are suited for camping can be limited by steep slopes, uninviting vegetation, distance to water, and lack of access. Those areas that are desirable receive high use, especially if they are near water or during weekends and holiday periods, which can lead to compaction of soils, trampling of ground vegetation, and unplanned site expansion. These types of impacts have been noted in popular areas such as Mingus Mountain, Camp Wood, the upper Verde River, and the vicinity of Yellow Jacket Creek.

In the Prescott Basin, the forest requires that camping outside of developed campgrounds only take place in designated sites. At the moment, there is not enough NVUM data available to identify a trend; however, field observations indicate increasing use of designated dispersed camping sites over the past 5 years. In addition most, if not all, designated dispersed sites are full on the weekends in the summer. This would indicate that demand may be nearing capacity, at least seasonally.

Almost 5 percent of visitors to the Prescott NF participate in fishing as their primary activity on the forest, and an additional 3 percent fish in conjunction with other activities during their visit (Forest Service, 2009d). The fishing opportunities include developed day-use sites at three lakes and access points along the Verde River for boat launching or bank fishing. Fishing opportunities have benefitted from the dredging of Granite Basin Lake and Mingus Lake in the 1990s and more recently from the tamarisk eradication projects along the Verde River between 2007 and 2010.

Participation rates for hunting on the Prescott NF are low—only one-half of 1 percent of visitors. However, hunting is considered part of the cultural tradition of the area by some participants and

was repeatedly mentioned in the community vision statements (Forest Service, 2009c). Although there are no use figures available for recreational shooting, the Prescott NF offers a developed target shooting range in the Prescott Basin. As residential development has expanded in the Prescott area, there has been an increase in public concern with noise and safety issues associated with this facility. Discussions have been raised over the discharge of firearms adjacent to residential areas and over the potential for groundwater contamination from the spent lead bullets. It is slated for closure at the end of 2014 when the current special use permit expires, and there are no plans for a replacement venue within the Prescott Basin. There have been proposals, but no plans, to develop a replacement venue in a location outside of the Prescott Basin. A new developed shooting range would continue to provide the opportunity for a recreational shooting experience on the forest and would help to reduce the safety concerns associated with unregulated target shooting.

The majority of visitors to the forest use the trails; there is high demand for desired experiences on this finite resource. The trail system on the Prescott NF includes 394 miles of nonmotorized trail and 408 miles of multiple-use trail that allows motorized access. The size of the trail system, combined with its popularity—44.5 percent of 1.27 million visitors reported hiking or walking as their primary activity (Forest Service, 2009d)—has led to a decline in the condition of the trails. From 2002 to 2010, the backlog of maintenance needed on the trails increased by 18 percent. As trail conditions deteriorate, they create safety issues for visitors and cause damage to other resources.

### **Recreation Trends on the Prescott NF**

The potential for conflict on the trails and at the trailheads is compounded by the diversity of trail users. Because of the mild climate, trail use by hikers, bicyclists, horseback riders, and off-highway vehicles occurs year round, rather than the seasonal use found on higher elevation forests (Forest Service, 2009d), and so there is no “off season” for conflict. Potential issues include horses becoming spooked by bicycles or OHVs, speed related collisions between bicycles or OHVs and other trail users, and noise impacts from motorized trail use. There can also be competition between user types for parking at trailheads, causing resentment from hikers or bicyclists toward horse or OHV trailers taking up additional space. Different user types do not have to be present at the same time for conflict to occur; often the problem is related to the perception of the impacts of another group, rather than actual interaction with other users. Examples include accelerated trail widening caused by users walking or riding abreast, increased erosion from users displacing water bars, or erosion and de-vegetation from users short cutting switchbacks. These types of impacts can be caused by any type of user but are often attributed to a conflicting use.

The forest has eight wilderness areas, comprising over 104,000 acres. Visitors to the wilderness have a similar profile to the general Prescott NF visitor—majority male (59 percent), predominately Caucasian (97 percent), and non-Hispanic (97 percent). They also tend to be older, with only about 3 percent 16 years old or younger, and 38 percent at least 50 years old (Forest Service, 2009d). Overall wilderness visitation on the Prescott NF was estimated at approximately 16,000 visits annually in 2002 and approximately 40,000 annual visits in 2007 (Forest Service, 2009c). Based on use categories developed by the Forest Service Wilderness Advisory Group, this level of visitation (2,000 to 5,000 annual visits per wilderness) is considered low use (Forest Service, 2009e). Although visitation data for individual areas are not available, field observations suggest that Granite Mountain Wilderness receives the most use due to its close proximity from

Prescott. Crowding in designated wilderness areas is not an issue; 94 percent of visitors to wilderness rated crowding as a 6 or less on a scale of 1 to 10 (Forest Service, 2009d).

There is potential for higher demand for recreation resources due to population growth in the area. Population growth in Yavapai County far exceeded the rate of increase in overall State population from 1980 to 2000 (146 percent versus 89 percent, respectively). Of the increase of 167,517 residents in Yavapai County between 1990 and 2000, 32 percent moved into Yavapai County from another place. Over the last 2 decades OHVs have become more popular for recreation; consequently, their use on the forest has increased. If not properly managed, overcrowding, visitor conflict, and resource damage could occur in many areas.

The increase in retirement age citizens may also increase the demand for age specific recreation such as more walking trails located near population centers or more motorized recreation opportunities (Cordell et al., 2002). The median age in Yavapai County was 49 in 2010 Census, up from 45 years in the 2000 Census 42 years in the 1990 Census, and it is higher than Arizona's median age of 36 years in 2010. The percentage of county residents 65 years and older is 22 percent, substantially higher than the 13 percent that they represent at the State level.

Access to forest land may be directly affected by increases in population and development. Residents who live near the forest boundary may create social trails and unintentionally create resource damage. In addition, access for forest management may be affected as lands change hands and informal agreements to use roads that cross land under non-Forest Service land ownership may require obtaining easements.

Changes in the climate could lead to increased use resulting from more people seeking heat relief during a longer, hotter, and drier summer. Climate change also increases the potential for higher winter season visitation as warmer winters and reduced snowpack allow for greater accessibility to the high country and milder temperatures in the lower elevations. This potential shift in use patterns could create a demand for different types of recreation opportunities and facilities than are currently offered on the forest.

Overall wilderness use is expected to decline by 15 percent on a per capita basis between 2006 and 2056 because of increases in population proportions for categories that are currently negatively correlated with participation in wilderness recreation. Over the next 50 years, the total number of wilderness participants is predicted to increase by 26 percent, while the Census Bureau growth predictions in Arizona are that its population will increase by 109 percent between the years 2000 and 2030 (Forest Service, 2009e). Although recreation pressure is expected to increase proportionally with population, designated wilderness on the Prescott NF is expected to experience slower demand growth than recreation in general.

## **Environmental Consequences**

The environmental consequences of the alternatives have been organized by the "Need for Change 3" in chapter 1. This includes needed improvements to recreation sites and trails, expansion of the methods for sharing information with visitors, addressing resource impacts due to dispersed recreation activities, additional areas that potentially provide wilderness character, and plan resilience to the expected outcomes of climate change. Target shooting and fishing opportunities are addressed with recreation sites. Further information about the evaluation of the potential wilderness areas is contained in the "Prescott National Forest Potential Wilderness Area

Evaluation Report” (Forest Service, 2012a), and information about the selection of recommended wilderness areas for each alternative is included in the “Prescott National Forest Plan Revision EIS Recreation Specialist Report” (Forest Service, 2011g).

### Improvements to Recreation Sites

**Table 28. Developed recreation opportunities by alternative**

Developed Recreation Opportunities	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Quantity	Decrease	Increase More		Increase Less	
Quality	Decrease	Increase			

#### Alternative A

Guidance for developed recreation in the 1987 plan (alternative A) is to operate developed sites at the standard service level and to maintain facilities in a safe and operable condition.

Although the 1987 plan recognizes a projected increase in recreation use, the direction is to maintain the capacity and improve existing facilities, rather than the development of new areas to meet future demand. It also lacks a clear definition of the “standard service level” (Forest Service, 1987, p. 18) at which developed sites should be operated. It is expected that the emphasis would be on reduction of the maintenance backlog for existing facilities. This alternative does not address the need for additional facilities, including improvements to fishing opportunities and a replacement venue for recreational shooting. If future demand surpasses the available capacity, the perception of crowding in developed facilities will increase, and levels of satisfaction could be reasonably expected to decrease. This could lead to a reduction in the quantity and an erosion of the quality of the available developed recreation opportunities on the forest.

#### Alternatives B and C

Alternatives B and C address the need to improve developed recreation facilities by continuing an aggressive reduction in the maintenance backlog and creating new developed sites to respond to anticipated shifts in demand. They also contain provisions to replace the existing shooting venue that is slated for closure, and provide direction to expand the recreational fishing opportunities on the forest. These alternatives would increase both the quantity and quality of the developed recreation opportunities on the forest by creating more capacity, improving the condition of the existing infrastructure, and expanding the range of available developed recreation opportunities.

Under these alternatives, 2 to 5 new developed recreation sites would be created on the forest within 10 years and the maintenance backlog would be reduced a further 80 to 90 percent (Objectives 7 and 9). These new sites would increase the developed recreation capacity on the forest, expand the range of developed recreation opportunities, and move the forest toward desired conditions for recreation. These desired conditions envision facilities that can adapt to expected changes in visitor demographics and demand, protect natural resources, and provide the opportunity for a clean and safe recreation experience.

In areas where unmanaged recreation is causing soil compaction or loss of vegetation, it could be expected that these additional developed sites would improve degraded watershed conditions. Developed recreation sites would improve water quality in these watersheds by shifting use to hardened surface, thereby reducing erosion, slowing soil loss, and decreasing water turbidity. Effects to other resources, such as wildlife, would be determined by site-specific analysis.

Alternatives B and C would give direction to develop a partnership with an outside group to create a new shooting range to replace the existing range that is scheduled for closure at the end of 2014 (Objective 10). A new range at a different site would address the safety concerns about encroaching development around the existing range and would continue to provide a regulated shooting venue. There is public support for a designated shooting range to help reduce the conflict caused by uncontrolled recreational target shooting on the forest.

In addition to developing a new shooting range, these alternatives direct the forest to work with partners to expand the recreational fishing opportunities at two lakes or ponds (Objective 13). These improvements would increase the quality and capacity of the fishing opportunities and reduce the potential impacts caused by unmanaged access along the shoreline.

#### **Alternative D**

Alternative D would create only 1 or 2 new developed recreation sites in the next 10 years (Objective 7). In this alternative, the emphasis of the recreation program is shifted from developed recreation to dispersed recreation. It would still provide the forest with the direction to create additional developed recreation sites to respond to changes in demand and maintain a diversity of recreation opportunities, but it would result in one or more potential developed campground areas being managed instead for designated dispersed camping. It would also continue the trend of reducing the maintenance backlog but at a slower pace so that more resources could be devoted to dispersed recreation (Objective 9).

Alternative D would increase both the quantity and quality of the developed recreation opportunities on the forest by improving the condition of the existing infrastructure and working with partners to create new venues; however, it would create less additional developed capacity than alternatives B and C. It contains the same objectives as alternatives B and C with regard to developing partnerships to promote shooting and fishing opportunities (Objectives 10 and 13), and so it is assumed that the consequences would be the same.

#### **Alternative E**

Alternative E is similar to alternative D in that it would create only 1 or 2 new developed recreation sites in the next 10 years and would reduce the maintenance backlog at a slower pace than alternatives B and C. Under alternatives D and E, the developed recreation maintenance backlog would be reduced a further 50 to 60 percent (Objective 9), compared to the 80 to 90 percent reduction in alternatives B and C.

In alternative E, Objective 10 provides direction to develop strategies for raising awareness of responsible shooting. Alternative E is similar to alternative A in that there is no direction to construct a replacement venue for recreational shooting; however, it does note that the Prescott NF would be open to entering into a partnership for a new facility. The language to pursue a partnership found in Objective 10 under alternatives B, C, and D was moved to the supporting background and rationale in alternative E and thus is not part of the plan component.

Alternative E would be similar to alternative D in that it would increase both the quantity and quality of the developed recreation opportunities on the forest; however, it would be a lesser increase in the quantity of opportunities as there would not be a replacement shooting venue.

### Improvements to Trails

**Table 29. Trails opportunities by alternative**

<b>Trails Opportunities</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. C</b>	<b>Alt. D</b>	<b>Alt. E</b>
Quantity	Decrease	Increase	Increase Less	Increase Most	Increase Least
Quality	Decrease	Increase	Increase Less	Increase Most	Increase Least

#### **Alternative A**

Although alternative A describes an access policy, it provides very little guidance for trails management. Due to the lack of emphasis on trails issues, this alternative would result in a decrease in the quality of available trail recreation opportunities due to trail maintenance not keeping pace with user impacts and an increased potential for conflict from vague policy and competing uses. The quantity of available trail recreation would also decrease as increased use places additional maintenance pressure on the trail infrastructure, which may result in the forced closure of some trails for safety reasons.

From 2002 to 2010 the trails maintenance backlog increased by 18 percent, and this lack of maintenance affects not only the trail users, but also the health of the watershed. Erosion from poorly located trails and improper stream and drainage crossings is adding to the sediment load and impacting watershed integrity.

Conflicts that currently exist between and among different user groups would go unaddressed and could worsen under alternative A. This could lead to a decline in use by groups that felt that they had been displaced, or increased impacts to trails from use that they were not designed to accommodate. Although these types of conflict may actually be uncommon, there is a perception that they occur frequently.

#### **Alternative B**

This alternative reverses the trend for trail maintenance by emphasizing improvements to trails and trailheads, and a commitment to reducing the maintenance backlog (Objectives 9, 11, and 17). Alternative B would increase both the quantity and quality of the trail recreation opportunities provided by improving and expanding the facilities and providing clear policy and guidance to visitors to help reduce conflicts and resource impacts.

Improvements to the trailheads and signage help to mitigate the potential for conflict among trail users. By clearly signing the intended use for each trail, managers could reduce conflict that arises from unintended use, and users would cause less impact while achieving a better experience on a trail that has been designed to suit their needs. Improvements to trailheads could also physically separate different user groups to avoid conflict and reduce impacts by providing adequate facilities to meet the needs of different groups. Examples would include larger parking spots for vehicles with trailers or hitching posts for horses.

### **Alternative C**

Alternative C is similar to alternative B, but because its focus is on vegetation and wildlife habitat restorations, it directs more resources to those programs and fewer resources to trails and trailheads. It would result in a lesser increase in the quality of the trail recreation opportunities and a potentially smaller expansion of the quantity of trail opportunities.

This alternative still would reverse the trend for trail maintenance, just to a lesser degree than alternative B. Alternative C would reduce the maintenance backlog at a slower pace, with a target of a 35 to 50 percent reduction over 10 years, rather than the 50 to 70 percent reduction in alternative B (Objective 9). This reduction in the final target might change the process for prioritizing the schedule to address the backlog, and it could involve more public participation to determine which priorities had the most public support.

This alternative would also potentially improve fewer trailheads, although the difference in the alternatives is at the upper end of the range, with alternative B allowing for improvements at up to 20 trailheads over the next 10 years and alternative C allowing for improvements at up to 10 (Objective 11). The difference would most likely be felt in those projects that were not a priority, either because they did not mitigate current resource damage issues or did not respond to current user demands. Examples might include projects developed in response to anticipated shifts in use types or visitor demographics.

### **Alternative D**

Alternative D provides a greater emphasis on trails and trailheads than any of the other alternatives, and it includes additional direction to create new trails and decommission trails that receive little to no use, are located in ecologically sensitive areas, or have unsafe conditions. This alternative would provide a greater increase in both the quantity and quality of the dispersed recreation opportunities than alternatives A, B, or C.

Alternative D provides guidance for a stronger response to public comments for increased trail opportunities. It provides direction for improvements to at least twice as many trailheads as either alternative B or C (Objective 11). This expansion would allow the forest to accommodate improvements for a number of different trail use types to respond to the priorities of different user groups. This, in turn, would help to reduce conflict between groups, both at the trailheads and on the trails.

This alternative also places an emphasis on improving the trail system as a whole by directing managers to create new trails and decommission existing trails where appropriate (Objective 17). Additional trail mileage would allow the forest to improve the existing system through creation of loop trails that return users to their starting point and connector trails that help to link communities. New trail construction would ensure that trails were properly designed and located to minimize the impact they would have on the landscape. There is a desire for these types of trails, as expressed in the public feedback received in comments, and if not created by the forest, they might become nuisance trails created informally by users. The decommissioning of system trails would benefit users by removing those trails that cannot be maintained to minimum safety standards. It would also provide managers the option of removing a trail that is causing damage to other resources, such as watershed quality or wildlife habitat, and that cannot be safely rerouted.

**Alternative E**

Alternative E is similar to alternative B, but it would not direct resources toward reducing the backlog of needed trail maintenance. It would result in a lesser increase in the quality of the trail recreation opportunities and a potentially smaller expansion of the quantity of trail opportunities.

**Sharing Information with Visitors**

**Table 30. Information sharing by alternative**

Information Sharing	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Match visitors to opportunities	No Change			Increase	
Visitor satisfaction	No Change			Increase	

**Alternative A**

Alternative A would continue to provide guidance established in the 1987 plan. This plan was developed under an older management framework and is outdated in its approach. As such, it is not well suited to addressing the social, ecological, and technological changes that are occurring. Information sharing is focused on traditional methods, such as the distribution of printed material and onsite visitor contacts and does not include any provisions for the extended use of electronic or social media. This can place constraints on the ability of visitors to match their desired experiences with the opportunities available on the forest. If visitors are not able to find information about the forest before they arrive, they may not discover that it does not provide the type of opportunity they desire until they are already here. Or visitors may choose to not visit the forest at all. The results would be a mismatch between the visitor’s desired experience for those who come or the loss of potential visitors for those who do not.

**Alternatives B, C, D, and E**

The action alternatives propose increasing both the number of outlets and methods of delivery to expand visitor access to information (Objective 14). By developing two to five new methods of providing information, the forest would provide better service by making information available to visitors pre- and post-trip, as well as onsite. Easier access to information would help visitors better match their desired experiences to the available opportunities on the forest. This, in turn, should result in a reduction in visitor conflicts and an increase in visitor satisfaction.

**Dispersed Recreation**

**Table 31. Dispersed recreation opportunities by alternative**

Dispersed Recreation Opportunities	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Quantity	No Change	Increase		Increase Most	Increase
Quality	Decrease	Increase		Increase Most	Increase

### **Alternative A**

Dispersed recreation in alternative A would continue under the direction set forth in the 1987 plan. The focus of the 1987 plan is on managing dispersed recreation areas at an undefined “standard service level” (Forest Service, 1987, p. 18) and maintaining facilities in a safe and operable condition. The result could be a decrease in the ability of managers to contain or mitigate recreation impacts and an increased likelihood that visitors would encounter the effects of the impacts, leading to a decrease in the quality of the recreation opportunities provided.

It would continue to provide designated dispersed camping in the Prescott Basin, but there would be no direction to develop designated dispersed camping opportunities in other parts of the forest. Managers would have no guidance to designate dispersed camping sites as a means to mitigate resource damage in areas where dispersed camping is causing impacts to the natural environment. Areas near streams or water sources in particular are very popular places to camp on the forest, and due to their riparian vegetation, they are vulnerable to impacts such as trampling and erosion. There would be no displacement of campers who want a less regulated experience; however, there would continue to be displacement of campers who seek a more pristine, less impacted setting.

Alternative A is vague on the policy for using motorized vehicles for cross-country travel to retrieve big game. Current policy allows for big game retrieval with a valid permit (Forest Service, 1987, p. 19), but does not define either “big game” or “valid permit.” This lack of clarity has the potential to create conflict due to differing interpretations of these guidelines by hunters and managers.

### **Alternatives B, C, and E**

Alternatives B, C, and E balance the development of dispersed and developed recreation to provide a diverse set of recreation opportunities. They propose the creation of up to four new designated dispersed camping areas on the forest (Objective 8), with the goal of managing camping in areas that show high impact from recreation use, while still providing the opportunity to camp without the development and regulation of a traditional campground. The result could be an increase in the ability of managers to contain or mitigate recreation impacts and a decreased likelihood that visitors would encounter the effects of trampling and erosion, leading to an increase in the quality of the recreation opportunities provided.

These alternatives place an emphasis on mitigating and rehabilitating the impact of dispersed recreation. Its importance is highlighted by the fact that there is direction to address this issue in both the recreation and watershed objectives (Objectives 16, 17, 20, and 22). Actions to relocate or rehabilitate recreation areas or trails that show evidence of resource damage would foster numerous benefits for both the recreation users and surrounding ecosystem. Trail stream crossings and recreation sites relocated to more durable or hardened surfaces would require less maintenance and would reduce the amount of sedimentation due to runoff. Watershed integrity would be improved by reduced sediment load from recreation sites and trail crossings. Riparian vegetation and sensitive plants would be better protected from trampling if recreation sites were relocated away from sensitive areas. In turn, the protected vegetation would benefit the recreation setting by providing shade or privacy.

Some of the popular dispersed camping areas on the forest show signs of impact that include soil compaction, trampling of vegetation, and site expansion. By regulating the use in these areas

through the designation of sites, these impacts could be managed. Restricting the extent of these sites would allow for mitigation efforts to aid in the recovery of areas from the impacts of overuse. Designating camping sites could also act as a preventive measure. By channeling use onto sites that are more resistant to use, the extent of the impacts could be minimized before they become a problem. In some areas, designating sites would increase the capacity of the area by making acceptable camping spots more easily identifiable to visitors. However, these restrictions could also lead to a loss of capacity in some areas where use would have to be contained. This type of management could also displace some of the current users who seek a less regulated camping experience.

Part of the strategy to reduce conflict and mitigate recreation impacts is to avoid them in the first place. Alternatives B, C, and E would address this in part by marking, or remarking where needed, the wilderness boundaries in areas where there is a high risk of motorized or mountain bike intrusion (Objective 15). Motorized or mountain bike use in these areas could cause resource damage and provoke conflict with wilderness visitors. Although clear boundaries would not stop intentional illegal use, it would help to keep unintended motorized and mountain bike use out of the designated wilderness. Outside of designated wilderness areas, the alternatives would establish clear direction for the use of motorized vehicles for big game retrieval (Standard-Recreation-2). By placing restrictions on the timing and routing of motorized access, they would limit the off-trail impacts of this use. These impacts include both the physical disturbance to the environment and the potential conflicts from off-trail encounters between motorized and nonmotorized users.

#### **Alternative D**

Alternative D emphasizes the development of dispersed recreation opportunities over developed recreation, with the same guidance in regard to reducing user conflict, mitigating dispersed recreation impacts, and marking wilderness boundaries as alternatives B, C, and E. It proposes to manage camping in areas that show high impact from recreation use but still provide the opportunity to camp without the development and regulation of a traditional campground. As with alternatives B, C, and E, the result could be an increase in the ability of managers to contain or mitigate recreation impacts and a decreased likelihood that visitors would encounter the effects of the impacts. Alternative D would also provide managers with additional options to extend protection to popular dispersed camping areas while potentially causing less displacement of visitors.

Alternative D focuses on increasing the opportunities for dispersed recreation by favoring the creation of designated dispersed camping areas over the construction of developed campgrounds. Designated dispersed sites provide users the option of less regulated, less developed camping. For many, this is the preferred setting. Designated dispersed sites offer few amenities—features such as tent pads or fire rings are generally for the protection of the resource, rather than the convenience of the user. As the level of development for a designated dispersed site is less than for a developed campsite, it is expected that there would be less displacement of visitors who seek out these areas as an alternative to developed campgrounds.

The low level of development for designated dispersed sites also means that their initial cost and ongoing maintenance would be lower than a developed campground. However, these types of sites generally do not charge for use and, therefore, could not generate revenue for their maintenance. They also require more frequent patrolling, as they generally do not have a host

onsite to provide presence. This would hold true for designated dispersed sites, regardless of alternative.

**Recommended Wilderness**

**Table 32. Recommended wilderness by alternative**

Potential Wilderness	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Number of areas recommended	None	8 areas	None	16 areas	8 areas
Total acres recommended	0 acres	43,440 acres	0 acres	116,260 acres	23,137 acres
Recommended PWAs  Note: PWAs listed in <b>bold</b> contain inventoried roadless areas	None	Apache Creek A, Apache Creek B, Bald Mountain, <b>Black Canyon</b> , Castle Creek, Juniper Mesa, Sycamore Canyon A, Sycamore Canyon C	None	Apache Creek A, Apache Creek B, <b>Arnold Mesa</b> , <b>Ash Creek</b> , Castle Creek, Cedar Bench A, Cedar Bench B, Fritsche B, Juniper Mesa, <b>Muldoon</b> , Pine Mountain B, Pine Mountain C, Sycamore Canyon A, Sycamore Canyon B, Sycamore Canyon C, Woodchute	Apache Creek A, Castle Creek, Cedar Bench A, Cedar Bench B, Juniper Mesa, Pine Mountain B, Sycamore Canyon A, Woodchute

**Alternative A**

In alternative A, there are no potential wilderness areas (PWAs) recommended for wilderness designation. The result would be that there would be no restrictions on activities that are incompatible with the maintenance of wilderness character. There would be no withdrawal of mineral rights, implementation of grazing guidelines, or prohibitions on timber harvest due to wilderness designation, although any of these may occur for other reasons.

There would be no increase in the number of acres protected for wilderness character; however, management of any area for multiple use and ecosystem restoration does not preclude management for social values that are also associated with wilderness. The “quality of life” benefits derived from recreation are not exclusive to primitive or nonmotorized activities. A non-wilderness area can provide a more diverse set of recreation opportunities that could appeal to visitors who are not seeking a wilderness experience. These opportunities could include mountain bike trails, motorized trails, off-highway vehicle play areas, and developed camping or day-use areas. Community benefits, preservation of open space, scientific and educational values,

biodiversity, promotion of ecosystem services, and other forest related amenity values can be promoted in non-wilderness areas as part of a multiple-use management approach.

### **Alternative B**

Alternative B would recommend eight PWAs for designation, including Black Canyon PWA, which contains the Black Canyon Inventoried Roadless Area. The additional 43,440 acres recommended is approximately 40 percent of the existing wilderness acreage, and would strengthen and expand the opportunities for undeveloped recreation and increase the number of acres protected for wilderness character. This would, however, result in the loss of these areas for the development of new recreation facilities as management guidance would be to maintain the wilderness characteristics of the areas.

It is assumed that if these areas were to be designated as wilderness, they would contribute little additional wilderness visitation. Black Canyon PWA (see appendix B, map of wilderness recommendations) is the only separate parcel to be recommended in this alternative; all other recommended areas are contiguous to existing wilderness. Black Canyon could be reasonably expected to increase wilderness visitation if it were to become designated, as it is located in close proximity to the Verde Valley. It would most likely receive sustained local use as well as an initial bump in visitation upon designation.

According to the 2007 NVUM results, wilderness use on the Prescott NF averages around 5,000 visits per wilderness area (Forest Service, 2009d). Because Black Canyon would be a new, separate wilderness area, it could be expected to add about 5,000 additional wilderness visits if it were to be designated. It is estimated that the other seven PWAs could add an additional 1,000 visits combined, mainly due to the fact that they are expansions of existing wilderness areas and would receive little in the way of unique visitation; many of these areas already receive visitation as users pass through them to access the existing designated wilderness. This is a total estimated increase of 6,000 visits or 15 percent. It is not known how much of this increase in wilderness visitation would represent new visitors to the areas versus simply reclassifying the existing visitation as wilderness use.

PWAs recommended for wilderness designation would be managed to maintain their wilderness characteristics, including their scenic beauty, natural conditions, solitude, and identified special features. Recreation use would be managed to minimize the evidence of human use and to maintain the outstanding opportunities for solitude and primitive recreation in the recommended areas. Wilderness designation would prohibit any existing and future mountain bike and motorized use, including motorized big game retrieval. New facilities would be constructed only if they were required for the safety of users or the protection of wilderness resources, and the use of mechanized tools for trail construction and maintenance would be restricted.

However, the forest supervisor may allow the continued use of mechanized and motorized equipment in recommended areas if it does not permanently impair the area's wilderness character. This could allow for the use of mechanized and motorized equipment for projects designed to mitigate resource impacts caused by recreation. New road construction or improvement or the development of recreation facilities in a recommended area would be discouraged due to the impact on wilderness character. New road construction to improve access is unlikely in Black Canyon PWA as most of the area overlaps with the Black Creek Inventoried Roadless Area.

**Alternative C**

There are no PWAs recommended for wilderness designation in this alternative. Its focus is on progressing toward ecological desired conditions at a faster pace by increasing the use of management activities such as prescribed fire, mechanical removal of vegetation, and aquatic habitat improvements, over more areas of the forest. Management direction for recommended wilderness areas could preclude some actions such as the establishment and maintenance of firebreaks or the creation of temporary roads for mechanized access. It was determined that these types of restrictions could impair restoration efforts in the recommended areas and so recommending wilderness designation was incompatible with the goals of this alternative. The consequences with regard to potential wilderness are similar to those in alternative A.

Alternative C differs from alternative A in that it provides plan direction to add additional developed recreation sites and designated dispersed camping, improve road and trail stream crossings, and repair roads and trails that are impacting watershed integrity. Some of the actions required to meet these objectives—such as the construction of new access roads or the hardening of stream crossings—could permanently impair the wilderness character of the surrounding landscape. These activities would not be restricted in any of the identified potential wilderness areas, as none of them would be recommended for wilderness designation.

**Alternative D**

The consequences with regard to potential wilderness areas recommended for designation are similar to those in alternative B, the difference being that alternative D contains a greater quantity. Alternative D would recommend 16 PWAs for designation, containing over 116,260 acres and equaling about 110 percent of the existing wilderness acreage. The recommendations include Arnold Mesa PWA, Ash Creek PWA, and Muldoon PWA, all of which contain inventoried roadless areas identified in the 2001 Roadless Area Conservation Rule. Alternative D would result in the largest increase in the number of acres protected for wilderness character for any of the alternatives. It is estimated that, if designated, these areas could increase wilderness visitation by approximately 45 percent (Forest Service, 2011g), although, as noted in alternative B, it is not known how much of this increase would represent new visitors to the areas versus simply reclassifying the existing visitation as wilderness use. This alternative would also include the largest potential loss of developed recreation opportunities among the alternatives.

**Alternative E**

The consequences with regard to potential wilderness areas recommended for designation are similar to those in alternatives B and D; however, alternative E contains the lowest recommended acreage. Alternative E would recommend 23,137 additional acres for designation across 8 PWAs, equal to about 22 percent of the existing wilderness acreage.

If designated, it is estimated that these recommended areas could increase wilderness visitation by approximately 3 percent (Forest Service, 2011g). However, since these eight PWAs are contiguous to existing wilderness, like alternative B, it is not known how much of this increase in wilderness visitation would represent new visitors to the areas. It should also be noted that none of the PWAs recommended in alternative E overlap with any of the inventoried roadless areas identified in the 2001 Roadless Area Conservation Rule.

## Recreation Management Response to Climate Change

**Table 33. Recreation management response to climate change by alternative**

Climate Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Adapt to climate change	Additional effort required	Integrated into plan			

### Alternative A

The 1987 plan does not recognize the potential impacts, such as an increase in both summer and winter visitation, which could result from changes to the climate. There is no guidance for addressing this issue within the plan; subsequent policy direction would need to be integrated into current management. The extent of this effort is unknown, but would involve, at the minimum, an amendment to the “Monitoring” section of the plan. The result would be that increased effort would be needed to adapt management practices to respond to changes brought on by increased temperatures, longer heat waves, and reduced precipitation.

### Alternatives B, C, D, and E

The four action alternatives recognize that there will be implications from climate change that need to be addressed at the strategic level. As a result, these alternatives provide guidance that can accommodate the changes in management that may be needed to adapt to changes in conditions.

All of the plan revision alternatives integrate climate change assumptions into their management approach. The revised plan contains the flexibility needed to respond to the potential for increased use. The higher end of the range for each objective anticipates the increase in capacity needed to accommodate this increased use. There would be an increase in the number and variety of developed recreation sites that could accommodate increased visitation. New sites could be situated at a higher elevation for more cool relief or at lower elevation for increased winter capacity, depending on what use trends demand. Dispersed camping would be increasingly controlled in certain popular areas to mitigate the effects of increased use. Improved trailheads and trail signage, as well as a reduction of the maintenance backlog, would help improve resilience to increased visitor numbers and potential for extended recreation seasons.

These alternatives also establish a revised monitoring framework to provide managers with the information needed to adapt the recreation program and facilities to respond to the anticipated changes. Specific direction is to monitor the management actions, measures, or decisions that the Forest Service is taking to promote ecosystem resilience in response to changing environmental conditions. The monitoring plan incorporates information from the Forest Service infrastructure database and the cyclical National Visitor Use Monitoring surveys to provide feedback on progress toward meeting the plan objectives and responding to changes in use and visitation.

### Cumulative Environmental Consequences

Cumulative consequences are those consequences of foreseeable activities on lands that are not managed by the Prescott NF that, in conjunction with management activities likely to occur on the forest, may intensify, negate, improve, or otherwise affect the recreation opportunities on the forest.

The cumulative consequences area includes public and private lands within Yavapai County. The Prescott NF plays a central role in providing outdoor recreation opportunities within Yavapai County as it accounts for approximately 23 percent of the 5.2 million acres, but it is not the sole provider. There are outdoor recreation opportunities provided by other Federal agencies, the State of Arizona, and some of the municipalities that range from developed day-use areas to backcountry dispersed opportunities.

To evaluate the cumulative consequences to recreation opportunities, the proposed changes to recreation management on the Prescott NF were examined in the context of the contributions to recreation opportunities provided by other jurisdictions within Yavapai County.

On the Federal level, one of the foreseeable future actions that would have cumulative consequences on recreation opportunities in Yavapai County is direction within the Bureau of Land Management (BLM) Bradshaw-Harquahala Resource Management Plan (RMP) to complete the Black Canyon National Recreation Trail to connect with trails on the Prescott NF. This would provide forest users with access to the national recreation trail and expand opportunities for long distance trail rides. This plan also contains guidance to locate and develop staging and camping areas to service the north section of this nonmotorized trail, and to locate a motorized route that generally parallels the Black Canyon Trail.

In addition, under the Bradshaw-Harquahala RMP, the Black Canyon Management Unit manages 13,490 acres adjacent to the Castle Creek PWA that have been “Allocated to Maintain Wilderness Characteristics.” If the Castle Creek PWA were recommended for wilderness designation, the cumulative effect would be over 43,000 acres managed for wilderness character, including the designated Castle Creek Wilderness.

The government of Yavapai County has developed the Yavapai County Master Trails Plan that would expand trail-based recreation by creating links between the forest trail system and other trail systems in the county. The forest’s trails could provide use corridors between communities, and by connecting with the trails in other jurisdictions, there would be increased access to the trail system. Participants in the master trails plan would include the BLM, the State of Arizona, the Prescott and Coconino NFs, the cities of Prescott and Sedona, and the town of Prescott Valley, all of which have existing trail systems or trail plans.

Alternative A would contribute the least overall to the cumulative recreation opportunities available because it does not provide direction for expansion of the recreation program. There is also no plan direction to develop collaborative efforts or coordinate recreation opportunities with other jurisdictions. Collaboration and coordination would take the pressure off of recreation providers to offer as many different opportunities as possible and instead provide better service within a well-defined recreation niche. This would also provide the flexibility to adapt to changing conditions such as shifts in use patterns or demographics, changes in seasons of use, or declines in budgets or revenue sources.

## **Need for Change 4**

*Provide desired habitat for native fish species.*

This section summarizes the current conditions for fisheries, other aquatic and riparian species, and associated riparian habitats on the Prescott NF, and the consequences of implementing the revised plan or its alternatives. It provides a summary of aquatic and riparian species viability

assessments and examines in detail consequences to federally listed and proposed aquatic and riparian species and critical habitat, Forest Service regionally sensitive aquatic and riparian species and aquatic management indicator species. Environmental consequences to terrestrial species are disclosed in “Need for Change 1.”

This section has been organized by the issues identified in the “Need for Change 4” in chapter 1. These issues include addressing aquatic and riparian species diversity and viability and retaining or improving habitat for desired aquatic and riparian species. The full analysis can be found in the “Prescott National Forest Plan Revision EIS Vascular Plant Viability Analysis” (Forest Service, 2011d), the “Prescott National Forest Plan Revision EIS Fisheries Specialist Report” (Forest Service, 2011i), the “Prescott National Forest Plan Revision EIS Terrestrial Wildlife Specialist Report” (Forest Service, 2011e), and the “National Forest Plan Revision EIS Terrestrial Species Viability Report” (Forest Service, 2011m).

### **Aquatic and Riparian Species Viability**

An assessment of species diversity for the Prescott NF was completed as part of the “Prescott National Forest Ecological Sustainability Report” (Forest Service, 2009a). From an initial list of 815 species, 121 (terrestrial, aquatic, and riparian species) species were determined to have a potential viability concern. The species identified included: 11 mammals, 33 birds, 3 reptiles, 2 amphibians, 12 fish, 4 invertebrates, and 56 plants. Species viability assessments for those 121 species were prepared according to Forest Service policy (FSM 2670) and documented in three specialist reports (Forest Service, 2011d, 2011i, and 2011m).

Viability risks to aquatic and riparian species were based on assessments of:

- Availability and current conditions of the aquatic and riparian habitat or habitat features with which the species are typically associated;
- Population occurrence and distribution; and
- Threats from Forest Service management actions expected to occur within the planning area<sup>11</sup>. The results of these assessments provided a determination of no, low, or some risk to viability for each species evaluated.

As part of the plan revision process, coarse filter plan components (i.e., desired conditions statements) were developed that describe the desired outcomes and conditions for terrestrial vegetation, riparian habitats and features, and aquatic habitats and features within the planning area. For species determined to be at no or low risk, meeting and maintaining these desired conditions within the planning area would provide for the viability of those species. For those species determined to be at some risk, additional fine filter plan components (e.g., standards, guidelines, and objectives) were developed to lessen population viability risks to a low level.

Of the 121 species with potential viability concerns, a total of 29 aquatic and riparian species were assessed. The aquatic species analyzed include 12 fish, 2 amphibians, 2 reptiles, and 4 invertebrates; riparian species include 6 birds, 1 bat, and 2 plants. Twenty-one species were found to have low or no risk to their viability; and 8 were found to have some risk to their population

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<sup>11</sup>“Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area.” 36 CFR § 219.19 (1982).

viability. The remaining 92 species are addressed in the “Terrestrial Species Diversity and Viability” section in “Need for Change 1.”

Table 34 lists the 29 aquatic and riparian species that were assessed and the corresponding Prescott NF plan components (coarse or fine filter) needed to reduce population viability concerns to a low risk level.

**Table 34. Plan components that address aquatic and riparian species viability concerns**

Viability Filter Category	Taxon	Associated Plan Components	Species
Coarse filter plan components alone are sufficient to reduce viability to a level of no or low risk	Fish	Desired Conditions-Watershed-1 and 2 Desired Conditions-Aquatic-1 and 2 Desired Conditions-Wildlife-1 and 2 Desired Condition-Open Space-1 and 2 Desired Conditions-Vegetation-1, 4, and 5 Desired Conditions-Watershed-1 and 2	Gila chub, Gila trout, roundtail chub, desert sucker, longfin dace, Sonora sucker, speckled dace
	Amphibians		Arizona toad, lowland leopard frog
	Macro-invertebrates		brown springsnail, Verde Rim springsnail, Maricopa tiger beetle
	Mammals		western red bat
	Birds		Southwestern willow flycatcher, western yellow-billed cuckoo, Abert’s towhee, bald eagle, common black-hawk, Bell’s vireo
	Plants		broadleaf lupine, Cochise sedge
Coarse filter plan components plus fine filter plan components are necessary to reduce viability to a level of no or low risk	Fish	Guideline -Fish/Aquatics-1, 2, and 3 Standard-Range-2	Gila topminnow, razorback sucker, loach minnow, spikedace, Colorado pikeminnow
	Reptiles	Guideline-Watershed-4, 9, 10, and 11 Guideline-Recreation-8 Guideline-Lands-2 Guideline-Locatable Minerals-2	northern Mexican gartersnake, narrow-headed gartersnake
	Macro-invertebrates		A caddisfly

**Species Groups**

The species carried forward are associated with habitats or habitat features in the planning area, such as aquatic habitats or riparian vegetation features. For birds and mammals, riparian habitat is generally applicable; for fish, amphibians, reptiles, and invertebrates, aquatic or riparian habitats

are generally applicable. The following species are associated with riparian habitat: southwestern willow flycatcher, western yellow-billed cuckoo, bald eagle, western red bat, broadleaf lupine, and Cochise sedge. The following species are associated with aquatic habitat: all fish species, lowland leopard frog, northern Mexican gartersnake, narrow-headed gartersnake, A caddisfly, Verde Rim springsnail, and Brown springsnail.

## **Affected Environment**

### **Aquatic Habitats**

Big Sandy River, Burro Creek, and Santa Maria River sub-basins all flow to the Bill Williams River basin, which empties into the mainstem of the Colorado River near Parker, Arizona. The Big Chino Wash, Upper Verde, and Lower Verde sub-basins form the Verde River basin, which joins the Salt River, a tributary to the Gila River, near Phoenix, Arizona. The Agua Fria and Hassayampa sub-basins drain into the Middle Gila River basin, downstream from its confluence with the Salt River.

There are 79.4 miles of perennial stream on the Prescott NF, the main one being the Verde River, which extends about 52 miles across the forest. There are approximately 38 miles of river within the Granite Creek and Grindstone Wash watersheds that form the upper Verde River. This section of river is potentially eligible for inclusion in the National Wild and Scenic Rivers System (Forest Service, 1981). The upper Verde River also has a proposal to build a fish barrier for the management of listed fish species under the biological opinion for the Central Arizona Project (Fish and Wildlife Service, 2008b). Cherry Creek watershed and the upper segment of the Fossil Creek watershed flow through Verde Valley. This major reach of perennial stream (about 40 miles) is mainly in private ownership and is highly altered from water diversions and development. There are only about 5 miles of Prescott NF lands in this section to provide public access to the river. The lower segment of the Fossil Creek watershed is within the Verde Wild and Scenic River, about 15.5 miles of which is on the forest. The other 27 miles of streams within the Prescott NF are perennial intermittent or intermittent. These streams are mainly in the Ash Creek-Sycamore Creek and Upper Hassayampa River watersheds.

The historical extent of perennial stream is inferred to have been similar in location and length to current conditions, with similar to slightly more actual flow than current conditions. However, shifts in the timing of snowmelt combined with increases in summer temperatures have been observed in watersheds and streams in the American West. These shifts may pose challenges to reintroducing fish species into their historic range (Forest Service, 2007b; Millar et al., 2007).

A total of 10 native fish species currently occur within the Prescott NF. The Verde River has the highest native fish species diversity in the planning area and has been identified as one of several stream systems having the greatest potential for native fish restoration and conservation in Arizona (Turner and List, 2007). However, original populations of the Colorado pikeminnow, razorback sucker, Gila topminnow, Gila trout, and loach minnow were extirpated from the drainage. Efforts to reintroduce these species have been met with mixed success. The majority of fish species known on the forest have undergone declines in distribution across the basin. In contrast, the majority of nonnative fish that have been introduced into the basin have shown substantial increases in their distribution over time. Most nonnative fish species have well established populations on the forest and are considered a primary threat to native fish species on the forest.

Aquatic reptiles and amphibians have suffered the same fate as native fish in the reduction of distribution and abundance throughout their range. The loss or modification of habitat from various actions and the introduction of nonnative fishes, bullfrogs, and crayfish continue to impact populations.

The aquatic invertebrates have limited distribution in the planning area. The Verde Rim springsnail is only known from one spring complex in the headwaters of Sycamore Creek, and the Brown springsnail is limited to Brown Springs. Both of these populations occur on private lands, though forest activities have some level of impacts on their habitat. A caddisfly is generally restricted to cooler spring-fed streams in mountainous areas; however, the extent on the Prescott NF unknown.

### **Riparian Habitats**

The Riparian Gallery Forest vegetation type on the Prescott NF occurs along perennial or intermittent streams and around springs and seeps. It covers approximately 12,400 acres, represents less than 1 percent of the total forest acreage, and ranges in elevation from 2,000 to 8,000 feet (Forest Service, 2009a). It contains approximately 7,496 acres of suitable understory habitat and 4,247 acres of overstory habitat. The two major vegetation communities within it are cottonwood-willow and mixed broadleaf deciduous forests. The dominant woody vegetation varies according to elevation, substrate, stream gradient, and depth to groundwater. This contributes to the mix of vegetative structures within the type, including riparian forests, woodlands, and shrublands. Common species include Fremont cottonwood, narrowleaf, Gooding, and Bebb willow, Arizona sycamore, velvet and green ash, Arizona alder, Arizona walnut, and box elder. Herbaceous plants include several forbs, sedges, rushes, and grasses. Current vegetation shows a high similarity to desired conditions; the difference between existing and desired conditions is mainly due to the presence of tamarisk and other nonnative plants.

### **Federally Listed Species**

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) under authority of the Endangered Species Act of 1973 (ESA) (P.L. 93-205), as amended. Pursuant to Section 7 (2)(a) of the ESA, a biological assessment was prepared to assess the effects of implementing the “Prescott National Forest Land and Resource Management Plan” selected alternative on endangered or threatened species. All federally listed, proposed, and candidate species and designated and proposed critical habitats that the USFWS has identified in its Southwestern Region threatened/endangered species list<sup>12</sup> were considered in this analysis. The aquatic and riparian associated species that occur on the Prescott NF are shown in table 35.

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<sup>12</sup> [www.fws.gov/southwest/es/EndangeredSpecies/EndangeredSpecies\\_Lists/](http://www.fws.gov/southwest/es/EndangeredSpecies/EndangeredSpecies_Lists/)

**Table 35. Federally listed species critical and occupied habitat**

Common Name	Status	Habitat Extent on the Prescott NF	Critical Habitat
Gila chub	Endangered <sup>1</sup>	19 miles	Yes
Gila topminnow	Endangered	0 miles	No
Razorback sucker	Endangered	16 miles	Yes
Spikedace	Endangered	32 miles	Yes
Loach minnow	Endangered	0 miles	Yes
Gila trout	Threatened <sup>2</sup>	1 mile	No
Northern Mexican gartersnake	Threatened	103 miles	Proposed
Narrow-headed gartersnake	Threatened	103 miles	Proposed
Colorado pikeminnow	Experimental <sup>4</sup>	16 miles	No
Roundtail chub	Candidate <sup>5</sup> Sensitive <sup>3</sup>	51 miles	No
Southwestern willow flycatcher	Endangered	1,339 acres	Yes
Western yellow-billed cuckoo	Threatened	7,496 acres	Proposed

<sup>1</sup> Listed endangered under the ESA: Any species that is in danger of extinction throughout all or a significant portion of its range.

<sup>2</sup> Listed threatened under the ESA: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

<sup>3</sup> The species is listed on the Regional Forester's sensitive species list for the Southwestern Region of the Forest Service.

<sup>4</sup> Listed experimental population, non-essential under the ESA

<sup>5</sup> Listed candidate, ready for proposal for listing under the ESA.

### Gila Chub and Critical Habitat

The Gila chub (*Gila intermedia*) was listed as endangered with critical habitat in 2005 under the Endangered Species Act. It commonly inhabits pools in smaller streams, springs, and cienegas (i.e., a desert wetland), and it can survive in small artificial impoundments, such as human-made ponds. Of 47 known populations, only 29 are considered occupied and all are considered small, isolated, and subject to some form of threat. The primary threats to Gila chub across its range include predation by and competition with nonnative aquatic species and habitat alteration, destruction, and fragmentation from surface water diversions and groundwater withdrawals. Because the species exists in small, isolated populations, they are also highly susceptible to drought, flood events, and wildfire.

The 29 currently occupied populations are found in 7 major drainages, all in Arizona. Approximately 85 to 90 percent of Gila chub historic habitat has been degraded or destroyed, and roughly 59 percent of the lands supporting the extant populations are managed by the Bureau of Land Management and the Forest Service.

On the Prescott NF, the species is known to occur in Sycamore Creek, Little Sycamore Creek, and Indian Creek in the Agua Fria River drainage (Arizona Game and Fish Department, 1995a;

Arizona Game and Fish Department, 1996). There is also one known population and designated critical habitat located on private lands downstream of the eastern boundary of the forest (west half) in Williamson Valley Wash. All three streams on the Prescott NF have perennial-interrupted flow, and thus, provide less occupied habitat than available on the forest. There is limited direct impact to Gila chub and their habitat from management activities because of exclusions around occupied sites or rough terrain that restricts access to the stream. The species distribution and abundance in each stream have been negatively impacted by the presence of nonnative aquatic species which are predatory and/or competitive with the chub. The species has also been negatively impacted by the 2005 Cave Creek Complex wildfire through reduced habitat quantity and quality due to excess sedimentation filling in pool habitats.

A total of 19.5 miles of critical habitat occur in Sycamore Creek (11.4 miles), Little Sycamore Creek (2.9 miles), and Indian Creek (5.2 miles) in the Agua Fria River drainage on or adjacent to the Prescott NF. Land ownership is primarily Prescott NF, but there are private land inclusions along all stream systems. The main land use activities in the area include livestock grazing and dispersed recreation activities such as OHV and hunting.

The primary potential natural vegetation types (PNVTs) within these watersheds are the piñon-juniper PNVTs and grassland PNVTs. They have relatively low percentages of satisfactory soil conditions and the watershed conditions are rated “At-Risk” or “Impaired” for several key indicators in the Sycamore Creek, Little Sycamore Creek, and Indian Creek sub-watersheds. These departures are collectively contributing to an altered hydrologic condition that is affecting aquatic habitat quality in Gila chub streams. A more complete discussion of soil and watershed conditions can be found in the “Need for Change 2” section of chapter 3.

Primary constituent elements (PCEs) of critical habitat include perennial pool habitat, suitable water temperature and water quality, adequate food base, adequate cover, a healthy intact riparian vegetation community, habitat devoid of nonnative aquatic species or present in levels low enough to allow for Gila chub persistence, and a natural streamflow, including periodic flooding. All elements of critical habitat are considered to be present within these stream systems with one exception; nonnative species are present in abundant quantities to negatively impact Gila chub.

### **Gila Topminnow**

Gila topminnow (*Peociliopsis occidentalis*) has gone from being one of the most common fishes of the Gila River basin to one that exists in no more than 32 known locations: 14 natural and 18 stocked, with an additional 20 captive populations also in existence. The reasons for decline include dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing nonnative fishes. Gila topminnows are highly vulnerable to adverse effects from nonnative aquatic species, including nonnative crayfish and bullfrogs. Predation and competition from nonnative fishes has been a major factor in their decline and continues to be a major threat to the remaining populations.

Historically, there were no documented occurrences of Gila topminnow within the Prescott NF (Fish and Wildlife Service, 1999a). Twenty-four sites on the Prescott NF were introduced with topminnows in the early 1980s (Fish and Wildlife Service, 1985). All sites failed to maintain surviving populations (Arizona Game and Fish Department, 2003a). Reasons for failure included drying of sites, flooding impacts, reduction of suitable habitat due to vegetation overgrowth, and

cold temperatures. Potential habitats on the forest need to be assessed for those sites that meet habitat criteria for possible reintroduction. Possible sites include those already occupied by Gila chub in Sycamore, Little Sycamore, and Indian Creeks.

### **Razorback Sucker and Critical Habitat**

The razorback sucker (*Xyrauchen texanus*) was once abundant in the Colorado River and its major tributaries throughout the Colorado River Basin; however, its present range is much less than its historical distribution (Fish and Wildlife Service, 2002a). Wild populations of the razorback sucker exist only in the Colorado River, as the populations within the Lower Colorado River Basin were extirpated. Hatchery-raised razorback suckers were stocked into the mainstem and tributaries of the Salt, Verde, Gila, and lower Colorado Rivers in the recent past. Recaptures from these stocking efforts have been scarce to date. Monitoring is difficult, given the large reintroduction area and its geography (Fish and Wildlife Service, 2002a). Indications are that populations are being established in isolated habitats and in the uppermost reservoirs of the drainage. Individuals have been captured in the Verde River and Horseshoe Reservoir and in Fossil Creek. The few remaining unaltered rivers (e.g., upper Verde and Salt Rivers and their tributaries) are vital to the continued existence of razorback suckers (Fish and Wildlife Service, 2002a).

The Coconino, Prescott, and Tonto NFs manage 113.2 miles of the Verde River that has been designated as critical habitat for razorback sucker. Approximately 70 miles of designated critical habitat for razorback sucker occurs on and adjacent to the Prescott NF in the Verde River, from Perkinsville downstream to the forest boundary below Camp Verde. The uppermost 15 miles of river are within Forest Service ownership. The next 40-mile reach of river in the Verde Valley is primarily within private ownership. The lowermost 15 miles are again in Forest Service ownership.

The extent of occupied habitat on the Prescott NF is 16 miles in the lower Verde River. Primary constituent elements of critical habitat includes a quantity of water of adequate quality delivered within a natural hydrologic regime; physical habitat for use in spawning, nursery, feeding, and rearing or corridors between these areas; adequate food supply; and areas with few introduced nonnative fish species. All elements of critical habitat are considered to be present within the Verde River; however, nonnative species are present in abundant quantities to negatively impact razorback sucker.

Introductions made into main channels habitats of the Verde River since 1981 have had low survival, and recruitment has not been documented (Hendrickson, 1993; Hyatt, 2004). Since 1994, almost all reintroductions have occurred in the Verde Wild and Scenic River below Camp Verde. Between 1981 and 1990, more than 13 million hatchery-produced razorback sucker fry and fingerling-sized fish were released at 57 sites into historic habitat in Arizona, primarily in the Verde, Gila, and Salt Rivers and their tributaries, where the natural population had been extirpated (Hendrickson, 1993). Low short term survival and no long term survival were reported from these releases, primarily because of predation by nonnative fishes. Since 1994, over 17,000 razorback suckers over 12 inches in length have been stocked into the Verde River at Beasley Flat and Childs river access points (Jahrke and Clark, 1999). Numerous fish have been recaptured, and survival up to two years has been documented. In addition, ripe males have been encountered in the Verde River, but no evidence of reproduction or recruitment has been found. Adults were recently reported from Fossil Creek, a tributary to the Verde River on Coconino and Tonto NFs

(Fish and Wildlife Service, 2002a). The goal of the razorback sucker reintroduction program is to stock 2,000 fish annually in the Verde River (Jahrke and Clark, 1999). Introductions could also occur in the upper Verde River if deemed appropriate by the USFWS and AZGFD. Recently, Stillman Lake, at the headwaters to the Verde River, was scheduled for renovation using chemical and mechanical removal of nonnative fishes for the purpose of reintroducing razorback sucker into this reach of the river (Fish and Wildlife Service, 2009a).

The three 5<sup>th</sup> level watersheds with current or historical presence of razorback sucker (Grindstone Wash-Upper Verde River, Cherry Creek-Upper Verde River, and Fossil Creek-Lower Verde River) have relatively low percentages of satisfactory soil conditions and the watershed conditions are rated “At-Risk” or “Impaired” for several key indicators. These departures are collectively contributing to an altered hydrologic condition that is affecting aquatic habitat quality in the Verde River. A more complete discussion of soil and watershed conditions can be found in the “Need for Change 2” section of chapter 3.

Trends in species population and habitat in the Verde River have decreased from historical levels due to a combination of factors. The most significant factors are those associated with water development projects (i.e., dams) that have altered stream morphology, flow patterns, temperatures, water chemistry, and silt loads of most major streams throughout the Colorado River Basin (Fish and Wildlife Service, 2002a). Fish access to most spawning areas has been blocked by dams. Water temperature changes resulting from the construction of dams and habitat degradation may be having a significant effect; cold water released from reservoirs created by dams can inhibit embryonic development and increase early life mortality.

Interactions with nonnative fishes may also be an important factor in the continued survival or success of reintroduced populations of razorback sucker. Predation by nonnative channel catfish, smallmouth bass, and flathead catfish on young sucker may limit successful reintroduction in Arizona. Another specific threat is from pesticides and pollutants (Fish and Wildlife Service, 2002a).

### **Spikedace and Critical Habitat**

Spikedace (*Meda fulgida*) are found in moderate to large perennial streams at elevations ranging from 1,620 to 4,500 feet, where they inhabit shallow riffles with sand, gravel, and rubble substrates. Recurrent flooding and a natural flow regime are very important in maintaining the habitat of spikedace and in helping maintain a competitive edge over invading nonnative aquatic species.

In Arizona, the species is now common only in Aravaipa Creek. The Verde River is presumed occupied; however, the last captured fish from this river was from a 1999 survey. Spikedace from the Eagle Creek population have not been seen for over a decade, although they are still thought to exist in numbers too low for the sampling efforts to detect. Translocated populations are present in Hot Springs Canyon and Fossil and Bonita Creeks. During the last century, both the distribution and abundance of spikedace have been greatly reduced throughout the species' range. Competition and predation by nonnative fish and habitat destruction have reduced the historic range of spikedace by about 85 percent.

Historically, spikedace were collected in the Verde River above Camp Verde and the lower ends of Beaver Creek and West Clear Creek in 1938 and in the Verde River above Camp Verde in 1950 (Minckley, 1993). The species was first collected in the upper Verde River in the 1890s (Arizona

State University, 2002). Currently, the upper Verde River is presumed to be occupied by spinedace but they are rare based on extensive surveys (Arizona Game and Fish Department, 2000a-b, 2001, 2005a-c; Bahm and Robinson, 2009; Robinson and Crowder, 2009; Forest Service, 2010e; Fish and Wildlife Service, 2005). The last capture of a spinedace was documented during surveys in 1999 (Brouder, 2002). Spinedace populations are extirpated from the lower Verde River in the Verde Valley (Fish and Wildlife Service, 2007).

The nonnative fish populations are well established throughout the Verde River and are a primary threat from both predation and competition to native fishes such as razorback sucker, loach minnow, and spinedace. Trends in spinedace population and habitat in the Verde River have decreased from historical levels due to the establishment of nonnative aquatic species and a reduction in habitat quantity and quality. Factors contributing to the degradation of habitat include water diversions, nutrient enrichment from agricultural practices, excess sedimentation from land development in the watersheds, and the establishment of invasive plant species.

There are about 175 miles of designated critical habitat for spinedace on the Verde River and its tributaries Granite Creek, Oak Creek, Beaver/Wet Beaver Creek, West Clear Creek, and Fossil Creek. A total of about 106 miles of designated critical habitat occurs on the Verde River from the confluence with Fossil Creek upstream to Sullivan Dam. The uppermost 37 miles of river, from the forest boundary downstream to the city of Clarkdale, are primarily within Forest Service ownership with a few private land parcels occurring in this reach. The next 45 miles of river in the Verde Valley are primarily within private ownership. The lowermost 16 miles are again within Forest Service ownership. The critical habitat in Granite Creek occurs off-forest but is potentially impacted by Prescott NF management actions in the Granite Creek watershed that drains into this area.

As previously noted with other aquatic species, some of the 5<sup>th</sup> level watersheds associated with the Verde River have relatively low percentages of satisfactory soil conditions and the watershed conditions are rated “At-Risk” or “Impaired” for several key indicators. These departures are collectively contributing to an altered hydrologic condition that is affecting aquatic habitat quality. A more complete discussion of soil and watershed conditions can be found in the “Need for Change 2” section of chapter 3.

The primary threats to spinedace in the Verde River include nonnative fishes which are predatory and/or competitive with the native species and reduced habitat quantity and quality from water withdrawals in the Big Chino Aquifer and the Verde Valley. Increasing groundwater withdrawals from the Big Chino Aquifer has the potential to decrease perennial flow in the upper Verde River which would reduce the amount of habitat for spinedace. The Big Chino Aquifer has been shown to contribute at least 80 percent to the upper Verde River baseflow (Wirt et.al, 2005). More than 67 river diversions in the Verde Valley deliver surface water to agricultural fields and residential customers (Garner and Bills, 2012).

Physical and biological features of spinedace critical habitat include habitat to support all life stage for the species such as perennial flow and appropriate stream micro-habitat types; abundant aquatic insect food base; streams with no or low levels of pollutants; stream courses with connective corridors between occupied and seasonally occupied habitat; no nonnative aquatic species or levels that are low enough to allow persistence of the species; and streams with a natural unregulated flow regime that allows for periodic flooding or where modified that allows for adequate river function. All physical and biological features of designated critical habitat are

considered to be present within the Verde River, except, as noted, the presence of nonnative aquatic species at levels that would inhibit the persistence of spikedace.

#### **Loach Minnow and Critical Habitat**

Loach minnow (*Rhinichthys osculus*) are found in small to large perennial streams and use shallow, turbulent riffles with primarily cobble substrate and swift currents. It is rare or absent from habitats where fine sediments fill these interstitial spaces. Loach minnow are now restricted to portions of the upper Gila River, San Francisco River, and Tularosa River in New Mexico and Blue River, Aravaipa Creek, Eagle Creek, and the Black River in Arizona. The present range is 15 to 20 percent of its historical range, and the status of the species within occupied areas ranges from common to very rare. Threats to loach minnow are the same as those for spikedace and include habitat modification and destruction from water diversions, improper livestock grazing, and presence of nonnative fish species that are predatory and/or compete with the species.

Historically, the loach minnow was collected in the Verde River above Camp Verde and from Beaver Creek near its confluence with the Verde River in 1938 (Minckley, 1993), but it has been extirpated from the Verde River. Loach minnow were recently introduced into Fossil Creek in restoration efforts, but the success has not yet been assessed.

As with the razorback sucker, trends in population and habitat for loach minnow in the Verde River have decreased from historical levels due to the establishment of nonnative aquatic species and a reduction in habitat quantity and quality. Factors contributing to the degradation of habitat include water diversions, nutrient enrichment from agricultural practices, excess sedimentation from land development in the watersheds, and the establishment of invasive plant species.

There are about 136 miles of designated critical habitat for loach minnow on the Verde River and its tributaries Granite Creek, Oak Creek, Beaver/Wet Beaver Creek, West Clear Creek, and Fossil Creek. A total of about 74 miles of designated critical habitat occurs on the Verde River, from the confluence with Beaver Creek upstream to Sullivan Dam. The uppermost 43 miles of river are primarily within Forest Service ownership. The next 31 miles of river in the Verde Valley are primarily within private ownership. Physical and biological features of loach minnow critical habitat include habitat to support all life stage for the species such as perennial flow and appropriate stream microhabitat types; abundant aquatic insect food base; streams with no or low levels of pollutants; stream courses with connective corridors between occupied and seasonally occupied habitat; no nonnative aquatic species or levels that are low enough to allow persistence of the species; and streams with a natural unregulated flow regime that allows for periodic flooding or where modified that allows for adequate river function. All physical and biological features of designated critical habitat are considered to be present within the Verde River, except for the presence of nonnative aquatic species at levels that would inhibit the persistence of loach minnow.

#### **Gila Trout**

Gila trout (*Oncorhynchus gilae*) were originally recognized as endangered under the Federal Endangered Species Preservation Act of 1966, and subsequently, they were listed as endangered under the ESA of 1973. The Gila trout was downlisted from endangered to threatened in 2006. No critical habitat has been designated for Gila trout.

Surveys on most of the 18 existing populations indicate that the recovery efforts to remove nonnative fish and prevent their return to the renovated areas have been successful (Fish and Wildlife Service, 2003; Fish and Wildlife Service, 2011). Historically, there were no naturally occurring Gila trout populations on the forest, although they were introduced into Gap Creek, a tributary to the Verde River, in 1974. This population persisted until 1990 but was extirpated presumably due to drought. It was recommended not to restock this stream because of the inconsistency of stream flows. Gila trout were introduced into Grapevine Creek in 2009 (Arizona Game and Fish Department, 2009a) and augmented in 2012 along with speckled dace. The Grapevine Creek drainage area, with one mile of perennial water, occurs within the Grapevine Botanical Area and represents the only occupied Gila trout habitat on the Prescott NF. No reproduction has yet been documented. No livestock grazing is authorized within occupied habitat in the Grapevine Botanical Area (Forest Service, 1997), recreation use is restricted to day-use only, and there is management direction for no motorized or mountain bike use of trails.

There are few threats to occupied Gila trout habitat in Grapevine Creek or to suitable Gila trout habitat in Sycamore Creek. Primary threats to Gila trout include hybridization, competition, and/or predation by nonnative trout species, habitat degradation, and wildfire.

#### **Northern Mexican Gartersnake and Critical Habitat**

The Northern Mexican gartersnake (*Thamnophis eques megalops*) was designated a candidate species for listing under the Endangered Species Act in 2008 (Fish and Wildlife Service, 2008c). It was proposed for listing as threatened in 2013 (Fish and Wildlife Service, 2013a), and its threatened listing was finalized in 2014 (Fish and Wildlife Service, 2014). The designation of its critical habitat was proposed in 2013 (Fish and Wildlife Service, 2013b) and is expected to be finalized in the future.

There are 29 known localities for the northern Mexican gartersnake in the U.S. (Fish and Wildlife Service, 2013a). The current status for 24 of the 29 localities (83 percent) is considered likely not viable and may exist at low population densities that could be threatened with extirpation or may already be extirpated. In most localities where the species may occur at low population densities, existing survey data are insufficient to prove extirpation. Only five populations of northern Mexican gartersnakes in the U.S. are considered likely viable where the species remains reliably detected; one of these localities is the upper Verde River.

Critical habitat units proposed on the Prescott NF include the Verde River and Little Ash Creek (Fish and Wildlife Service, 2013b). A total of 103 miles of proposed critical habitat along the Verde River occurs on or adjacent to the Prescott NF. For Little Ash Creek, the first 3.7 miles are primarily on BLM lands with some State and private land ownership, and the last 3 miles are on Prescott NF lands.

In Arizona, northern Mexican gartersnakes are most abundant in densely vegetated habitat surrounding cienegas, cienega-streams, stock tanks, and in or near streams in valley floors and open areas. They are not generally found in steep mountain canyon stream habitat (Arizona Game and Fish Department, 2001). Most localities are between 3,000 and 5,000 feet elevation in aquatic systems of desert grassland plant communities (Rosen and Schwalbe, 1988). This species preys primarily on frogs, tadpoles, and native fish.

Threats to the species include predation, urbanization and lowered water tables, and habitat destruction, including that due to overgrazing. Population numbers are decreasing, with

extirpations at several localities since 1950 as habitat is changed and introduced predators invade habitat. Direct predation by nonnative bullfrogs, crayfish, and fishes on northern Mexican garter snakes is a significant threat range-wide, as is predation on gartersnake prey species (competition) by these same groups of nonnative taxa. Nonnative fish, crayfish, and bullfrogs have reduced native populations of prey species throughout the range.

While disease is not currently considered a direct threat to northern Mexican gartersnakes, chytridiomycosis or Bd does have a widespread effect on anuran prey availability for the species. In addition, stress placed on northern Mexican gartersnakes as a result of threats related to habitat may affect the health condition of individuals within populations affected by these threats, which may increase the potential for disease within current populations in the future.

Threats to northern Mexican gartersnake critical habitat include water diversions, groundwater pumping, dams, channelization, and erosion. These are occurring in both the U.S. and Mexico and affect the amount of water within occupied habitat, directly affecting its suitability for northern Mexican gartersnakes. Threats from development, roads, flood control and water diversion, improper livestock grazing, high-intensity wildfire, and undocumented immigration that alter the vegetation of occupied northern Mexican gartersnake habitat are documented throughout its range and reduce the habitat's suitability as cover for protection from predators, as a foraging area, and as an effective thermoregulatory site.

Nine 5<sup>th</sup> level watersheds are known to have current or historical presence of northern Mexican gartersnake. The main PNVTs within these watersheds are piñon-juniper and grassland PNVTs with relatively low percentages of satisfactory soil conditions. Many of these watersheds are also rated "At-Risk" or "Impaired" for several key watershed condition indicators. These departures are collectively contributing to an altered hydrologic condition that is affecting aquatic habitat quality in the Verde River. A more complete discussion of soil and watershed conditions can be found in the "Need for Change 2" section of chapter 3.

Historically, this species is found along the Verde River and Little Ash Creek on the forest (Rosen and Schwalbe, 1988). A few specimens have been collected in recent years along the Verde River (Holycross et al., 2006; Emmons and Nowak, 2013), where populations are considered to be at low densities. Trends in species population and habitat in the Verde River have decreased from historical levels due to the establishment of nonnative aquatic species and a reduction in habitat quantity and quality. Current occupied habitat is estimated at about 47 miles along the Verde River. Factors contributing to the degradation of habitat include water diversions, nutrient enrichment from agricultural practices, excess sedimentation from land development in the watersheds, and the establishment of invasive plant species. Based on available information, populations along Little Ash Creek may be at low densities or could be extirpated, but there is insufficient evidence to support extirpation (Fish and Wildlife Service, 2014).

#### **Narrow-headed Gartersnake and Critical Habitat**

The narrow-headed gartersnake (*Thamnophis rufipunctatus*) was proposed for listing as threatened under the Endangered Species Act in 2013 (Fish and Wildlife Service, 2013a), and its threatened listing was finalized in 2014 (Fish and Wildlife Service, 2014). The designation of its critical habitat was proposed in 2013 (Fish and Wildlife Service, 2013b) and is expected to be finalized in the future.

There are 38 known localities for the narrow-headed gartersnake in the U.S. (Fish and Wildlife Service, 2013a). The current status for 29 of the 38 localities (76 percent) is considered likely not viable and may exist at low population densities that could be threatened with extirpation or may already be extirpated. In most localities where the species may occur at low population densities, existing survey data are insufficient to prove extirpation. Only three populations of narrow-headed gartersnakes in the U.S. are considered likely viable where the species remains reliably detected; the closest of these localities is Oak Creek in Arizona.

Critical habitat proposed on the Prescott NF includes the Verde River (Fish and Wildlife Service, 2013b). A total of 103 miles of proposed critical habitat along the Verde River occurs on or adjacent to the Prescott NF and is contiguous with proposed critical habitat for northern Mexican gartersnake.

In Arizona, the narrow-headed gartersnake is known primarily from streams draining the Mogollon Rim and the White Mountains (Arizona Game and Fish Department, 2009a). Most localities are between 4,000 and 6,000 feet elevation in aquatic systems of piñon-juniper, oak-pine belts, or ponderosa pine forests (Rosen and Schwalbe, 1988). It is a highly aquatic species, primarily consumes fish, and is associated with cool and clear riffle pool complexes supporting high native fish concentrations. Threats to this species from human activities include loss or reduction of streamflow, habitat modification, grazing along streambeds, and increased recreational use in riparian areas. Other threats include introduced predators such as bullfrogs or nonnative fishes and habitat fragmentation. Trends show declines in many populations.

A few specimens have been collected in recent years along the Verde River (Holycross et al., 2006; Emmons et al., 2011), but there are no known or historical occurrences within the Agua Fria River drainage (Arizona Game and Fish Department, 2009a). Nonnative fish populations, bullfrogs, and crayfish are well established throughout the Verde River and pose threats of predation. Trends in population and habitat for narrow-headed gartersnake in the Verde River have decreased from historical levels due to the presence of nonnative species. This is a persistent issue for all native species in and along the Verde River.

Information on watershed conditions and threats to narrow-headed gartersnake on the Prescott NF are the same as for the northern Mexican gartersnake.

### **Colorado Pikeminnow**

Wild populations of Colorado pikeminnow (*Ptychocheilus lucius*) exist only in the upper Colorado River basin above Glen Canyon Dam. Populations in the lower Colorado River basin were extirpated. Introduction of pikeminnow have occurred within the Verde and Salt Rivers in Arizona as “experimental non-essential” under Section 10J of the Endangered Species Act (Fish and Wildlife Service, 1985); however, no critical habitat has been designated in Arizona.

Colorado pikeminnow is adapted to life in big river systems that are highly variable, with extremes in flow and turbidity. Habitat includes pools, deep runs, and eddies of medium to large rivers. Threats to the species include streamflow regulation, habitat modification, competition with and predation by nonnative fish species, and pesticides and pollutants.

Historical and current distribution and status of the Colorado pikeminnow on the Prescott NF is the same as for the razorback sucker. Introductions of Colorado pikeminnow made into main channel habitats of the Verde River since 1985 have had low survival, and recruitment has not

been documented (Hendrickson, 1993; Hyatt, 2004). Since 1994, almost all reintroductions have occurred in the Verde Wild and Scenic River below Camp Verde. The extent of occupied habitat on the Prescott NF is 16 miles, located within the lower Verde River. The nonnative fish populations are well established throughout the Verde River and are a primary threat from both predation and competition to all native fishes.

Trends in population and habitat for Colorado pikeminnow in the Verde River have decreased from historical levels. This is primarily due to the establishment of nonnative aquatic species and a reduction in habitat quantity and quality. Factors contributing to the degradation of habitat include water diversions, nutrient enrichment from agricultural practices, excess sedimentation from land development in the watersheds, and the establishment of invasive plant species.

### **Roundtail Chub**

Roundtail chub (*Gila robusta*) are found in cool to warm water, mid-elevation rivers and streams throughout the Colorado River Basin, often occupying open areas of the deepest pools and eddies on middle sized to larger streams (Arizona Game and Fish Department, 2002a). Roundtail chub was once considered common throughout its range, including the Verde River and tributaries; however, it has been extirpated from approximately 60 percent of its historic occurrence. Current range includes areas varying in elevation from approximately 1,210 to 7,220 feet, although they are more commonly found between 2,000 and 5,000 feet. Habitats occupied by roundtail chubs are often associated with adjacent cover in the form of boulders, overhanging cliffs, undercut banks, or vegetation.

The greatest threats to roundtail chub are the predation by and competition with nonnative aquatic species, particularly fish, and the de-watering of habitat. De-watering can occur due to water diversions, groundwater pumping, mining, or urban and agricultural development. (Fish and Wildlife Service, 2009b). These threats will likely be exacerbated by changes to climatic patterns in the southwestern U.S. if the predicted patterns are realized and will be magnified by the fragmentation of existing populations.

Populations are found in the Verde River mainstem throughout the forest (Arizona Game and Fish Department, 2002a, 2003a, and 2009a), with about 51 miles of the Verde River considered occupied habitat. They were also introduced in Gap Creek within the Cedar Bench Wilderness on the Prescott NF in 2012. Trends in population and habitat for roundtail chub in the Verde River have decreased from historical levels. The primary threats specific to the Verde River include nonnative fish and reduced habitat quantity and quality from water withdrawals in the Big Chino Aquifer and the Verde Valley. Population growth in the area surrounding the forest is expected to continue with residential home and commercial development on private lands and increase impacts to watershed integrity.

As previously noted, the main PNVTs within the watersheds along the Verde River are the piñon-juniper and grassland PNVTs with relatively low percentages of satisfactory soil conditions. The five 5<sup>th</sup> level watersheds with occupied roundtail chub habitat are rated “At-Risk” or “Impaired” for several key watershed condition indicators. These departures are collectively contributing to an altered hydrologic condition that is affecting aquatic habitat quality in the Verde River. A more complete discussion of soil and watershed conditions can be found in the “Need for Change 2” section of chapter 3.

### **Southwestern Willow Flycatcher and Critical Habitat**

Occupied sites for southwestern willow flycatcher (*Empidonax traillii extimus*) in Arizona are located along permanent watercourses, including the San Pedro, Salt, Gila, and Verde Rivers; Alamo Lake; and Tonto Creek (Arizona Game and Fish Department, 2008a). The southwestern willow flycatcher is historically known to occur—nest and migrate—along the Verde River; however, no occurrences of this specific subspecies have been reported on Prescott NF lands. Several observations of other willow flycatchers were reported in 1997 on the Verde Ranger District in the vicinity of the Verde River and Black Canyon, and sites monitored along the Verde River have also reported occurrences adjacent to the Prescott NF in Camp Verde (Arizona Game and Fish Department, 2008a).

Critical habitat for southwestern willow flycatcher was designated in 2013 along 44.7 miles of the Verde River, encompassing both Federal and non-Federal land in the Verde Valley. Due to the fragmented nature of land ownership through the Verde Valley and the absence of thorough flycatcher surveys, it is difficult to determine flycatcher presence on National Forest System (NFS) parcels. There are currently no known southwestern willow flycatcher territories on the Prescott NF.

Southwestern willow flycatcher habitat requirements include riparian vegetation with dense foliage from ground level to 13 feet in thickets of trees and shrubs interspersed with small openings. It breeds in dense shrub and tree dominated riparian habitats along streams or other wetlands. Slow moving or still surface water is very common, and saturated soils are present at or near breeding sites during non-drought years (Fish and Wildlife Service, 2002b).

The threats to southwestern willow flycatcher are often interrelated and include habitat loss or modification, vulnerability due to a small population, and migration and winter range stresses associated with habitat quantity and quality. Nonnative species negatively impact habitats; however, tamarisk also provide a benefit as they are used for nesting. Tamarisk leaf beetle has been introduced in some areas as a biological-control agent to eradicate tamarisk and may now be considered a threat to southwestern willow flycatcher. Nest predation by brown-headed cowbirds can also be a significant contributor to population decline (Fish and Wildlife Service, 2002b).

### **Western Yellow-billed Cuckoo**

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is associated with riparian habitat features and is most closely associated with understory riparian vegetation. Historically the species was locally common and widespread in California and Arizona, locally common in New Mexico, Oregon, and Washington, and uncommon in Colorado, Wyoming, Idaho, Nevada, Utah, and British Columbia, Canada. Currently, the largest remaining population west of the Rocky Mountains is in Arizona., however, yellow-billed cuckoo is relatively common in much of the eastern U.S.

Yellow-billed cuckoos typically occur in narrow riparian cottonwood-willow galleries and are known to use salt cedar. Dense understory foliage is an important factor in nest site selection and they are known to use mesquite bosques in Arizona. Most reported occurrences in Arizona come from riparian habitats containing a variable combination of Fremont cottonwood, willow, velvet ash, Arizona walnut, mesquite, and tamarisk (Corman and Wise-Gervais, 2005).

The threats to the species include the destruction, modification, or curtailment of its habitat or range and natural or human-made factors affecting its continued existence (Fish and Wildlife Service, 2013c). Loss of riparian habitat has been identified as the primary cause of western yellow-billed cuckoo population decline. It may be precipitated by dam construction and operations, water diversions, river-flow management, stream channelization and stabilization, conversion of land to agricultural uses, urban and transportation infrastructure, and increased incidence of wildfire.

On the Prescott NF, western yellow-billed cuckoo have been documented along the Verde River, Sycamore Creek and Little Sycamore Creek, with a total of 13 observations reported between 2001 and 2003. They have also been documented breeding on the adjacent important bird areas (IBAs), Aqua Fria National Monument, and the Upper Verde River. Current status of breeding on Prescott NF lands is unknown, but no nesting was reported from monitored sites.

Habitat availability for this species on Prescott NF lands is approximately 7,496 acres. Habitat loss has been attributed to water diversion and impoundment, channelization, livestock grazing, off-road vehicle and other recreation uses, as well as increases in nonnative plant species (Fish and Wildlife Service, 2010). Currently, proposed critical habitat for western yellow-billed cuckoo has been identified on the Verde River, the Agua Fria River, and tributaries.

**Regionally Sensitive Species**

The regional forester’s sensitive species program is the Forest Service’s dedicated initiative to conserve and recover plant and animal species according to Forest Service policy (FSM 2670). The Prescott NF improves habitat and restores ecosystems for sensitive species through vegetation treatments and management practices. Sensitive species are those plant and animal species identified by the regional forester for which population viability is a concern, as evidenced by the following:

- Significant current or predicted downward trends in population numbers or density, and
- Significant current or predicted downward trends in habitat capability that would reduce a species’ existing distribution

The Regional Forester’s sensitive species list from 2007 was updated in 2013. Between draft and final versions of this EIS additional analysis was conducted for several species new to the list. Table 36 reflects the 2013 list of regionally sensitive species that are known or are likely to occur in aquatic or riparian habitats within the planning area.

The occupied river mile and acreage estimates reported in table 36 are based upon the vegetation types, inclusions, riverine, or riparian habitats that meet the life history requirements of the species.

**Table 36. Regionally sensitive species and habitat**

Common Name	Status	Habitat Extent on the Prescott NF
Desert sucker	Sensitive	59 miles

Common Name	Status	Habitat Extent on the Prescott NF
Sonora sucker	Sensitive	51 miles
Bald eagle	Sensitive	3,356 acres
Western red bat	Sensitive	4,247 acres
Lowland leopard frog	Sensitive	62 miles
A Caddisfly*	Sensitive	Unknown
Brown springsnail	Sensitive	0.25 mile
Verde Rim springsnail	Sensitive	0.25 mile
Broadleaf lupine	Sensitive	Unknown
Cochise sedge*	Sensitive	Unknown

\*Species added to regionally sensitive species list between DEIS and FEIS

### Desert Sucker and Sonora Sucker

Desert sucker (*Catostomus clarki*) are found in the rapids and flowing pools of streams and rivers, primarily over bottoms of gravel-rubble with sandy silt in the interstices. Elevation ranges from 480 to 8,840 feet. The Sonora sucker (*Catostomus insignis*) is found in a variety of habitats from warm water rivers to trout streams between 1,210 and 8,730 foot elevations. Threats to these species and their habitats include the introduction and spread of nonnative aquatic species and the destruction of habitat from human activities.

Desert sucker occur in numerous streams in the planning area, and Sonora sucker are found in the Verde River mainstem throughout the forest (Arizona Game and Fish Department, 1995a, 2002a, 2003a, and 2009a). Population abundance for these species in the Verde River is being negatively impacted due to nonnative predatory fishes (Bonar et al., 2004). Conditions are similar to those for razorback sucker, loach minnow, and spokedace, which also reside in the Verde River and face similar threats to their populations and habitat.

Abundance in other streams across the forest is influenced by the amount of available habitat in these intermittent or perennial-interrupted streams and the presence of nonnative aquatic species. Placer mining is a regular occurrence in the Hassayampa, Big Bug Creek, and Turkey Creek drainages, and it is an example of the type of activity that is contributing to degradation of desert sucker habitat.

### Bald Eagle

Bald eagle (*Haliaeetus leucocephalus*) is associated with riparian habitat, as well as rock and tree features. Wintering populations occur in both central and northern Arizona (Arizona Game and Fish Department, 2010a), and breeding sites are distributed mostly along major rivers in the central portion of the State (Southwestern Bald Eagle Management Committee, 2010). Known breeding occurrences for the Prescott NF include three monitored nest sites located at Lynx Lake and along the Verde River, with confirmed fledgling of at least one young each year from 2002 to 2009. One winter roost site is also known to occur on the Prescott NF near Goldwater Lake.

Nesting in Arizona typically occurs on cliff faces, pinnacles, and ledges, generally within 600 feet of water or in pine habitats within 1 mile of larger water bodies. Nesting habitat for the bald eagle includes 2,780 acres of overstory riparian along the Verde River, 426 acres of cliff habitat along the Verde River, and approximately 100 acres of ponderosa pine forest adjacent to Lynx Lake. Winter roost habitat includes about 50 acres adjacent to Goldwater Lake. The total acres of bald eagle habitat on the Prescott NF is approximately 3,356 acres.

Human disturbance can lead to nest failure. Power line electrocution and automobile collisions associated with feeding on road kill are potential mortality factors (Fish and Wildlife Service, 1999b).

### **Western Red Bat**

Western red bat (*Lasiurus blossevillii*) is associated with broadleaf deciduous riparian forests and other wooded areas, which comprise roosting habitat as well. It is usually solitary, roosting primarily in the foliage of trees or shrubs (Western Bat Working Group, 2005); they have also been known to “roost” in the leaf litter in the riparian zone.

Arizona locations are scattered throughout the State but absent from the desert areas (Hoffmeister, 1986), at elevations ranging from 1,900 to 7,200 feet (Arizona Game and Fish Department, 2003b). One occurrence near the Verde River was reported in 1994 (Arizona Game and Fish Department, 1995b) and several other occurrences were reported within Yavapai County, east of the Prescott NF (Heritage Data Management System, 2011). Modeling indicates approximately 4,248 acres of existing habitat on the Prescott NF.

The loss of dense, mature cottonwood forest is a factor in declining abundance (Arizona Game and Fish Department, 2003c). Intensive use of pesticides in fruit orchards may pose a threat to individuals and may reduce available prey. Controlled burns have the potential to cause mortality of bats roosting in leaf litter during periods of cooler temperatures (Western Bat Working Group, 2005).

### **Lowland Leopard Frog**

The lowland leopard frog (*Lithobates yavapaiensis*) is found in small to medium streams, small springs, stock ponds, and occasionally large rivers. This species is generally restricted to permanent waters below elevations of 6,400 feet. The greatest threats to this species are habitat alteration and fragmentation, accentuated by the introduction of nonnative predatory and competitive fishes, crayfishes, and bullfrogs.

Placer mining is a regular occurrence in the Hassayampa and Big Bug Creek drainages, and it is an example of the type of activity that is contributing to degradation of lowland leopard frog habitat. Trends in population and habitat in the Verde River and other streams have decreased from historical levels because of the introduction and establishment of nonnative aquatic species that are predatory and/or competitive with native species and reduced habitat quantity and quality from water diversions, nutrient enrichment from agricultural practices, excess sedimentation from land development in the watersheds, and introduction and establishment of invasive plant species.

### **A Caddisfly**

A Caribbean genus, A caddisfly (*Wormaldia planae*) is more or less restricted to the cooler spring-fed streams in mountainous regions of Middle America (Flint, 1968). This species was originally described from Chiapas, Mexico but was recently found in Arizona from Gila County to Yavapai County (Gila County: Line Fossil Creek, Fossil Creek; Yavapai County: Beaver Creek, below outlet of Montezuma Well; unnamed stream at Ward Ranch) (Munoz-Quesada and Holzanthal, 2008). These localities and 5<sup>th</sup> level watersheds are mainly on the Coconino NF. There have been no surveys for this species on the Prescott NF.

### **Brown Springsnail**

The total range of the Brown springsnail (*Pyrgulopsis sola*) is Brown Spring in Yavapai County, Arizona (Arizona Game and Fish Department, 2003a). This occurrence is on private lands but with a water diversion to forest lands. Threats include highly restricted distribution with associated potential for extinction due to chance events, water development, and groundwater depletion. The population has not been monitored since 1988, so population trends are unknown (Arizona Game and Fish Department, 2003a).

### **Verde Rim Springsnail**

The total range of the Verde Rim springsnail (*Pyrgulopsis glandulosa*) is the Nelson Place Spring complex that forms the headwaters of Sycamore Creek in Yavapai County, Arizona (Arizona Game and Fish Department, 2003a). This occurrence is on private lands, but the spring is not fenced off from livestock grazing within the Sycamore allotment. Forest Trail 159 to Pine Mountain Wilderness passes through the spring habitat. Threats include highly restricted distribution with associated potential for extinction due to chance events, wildfire, improper livestock grazing, and recreational activities. A site visit in September 2010 revealed a large, healthy population at the main spring (Stevens and Ledbetter, 2011).

### **Broadleaf Lupine**

In Arizona, broadleaf lupine (*Lupinus latifolius var. leucanthus*) occurs in Mohave, Gila, and Yavapai Counties. The total distribution range for broadleaf lupine is 175 miles: in southeast Mohave County, there are 2 occurrences, ranging less than 1 mile; in north and central Gila County, there are 3 occurrences, ranging 35 miles; and in central Yavapai County, there are 21 occurrences, ranging 50 miles. Nineteen occurrences for the species are widespread over the Prescott NF, ranging 45 miles (Arizona Game and Fish Department, 2005d). Populations of broadleaf lupine within the Prescott NF nearly always occur along perennial streams or where the soil is wet all or most of the year. They are also found on north-facing slopes, along streams, and near springs, with substrates including granite, granite cobble, and basalt. Elevation ranges between 4,265 and 6,900 feet with a mean elevation of 5,600 feet.

The primary threat to populations of broadleaf lupine is wetland degradation. Healthy populations occur where there is a stable source of flowing water, and the drying of soil or severe flooding can kill entire stands. There is no evidence that grazing negatively affects plants and, because of the perennial nature of its underground stems, most fires do not directly kill individuals. However, severe fires could kill stands by impacting wetland stability. Encroaching weeds, especially those with perennial rhizomes, are capable of crowding out broadleaf lupine in riparian areas.

### **Cochise Sedge**

Cochise sedge (*Carex ultra*) is a widespread species occurring from Mexico (Sonora and Coahila), to New Mexico (Grant, Hidalgo, and Sierra counties), and Arizona (Cochise, Coconino, Graham, Pima, Pinal, Santa Cruz, and Yavapai counties). Populations of Cochise sedge are most often found growing in saturated soil near perennial seeps, streams, and springs, and in shady, moist canyon bottoms at elevations ranging between 2,000 and 5,900 feet. Rare plant surveys indicate that the species occurs at the southern edge of the Prescott NF, but no plants have been found within the Forest boundaries (Forest Service, 2011d). The primary threat to populations of Cochise sedge is riparian habitat degradation. Grazing and trampling can heavily impact these areas if not properly managed (Forest Service, 2013).

### **Management Indicator Species**

#### **Aquatic Macro-invertebrates**

The Prescott NF followed the process and procedures outlined for management indicator species (MIS) selection outlined in the “Region 3 Management Indicator Species Selection Process and Criteria” (Forest Service, 2010b). Aquatic macro-invertebrates were chosen as an indicator of water quality based on their responsiveness to changes in water quality and physical features of stream channels essential for quality aquatic habitat. By monitoring aquatic macro-invertebrate populations and/or water quality parameters, the health and productivity of these systems can be assessed.

Aquatic macro-invertebrates include mayflies, stoneflies, caddis flies, black flies, beetles, midges, freshwater earthworms, snails, and many others. Each species has specific habitat needs and so they respond differently to changes in either the chemical, physical, or biological components of their habitat. These species are classified or separated according to a number of habitat preferences and life history traits. A main distinction between species or groups is their tolerance to pollution. Species are classified as pollution intolerant taxon or pollution tolerant taxon. Examples of water quality parameters affecting pollution intolerant species are excessive fine sediments, low dissolved oxygen, high water temperatures, and nutrient enrichment.

Aquatic macro-invertebrates are a management indicator species for aquatic habitat and late seral riparian habitat in the 1987 plan. Population and habitat trend data for macro-invertebrates is reported in the “Forest Level Analysis of Management Indicator Species for the Prescott NF” (Forest Service, 2010b). Bio-assessments and/or water quality assessments have been completed on 193.3 miles of perennial streams across the forest since 1992 by the Arizona Department of Environmental Quality (Arizona Department of Environmental Quality, 2000, 2002, 2004b, and 2009). These assessments are used to evaluate the health of the aquatic habitat found on the Prescott NF as described above in the “Affected Environment.” The 193 assessed miles of perennial stream habitat represent the known extent of aquatic macro-invertebrate habitat on the Prescott NF.

Two terrestrial species—pronghorn antelope and northern goshawk—were also selected as MIS (see “Management Indicator Species” section for terrestrial species in “Need for Change 1”).

## Environmental Consequences

### Federally Listed Species

**Table 37. Federally listed species trends by alternative**

Trend	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Population trends for federally listed species	Stable	Increase	Greatest Increase	Increase	
Habitat trends for federally listed species	Slow increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity	Greatest increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity	

### Gila Chub and Critical Habitat

#### Common to All Alternatives

The implementation of plan components related to vegetation and fire treatments, recreation and wilderness management, and lands, minerals, transportation and special uses management is expected to have insignificant and discountable effects to Gila chub because of the limited extent and rate of treatments and the mitigation of effects through implementation of standards and guidelines. Plan components related to watershed and soil management, wildlife, fish, and rare plants management, transportation, and range management may have short term adverse effects to the species and critical habitat but would maintain or improve the quality of occupied habitat and primary constituent elements of critical habitat on the forest. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for Gila chub and Gila chub critical habitat.

#### Alternative A

Among all alternatives, alternative A would have the least effect to Gila chub population and habitat trends, primarily due to the low emphasis on native fish restoration. Gila chub populations would be maintained at current, lower than historic levels, and there would be no change expected in habitat quantity or distribution. Habitat quality would continue to improve at a slow rate. Based on the analysis of the effects on the aquatic habitat, it was determined that this alternative would maintain species viability on the Prescott NF but would not increase trends in species populations.

Relevant laws, policies, and manual direction such as FSM 2600 that regulate management of federally listed and regionally sensitive species would remain in place, and these species would continue to be addressed in project-level analyses.

Environmental consequences from management actions would be low for Gila chub and its designated critical habitat in the Ash Creek-Sycamore Creek watershed. Current populations are below historic levels due to the presence of nonnative aquatic species in the suitable habitats.

Vegetation treatments are intended to restore the natural fire regime, improve forest health, and reduce the potential for high severity wildfire in the planning area. The erosion and surface runoff from these treatments that would result in short term sedimentation and nutrient loading in

species habitat would be mitigated by implementation of the standards, guidelines, and best management practices prescribed in the 1987 plan. Long term, these treatments would result in improved watershed, soil, and vegetation conditions in the planning area, which in turn would maintain or improve aquatic habitats and species populations on the forest.

Runoff, sedimentation, and loss of riparian vegetation from recreation use are problems that are not adequately addressed under current management direction. These factors degrade the quality of the existing and potential aquatic and riparian habitat and can work against habitat restoration and species recovery efforts. This could account, in part, for the slow rate of recovery under current direction.

### **Alternatives B and D**

These alternatives would promote increasing trends in Gila chub habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that they would maintain species viability on the Prescott NF.

Alternatives B and D provide direction for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1).

This direction would have a positive effect on Gila chub by increasing the quality of the existing and potential habitat at a faster rate than current guidance. The improvements in habitat quality could be expected to lead to increased rates of success for recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). There is no expected change in the quantity or distribution of Gila chub habitat in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B and D. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish (Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in Gila chub populations and the most improvement in the quality of Gila chub habitat. This alternative is not expected to increase the quantity or distribution of habitat for Gila chub, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

### **Alternative E**

Alternative E would also promote increasing trends in Gila chub habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

Alternative E provides direction similar to alternatives B and D for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). It does not contain specific direction for land acquisition of inholdings along occupied and critical riparian habitat as found in Objective 29 of the other action alternatives. There is no expected change in the quantity or distribution of Gila chub habitat in this alternative.

Alternative E contains direction (Objective 31) to apply for water rights on in-stream flows within rivers that flow through the Prescott NF. This could complement native fish restoration actions by protecting base flows where water rights are granted and help maintain aquatic and riparian habitats on the Prescott NF.

### **Razorback Sucker and Critical Habitat**

#### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; recreation and wilderness management; and lands, minerals, transportation and special uses management is expected to have insignificant and discountable effects to razorback sucker and razorback sucker critical habitat because of the limited extent and rate of treatments and the mitigation of effects through implementation of standards and guidelines. Plan components related to watershed and soil management, wildlife, fish, or rare plants management may have short term adverse effects to aquatic habitat but would result in long term beneficial effects to maintaining or improving critical habitat and species populations on the forest. Plan components related to range management would have short term adverse effects to water quality from livestock use along the Verde River but would maintain primary constituent elements of critical habitat on the forest. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for razorback sucker and razorback sucker critical habitat.

#### **Alternative A**

Among all alternatives, alternative A would have the least effect to razorback sucker population and habitat trends, primarily due to the low emphasis on native fish restoration. Management actions would cause no change to habitat quantity or distribution, and habitat quality would continue to improve, albeit at a slow rate. Based on the analysis of the effects on aquatic habitat, it was determined that species viability would not be achieved on the Prescott NF without the restoration of razorback sucker habitat and successful reintroduction of the species.

Relevant laws, policies, and manual direction, such as FSM 2600, that regulate the management of federally listed and regionally sensitive species would remain in place, and these species would continue to be addressed in project-level analyses.

Populations of razorback sucker would be maintained at current levels in the Verde River; however, these are lower than historic population levels due primarily to the presence of nonnative aquatic species and construction of a dam downstream from the Prescott NF.

Vegetation treatments are intended to restore the natural fire regime, improve forest health, and reduce the potential for high severity wildfire in the planning area. The erosion and surface runoff from these treatments that would result in short term sedimentation and nutrient loading in species habitat would be mitigated by implementation of the standards, guidelines, and best management practices prescribed in the 1987 plan. Long term, these treatments would result in improved watershed, soil, and vegetation conditions in the planning area, which in turn would maintain or improve aquatic habitats and species populations on the forest.

Runoff, sedimentation, and loss of riparian vegetation from recreation use are problems that are not adequately addressed under current management direction. These factors degrade the quality of the existing and potential aquatic and riparian habitat and can work against habitat restoration and species reintroduction efforts. This could account, in part, for the slow rate of recovery under current direction.

#### **Alternatives B and D**

Alternatives B and D would promote increasing trends in razorback sucker habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that they would maintain species viability on the Prescott NF.

These alternatives provide direction for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). This direction would have a positive effect on razorback sucker by increasing the quality of the existing and potential habitat at a faster rate than current guidance. Improvements in habitat quality could be expected to lead to increased rates of success for razorback sucker reintroduction efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). However, there is no expected change in the quantity or distribution of razorback sucker habitat in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

#### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B and D. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish (Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in razorback sucker populations and the most improvement in the quality of

razorback sucker habitat. This alternative is not expected to increase the quantity or distribution of razorback sucker habitat, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

### **Alternative E**

Alternative E would also promote increasing trends in razorback sucker habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

Alternative E provides direction similar to alternatives B and D for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). It does not contain specific direction for land acquisition of inholdings along occupied and critical riparian habitat as found in Objective 29 of the other action alternatives. There is no expected change in the quantity or distribution of razorback sucker habitat in this alternative.

Alternative E contains direction (Objective 31) to apply for water rights on in-stream flows within rivers that flow through the Prescott NF. This could complement native fish restoration actions by protecting base flows where water rights are granted and help maintain aquatic and riparian habitats on the Prescott NF.

### **Spikedace, Loach Minnow, and Critical Habitat**

#### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; recreation and wilderness management; and lands, minerals, transportation and special uses management is expected to have insignificant and discountable effects to spikedace and loach minnow because of the limited extent and rate of treatments and the mitigation of effects through implementation of standards and guidelines. Plan components related to watershed and soil management, wildlife, fish, or rare plants management, may have short term adverse effects to aquatic habitat but would result in long term beneficial effects to maintaining or improving aquatic habitat and species populations on the forest. Plan components related to range management would maintain or improve upland and riparian vegetation on the forest but would have short term adverse effects to water quality from livestock use along the upper Verde River. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for spikedace and loach minnow.

The implementation of plan components related to vegetation and fire treatments; recreation and wilderness management; and lands, minerals, transportation and special uses management is expected to have insignificant and discountable effects to spikedace and loach minnow critical habitat because of the limited extent and rate of treatments and the mitigation of effects through implementation of standards and guidelines. Plan components related to watershed and soils management, wildlife, fish, or rare plants management may have short term adverse effects to aquatic habitat, but would result in long term beneficial effects to maintaining or improving primary constituent elements of critical habitat on the forest. Plan components related to range management would have short term adverse effects to water quality from livestock use along the Verde River but would maintain primary constituent elements of critical habitat on the forest. All

of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for spikedace and loach minnow critical habitat.

#### **Alternative A**

Among all alternatives, alternative A would have the least effect to spikedace and loach minnow population and habitat trends, primarily due to the low emphasis on native fish restoration. The effects are expected to be the same as those for razorback sucker and its designated critical habitat. Based on the analysis of the effects on the aquatic habitat, it was determined that viability would not be achieved on the Prescott NF without habitat restoration and the successful recovery of these species.

#### **Alternatives B and D**

Alternatives B and D would promote increasing trends in spikedace and loach minnow habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that they would maintain species viability on the Prescott NF.

Alternatives B and D provide direction for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). This direction would have a positive effect on both spikedace and loach minnow by increasing the quality of the existing and potential habitat at a faster rate than current guidance. The improvements in habitat quality could be expected to lead to increased rates of success for recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). There is no expected change in the quantity or distribution of spikedace or loach minnow habitat in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

#### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B and D. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish (Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in spikedace and loach minnow populations and the most improvement in habitat quality. This alternative is not expected to increase the quantity or distribution of habitat for spikedace or loach minnow, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF for both of these species.

### **Alternative E**

Alternative E would also promote increasing trends in spokedace and loach minnow habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

Alternative E provides direction similar to alternatives B and D for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). It does not contain specific direction for land acquisition of inholdings along occupied and critical riparian habitat as found in Objective 29 of the other action alternatives. There is no expected change in the quantity or distribution of spokedace and loach minnow habitat in this alternative.

Alternative E contains direction (Objective 31) to apply for water rights on in-stream flows within rivers that flow through the Prescott NF. This could complement native fish restoration actions by protecting base flows where water rights are granted and help maintain aquatic and riparian habitats on the Prescott NF.

### **Gila Trout**

#### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; recreation and wilderness management; and lands, minerals, transportation and special uses management is expected to have insignificant and discountable effects to Gila trout because of the limited extent and rate of treatments and the mitigation of effects through implementation of standards and guidelines. Plan components related to watershed and soil management, wildlife, fish, or rare plants management, and range management may have short term adverse effects to the species but would maintain or improve quality of occupied and suitable habitat on the forest. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for Gila trout.

#### **Alternative A**

Among all alternatives, alternative A would have the least effect to Gila trout population and habitat trends, primarily due to the low emphasis on native fish restoration. Based on the analysis of the effects on the aquatic habitat, it was determined that this alternative would maintain species viability on the Prescott NF but would not increase trends in species populations.

Relevant laws, policies, and manual direction, such as FSM 2600, that regulate the management of federally listed and regionally sensitive species would remain in place, and these species would continue to be addressed in project-level analyses.

Gila trout populations would be maintained at current levels which are higher than historic population levels due to successful introductions in the Big Bug Creek watershed. There would be no change expected in habitat quantity or distribution, and habitat quality would continue to improve at a slow rate. The environmental consequences of other management actions would be similar to those for Gila chub.

### **Alternatives B and D**

Alternatives B and D would promote increasing trends in Gila trout habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that they would maintain species viability on the Prescott NF.

Alternatives B and D provide direction for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1).

This direction would have a positive effect by increasing the quality of existing and potential habitat at a faster rate than current guidance. The improvements in habitat quality could be expected to lead to increased rates of success for Gila trout recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). There is no expected change in the quantity or distribution of Gila trout habitat in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B and D. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish (Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in Gila trout populations and the most improvement in the quality of Gila trout habitat. This alternative is not expected to increase the quantity or distribution of habitat for Gila trout, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

### **Alternative E**

Alternative E would also promote increasing trends in Gila trout habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

Alternative E provides direction similar to alternatives B and D for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). It does not contain specific direction for land acquisition of inholdings along occupied and critical riparian habitat as found in Objective 29 of the other action alternatives. There is no expected change in the quantity or distribution of Gila trout habitat in this alternative.

Alternative E contains direction (Objective 31) to apply for water rights on in-stream flows within rivers that flow through the Prescott NF. This could complement native fish restoration actions by protecting base flows where water rights are granted and help maintain aquatic and riparian habitats on the Prescott NF.

### **Northern Mexican Gartersnake and Critical Habitat**

#### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; recreation and wilderness management; and lands, minerals, transportation and special uses management is expected to have insignificant and discountable effects to northern Mexican gartersnake and proposed northern Mexican gartersnake critical habitat because of the limited extent and rate of treatments and the mitigation of effects through implementation of standards and guidelines. Plan components related to watershed and soil management, wildlife, fish, or rare plants management, may have short term adverse effects to aquatic and riparian habitat but would result in long term beneficial effects to maintaining or improving proposed critical habitat and species populations on the forest. Plan components related to range management would have short term adverse effects to aquatic and riparian habitat from livestock use along the Verde River and Little Ash Creek but would maintain primary constituent elements of proposed critical habitat on the forest. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for northern Mexican gartersnake and proposed northern Mexican gartersnake critical habitat.

#### **Alternative A**

Among all alternatives, alternative A would have the least effect to northern Mexican gartersnake population and habitat trends, primarily due to the low emphasis on native fish restoration. Management actions would cause no change to habitat quantity or distribution, and habitat quality would continue to improve, albeit at a slow rate. Based on the analysis of the effects on the riparian habitat, it was determined that viability would not be achieved on the Prescott NF without habitat restoration and the successful recovery of the species.

Runoff, sedimentation, and loss of riparian vegetation from recreation use are problems that are not adequately addressed under current management direction. These factors degrade the quality of existing and potential aquatic and riparian habitat and can work against habitat restoration and species recovery efforts. This could account, in part, for the slow rate of recovery under current direction.

#### **Alternatives B, D, and E**

Alternatives B, D, and E would promote increasing trends in northern Mexican gartersnake habitat and populations, and based on the analysis of the effects on the riparian habitat, it was determined that they would maintain species viability on the Prescott NF.

All of these alternatives provide direction for watershed integrity projects (Objectives 18 to 22), and alternatives B and D provide direction for land acquisition of inholdings along occupied and critical habitat (Objective 29) that would directly benefit northern Mexican gartersnakes. They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). This direction would have a positive effect by increasing the quality of existing and potential northern Mexican gartersnake habitat at a faster rate than current guidance, and the improvements in

habitat quality could be expected to lead to increased rates of success for recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). There is no expected change in the quantity or distribution of northern Mexican gartersnake habitat in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B, D, and E. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish (Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in populations and the most improvement in the quality of northern Mexican gartersnake habitat. This alternative is not expected to increase the quantity or distribution of habitat for northern Mexican gartersnake, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

### **Narrow-headed Gartersnake and Critical Habitat**

#### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; recreation and wilderness management; and lands, minerals, transportation and special uses management is expected to have insignificant and discountable effects to narrow-headed gartersnake and proposed narrow-headed gartersnake critical habitat because of the limited extent and rate of treatments and the mitigation of effects through implementation of standards and guidelines. Plan components related to watershed management, wildlife, fish, or rare plants management, may have short term adverse effects to aquatic and riparian habitat but would result in long term beneficial effects to maintaining or improving proposed critical habitat and species populations on the forest. Plan components related to range management would have short term adverse effects to aquatic and riparian habitat from livestock use along the Verde River but would maintain primary constituent elements of proposed critical habitat on the forest. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for narrow-headed gartersnake and proposed narrow-headed gartersnake critical habitat.

#### **Alternative A**

Among all alternatives, alternative A would have the least effect to narrow-headed gartersnake population and habitat trends, primarily due to the low emphasis on native fish restoration. Management actions would cause no change to habitat quantity or distribution, and habitat quality would continue to improve, albeit at a slow rate. Based on the analysis of the effects on the

riparian habitat, it was determined that viability would not be achieved on the Prescott NF without habitat restoration and the successful recovery of the species.

Runoff, sedimentation, and loss of riparian vegetation from recreation use are problems that are not adequately addressed under current management direction. These factors degrade the quality of existing and potential aquatic and riparian habitat and can work against habitat restoration and species recovery efforts. This could account, in part, for the slow rate of recovery under current direction.

### **Alternatives B, D, and E**

Alternatives B, D, and E would promote increasing trends in narrow-headed gartersnake habitat and populations, and based on the analysis of the effects on the riparian habitat, it was determined that they would maintain species viability on the Prescott NF.

All of these alternatives provide direction for watershed integrity projects (Objectives 18 to 22), and alternatives B and D provide direction for land acquisition of inholdings along occupied and critical habitat (Objective 29) that would directly benefit narrow-headed gartersnakes. They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). This direction would have a positive effect by increasing the quality of existing and potential narrow-headed gartersnake habitat at a faster rate than current guidance, and the improvements in habitat quality could be expected to lead to increased rates of success for recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). There is no expected change in the quantity or distribution of northern Mexican gartersnake habitat in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B, D, and E. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish (Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in populations and the most improvement in the quality of narrow-headed gartersnake habitat. This alternative is not expected to increase the quantity or distribution of habitat for narrow-headed gartersnake, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

## **Colorado Pikeminnow**

### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; watershed and soils management; recreation and wilderness management; lands, minerals, transportation and range management is expected to have insignificant and discountable effects to Colorado pikeminnow because of the limited extent of action and/or mitigation of effects through implementation of standard and guidelines. The proposed LRMP would result in a “Not Likely to Jeopardize” determination to the §10(j) population of Colorado pikeminnow.

### **Alternative A**

Among all alternatives, alternative A would have the least effect to Colorado pikeminnow population and habitat trends, primarily due to the low emphasis on native fish restoration. The effects are expected to be the same as those for razorback sucker and its designated critical habitat. Based on the analysis of the effects on the aquatic habitat, it was determined that viability would not be achieved on the Prescott NF without habitat restoration and the successful reintroduction of this species.

### **Alternatives B and D**

Alternatives B and D would promote increasing trends in Colorado pikeminnow habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that they would maintain species viability on the Prescott NF.

These alternatives provide direction for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Fish/Aquatic Guideline 1).

This direction would have a positive effect by increasing the quality of the existing and potential habitat at a faster rate than current guidance. The improvements in Colorado pikeminnow habitat quality could be expected to lead to increased rates of success for reintroduction efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). There is no expected change in the quantity or distribution of Colorado pikeminnow habitat in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B and D. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish

(Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in Colorado pikeminnow populations and the most improvement in the quality of Colorado pikeminnow habitat. This alternative is not expected to increase the quantity or distribution of habitat for Colorado pikeminnow, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

### **Alternative E**

Alternative E would also promote increasing trends in Colorado pikeminnow habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

Alternative E provides direction similar to alternatives B and D for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). It does not contain specific direction for land acquisition of inholdings along occupied and critical riparian habitat as found in Objective 29 of the other action alternatives. There is no expected change in the quantity or distribution of Colorado pikeminnow habitat in this alternative.

Alternative E contains direction (Objective 31) to apply for water rights on in-stream flows within rivers that flow through the Prescott NF. This could complement native fish restoration actions by protecting base flows where water rights are granted and help maintain aquatic and riparian habitats on the Prescott NF.

### **Roundtail Chub**

#### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; recreation and wilderness management; and lands, minerals, transportation and special uses management is expected to have insignificant and discountable effects to roundtail chub because of the limited extent and rate of treatments and the mitigation of effects through implementation of standards and guidelines. Plan components related to watershed and soil management, wildlife, fish, or rare plants management may have short term adverse effects to aquatic habitat but would result in long term beneficial effects to maintaining or improving aquatic habitat and species populations on the forest. Plan components related to range management would maintain or improve upland and riparian vegetation on the forest but would have short term adverse effects to water quality from livestock use along the Verde River and tributaries. All of the alternatives would result in a “Not Likely to Jeopardize” determination for roundtail chub.

#### **Alternative A**

Among all alternatives, alternative A would have the least effect to roundtail chub population and habitat trends, primarily due to the low emphasis on native fish restoration. Roundtail chub populations would be maintained at current, lower than historic, levels and there would be no change expected in habitat quantity or distribution. Habitat quality would continue to improve at a slow rate. Based on the analysis of the effects on the aquatic habitat, it was determined that this alternative would maintain species viability on the Prescott NF but would not increase trends in species populations.

Relevant laws, policies, and manual direction, such as FSM 2600, that regulate the management of federally listed and regionally sensitive species would remain in place, and these species would continue to be addressed in project-level analyses.

Environmental consequences from management actions would be low to moderate for roundtail chub and its habitat in the Verde River. Current populations are below historic levels due to the presence of nonnative aquatic species in suitable habitats.

Vegetation treatments are intended to restore the natural fire regime, improve forest health, and reduce the potential for high severity wildfire in the planning area. The erosion and surface runoff from these treatments that would result in short term sedimentation and nutrient loading in species habitat would be mitigated by implementation of the standards, guidelines, and best management practices prescribed in the 1987 plan. Long term, these treatments would result in improved watershed, soil, and vegetation conditions in the planning area, which in turn would maintain or improve aquatic habitats and species populations on the forest.

Runoff, sedimentation, and loss of riparian vegetation from recreation use are problems that are not adequately addressed under current management direction. These factors degrade the quality of the existing and potential aquatic and riparian habitat and can work against habitat restoration and species recovery efforts. This could account, in part, for the slow rate of recovery under current direction.

#### **Alternatives B and D**

These alternatives would promote increasing trends in roundtail chub habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that they would maintain species viability on the Prescott NF.

Alternatives B and D provide direction for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1).

This direction would have a positive effect on roundtail chub by increasing the quality of the existing and potential habitat at a faster rate than current guidance. Improvements in habitat quality could be expected to lead to increased rates of success for recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). There is no expected change in the quantity or distribution of roundtail chub habitat in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B and D. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish (Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in roundtail chub populations and the most improvement in the quality of roundtail chub habitat. This alternative is not expected to increase the quantity or distribution of habitat for roundtail chub, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

### **Alternative E**

Alternative E would also promote increasing trends in roundtail chub habitat and populations, and based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

Alternative E provides direction similar to alternatives B and D for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Fish/Aquatics-1). It does not contain specific direction for land acquisition of inholdings along occupied and critical riparian habitat as found in Objective 29 of the other action alternatives. There is no expected change in the quantity or distribution of roundtail chub habitat in this alternative.

Alternative E contains direction (Objective 31) to apply for water rights on in-stream flows within rivers that flow through the Prescott NF. This could complement native fish restoration actions by protecting base flows where water rights are granted and help maintain aquatic and riparian habitats on the Prescott NF.

## **Southwestern Willow Flycatcher and Critical Habitat**

### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; watershed and soil management; wildlife, fish, or rare plants management; and range may have short term adverse effects to riparian habitat, but would result in long term beneficial effects to maintaining or improving proposed critical habitat and species populations on the forest. Plan components related to recreation management, and lands, minerals, transportation and special uses management may have both short and long term adverse effects to southwestern willow flycatcher and southwestern willow flycatcher critical habitat. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for southwestern willow flycatcher and southwestern willow flycatcher critical habitat.

### **Alternative A**

Among all alternatives, alternative A would have the least effect to southwestern willow flycatcher population and habitat trends. Management actions would cause no change to habitat quantity or distribution, and habitat quality would continue to improve, albeit at a slow rate. Complying with the relevant management, including the “Southwestern Willow Flycatcher Recovery Plan” (Fish and Wildlife Service, 2002b), would ensure that key habitat features are

provided and available. Based on the analysis of the effects on riparian habitat features, it was determined that this alternative would maintain species viability on the Prescott NF.

Relevant laws, policies, and manual direction such as FSM 2600 that regulate the management of federally listed and regionally sensitive species would remain in place, and these species would continue to be addressed in project-level analyses. Current direction includes the development of breeding season timing restrictions and project-level mitigations to alleviate impacts from disturbance from mechanical vegetation treatments, prescribed burning, or other resource management activities occurring in the adjacent upland habitats.

Runoff, sedimentation, and loss of riparian vegetation from recreation use are problems that are not adequately addressed under current management direction. These factors degrade the quality of the existing and potential riparian habitat and can work against habitat restoration and species recovery efforts. This could account, in part, for the slow rate of recovery under current direction.

#### **Alternatives B, C, D, and E**

Alternatives B, C, D, and E would promote increasing trends in southwestern willow flycatcher habitat and populations, and based on the analysis of the effects on riparian habitat features, it was determined that they would maintain species viability on the Prescott NF.

All of these alternatives provide direction for watershed integrity projects (Objectives 18 to 22), and alternatives B, C, and D provide direction for land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions to incorporate requirements in the “Southwestern Willow Flycatcher Recovery Plan” (Fish and Wildlife Service, 2002b) by reference (Guideline-Wildlife-1), and therefore, would inherently comply with the management recommendations in that document.

The objectives in these alternatives would provide greater benefit to riparian vegetation habitat features than alternative A. This would have a positive effect on southwestern willow flycatcher by increasing the quality of the existing and potential habitat at a faster rate than current guidance. The combination of the riparian guidelines (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2) and the terrestrial wildlife guidelines for listed species (Guideline-Wildlife-1) would also be expected to maintain or improve riparian primary constituent elements (PCE) identified in critical habitat designation for southwestern willow flycatcher critical habitat.

The improvements in habitat quality could be expected to lead to increased rates of success for southwestern willow flycatcher recovery efforts, thus supporting long term species viability. Managing for the recovery of the species could eventually have beneficial effects for individual southwestern willow flycatchers. As there are no proposed treatments for riparian vegetation types in these alternatives, there is no expected change in the quantity or distribution of southwestern willow flycatcher habitat. Recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

## **Western Yellow-billed Cuckoo**

### **Common to All Alternatives**

The implementation of plan components related to vegetation and fire treatments; watershed and soil management; wildlife, fish, or rare plants management; and range may have short term adverse effects to riparian habitat, but would result in long term beneficial effects to maintaining or improving proposed critical habitat and species populations on the forest. Plan components related to recreation management and lands, minerals, transportation and special uses management may have both short and long term adverse effects to western yellow-billed cuckoo and proposed critical habitat. All of the alternatives would result in a “May Affect, Likely to Adversely Affect” determination for western yellow-billed cuckoo and its proposed critical habitat.

### **Alternative A**

Among all alternatives, alternative A would have the least effect to western yellow-billed cuckoo population and habitat trends. Management actions would cause no change to habitat quantity or distribution as there are no proposed treatments for riparian vegetation types, and habitat quality would continue to improve, albeit at a slow rate. Based on the analysis of the effects on the riparian habitat, it was determined that this alternative would maintain species viability on the Prescott NF.

Relevant laws, policies, and manual direction, such as FSM 2600, that regulate the management of federally listed and regionally sensitive species would remain in place, and these species would continue to be addressed in project-level analyses. Current direction includes the development of breeding season timing restrictions and project-level mitigations to alleviate impacts from disturbance from mechanical vegetation treatments, prescribed burning, or other resource management activities occurring in adjacent upland habitats.

Runoff, sedimentation, and loss of riparian vegetation from recreation use are problems that are not adequately addressed under current management direction. These factors degrade the quality of the existing and potential riparian habitat and can work against habitat restoration and species recovery efforts. This could account, in part, for the slow rate of recovery under current direction.

### **Alternatives B, C, D, and E**

Alternatives B, C, D, and E would promote increasing trends in western yellow-billed cuckoo habitat and populations, and based on the analysis of the effects on the riparian habitat, it was determined that they would maintain species viability on the Prescott NF.

All of these alternatives provide direction for watershed integrity projects (Objectives 18 to 22), and alternatives B, C, and D provide direction for land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions to incorporate any recovery plans and conservation strategies for federally listed species into future management actions (Guideline-Wildlife-1).

Riparian habitats have a high similarity to reference conditions and are expected to remain near reference conditions over the next 40 to 80 years. The objectives in these alternatives would provide greater benefit to riparian vegetation habitat features than alternative A. This would have

a positive effect on western yellow-billed cuckoo by increasing the quality of the existing riparian habitat and proposed critical habitat at a faster rate than current guidance.

Managing for the recovery of the species could eventually have positive effects for individual western yellow-billed cuckoos, and improvements in habitat quality could be expected to lead to increased rates of success for western yellow-billed cuckoo recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2). As there are no proposed treatments in riparian vegetation types in these alternatives, there is no expected change in the quantity or distribution of western yellow-billed cuckoo habitat.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

**Regionally Sensitive Species**

**Table 38. Regionally sensitive species trends by alternative**

<b>Trends</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternative E</b>
Population trends for regionally sensitive species	Stable	Increase	Greatest increase	Increase	
Aquatic habitat trends for regionally sensitive species	Slow increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity	Greatest increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity	
Riparian habitat trends for regionally sensitive species	Slow increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity	Greatest increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity	

**Common to All Alternatives**

Implementation of plan components related to vegetation treatments; recreation management; watershed management; wildlife, fish, or rare plants management; or land acquisition in any of the alternatives may have short term indirect effects on aquatic and riparian habitat or species populations, but they would produce long term benefits to the maintenance and improvement of habitats and species populations on the Prescott NF. The implementation of any alternative may render a “May impact individuals, but is not likely to result in a trend toward federal listing or loss of viability” determination.

### **Alternative A**

Among all alternatives, alternative A would have the least effect to habitat and population trends for regionally sensitive aquatic and riparian species. Based on the analysis of the effects on the aquatic and riparian habitat, it was determined that this alternative would maintain species viability for all regionally sensitive aquatic and riparian species on the Prescott NF, but trends in population would not increase for any of these species.

Relevant laws, policies, and manual direction, such as FSM 2600, that regulate the management of federally listed and regionally sensitive species would remain in place, and these species would continue to be addressed in project-level analyses.

Populations of these species would be maintained at current levels in the Verde River and in the small streams that are departed from historic conditions due to the presence of nonnative species. Management actions would not change habitat quantity or distribution.

As noted above, vegetation treatments are intended to restore the natural fire regime, improve forest health, and reduce the potential for high severity wildfire in the planning area. The erosion and surface runoff from these treatments that would result in short term sedimentation and nutrient loading in species habitat would be mitigated by implementation of the standards, guidelines, and best management practices prescribed in the 1987 plan. Long term, these treatments would result in improved watershed, soil, and vegetation conditions in the planning area, which in turn would maintain or improve aquatic habitats and species populations on the forest.

Runoff, sedimentation, and loss of riparian vegetation from recreation use are problems that are not adequately addressed under current management direction. These factors degrade the quality of the existing and potential aquatic and riparian habitat and can work against habitat restoration and species recovery efforts. This could account, in part, for the slow rate of recovery under current direction.

### **Alternatives B and D**

Alternatives B and D would promote increasing trends in habitat and population for regionally sensitive aquatic and riparian species on the Prescott NF. Based on the analysis of the effects on the aquatic and riparian habitat, it was determined that they would also maintain viability on the Prescott NF for these species.

These alternatives provide direction for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 23), and land acquisition of inholdings along occupied and critical habitat (Objective 29). They also include specific provisions that projects incorporate any design features, mitigation, or timing considerations needed to ensure that regionally sensitive species do not trend toward Federal listing (Guideline-Wildlife-2, Guideline-Fish/Aquatics-2, and Guideline-Plants-1). There is also a specific prohibition on collecting regionally sensitive plants, other than for research or scientific purposes (Standard-Plants-1).

This direction would have a positive effect by increasing the quality of the existing and potential habitat at a faster rate than current guidance. Improvements in habitat quality could be expected to lead to increased rates of success for recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat and

regionally sensitive species (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2; Guideline-Minerals Materials-5). There is no expected change in the quantity or distribution of habitat for any of the regionally sensitive species in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced through an increased management focus, as riparian vegetation and habitats would be better protected from trampling if recreation sites were relocated away from sensitive areas. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B and D. However, alternative C focuses on habitat restoration, with more emphasis on restoration of native fish (Objective 24) and departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in populations and the most improvement in the quality of habitat. This alternative is not expected to increase the quantity or distribution of habitat for any of the regionally sensitive species, but based on the analysis of the effects on aquatic and riparian habitats, it was determined that it would maintain regionally sensitive species viability on the Prescott NF.

### **Alternative E**

Alternative E would also promote increasing trends in habitat and population for regionally sensitive aquatic and riparian species on the Prescott NF. Based on the analysis of the effects on the aquatic and riparian habitat, it was determined that it would maintain viability on the Prescott NF for these species.

Alternative E provides direction similar to alternatives B and D for native fish restoration actions (Objective 24), watershed integrity projects (Objectives 18 to 22), and to ensure that regionally sensitive species do not trend toward Federal listing (Guideline-Wildlife-2, Guideline-Fish/Aquatics-2, Guideline-Plants-1, and Standard-Plants-1).

It does not contain specific direction for land acquisition of inholdings along occupied and critical riparian habitat as found in Objective 29 of the other action alternatives. There is no expected change in the quantity or distribution of habitat for any of the regionally sensitive species in this alternative.

Alternative E contains direction (Objective 31) to apply for water rights on in-stream flows within rivers that flow through the Prescott NF. This could complement native fish restoration actions by protecting base flows where water rights are granted, benefit aquatic and riparian habitats, and help maintain regionally sensitive species viability on the Prescott NF.

## Management Indicator Species

**Table 39. Management indicator species trends by alternative**

Trends	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Population trends for aquatic macro-invertebrates	Stable	Increase			
Habitat trends for aquatic macro-invertebrates	Slow increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity	Greatest increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity	Accelerated increase in quality, no change in quantity

### Alternative A

Among all alternatives, alternative A would have the least effect to aquatic macro-invertebrate population and habitat trends, primarily due to the low level of forest land restoration. This alternative would maintain current forestwide trends for aquatic macro-invertebrate habitat and populations.

Populations of aquatic macro-invertebrates would be maintained at current levels in the Verde River and in the small streams that are departed from reference conditions due to mining impacts and impaired watershed conditions. Management actions would not change habitat quantity and distribution. Consequences to habitat quality would be the same as for regionally sensitive species. As noted in environmental consequences for the “Riparian Areas, Seeps, and Springs” section (see “Need for Change 2”), under alternative A, recovery would occur at a slower rate than under the action alternatives. Based on historic trends, the rate of recovery would be equivalent to about 25 to 50 percent of the rate under the action alternatives.

### Alternatives B and D

Alternatives B and D would promote increasing trends in aquatic macro-invertebrate habitats and populations and would maintain species viability on the Prescott NF.

These alternatives provide direction for vegetation treatments (Objectives 1 to 5), seep and spring enhancement (Objective 23), watershed integrity projects (Objectives 18 to 22), and land acquisition of inholdings with suitable or occupied habitat (Objective 29). They also include specific provisions that projects incorporate any design features, mitigation, or timing considerations needed to insure that regionally sensitive species, such as the Verde Rim springsnail or the Brown springsnail, do not trend toward Federal listing (Guideline-Wildlife-2, Guideline-Fish/Aquatics-2).

This direction would have a positive effect by increasing the quality of existing and potential aquatic macro-invertebrate habitat at a faster rate than current guidance. The improvements in habitat quality could be expected to lead to increased rates of success for recovery efforts, thus supporting long term species viability. The prospects for viability are further enhanced by recreation, range, watershed, fish/aquatics, lands, and minerals guidance that protects aquatic and riparian habitat (Guideline-Recreation-8; Standard-Range-2; Guideline-Watershed 4, 9, 10, and 11; Guideline-Fish/Aquatics-1, 2, and 3; Guideline-Lands-2; Guideline-Locatable Minerals-2).

There is no expected change in the quantity or distribution of habitat for any of the aquatic macro-invertebrate in either of these alternatives.

The environmental consequences from vegetation treatments would be similar to alternative A, but the recreation impacts would be reduced by an increased management focus on dispersed recreation. Further analysis of the changes to recreation management can be found in the “Need for Change 3” section of this EIS.

### **Alternative C**

The consequences for alternative C are very similar to those for alternatives B and D. However, alternative C focuses on habitat restoration, with more emphasis on restoration of departed vegetation types (Objectives 1, 2, and 5). This would promote the greatest increase in populations and the most improvement in the quality of habitat by improving water quality within the aquatic habitat. This increase in water quality would be due to the greater emphasis on restoration of departed grasslands, resulting in increased infiltration rates and reduced sedimentation. This alternative is not expected to increase the quantity or distribution of habitat for aquatic macro-invertebrates, but based on the analysis of the effects on the aquatic habitat, it was determined that it would maintain species viability on the Prescott NF.

### **Alternative E**

Alternative E would also promote increasing trends in aquatic macro-invertebrate habitats and populations, and would maintain species viability on the Prescott NF.

Alternative E provides direction similar to alternatives B and D for vegetation treatments (Objectives 1 to 5), seep and spring enhancement (Objective 23), and provisions that projects ensure regionally sensitive species do not trend toward Federal listing (Guideline-Wildlife-2, Guideline-Fish/Aquatics-2). It does not contain specific direction for land acquisition of inholdings along occupied and critical riparian habitat as found in Objective 29 of the other action alternatives. This alternative could be reasonably expected to increase the quality of existing and potential aquatic macro-invertebrate habitat at a faster rate than current guidance.

## **Cumulative Environmental Consequences**

Cumulative consequences are those consequences of foreseeable activities on non-Prescott NF lands that, in conjunction with management activities likely to occur on the Prescott NF, may intensify, negate, improve, or otherwise affect the vegetation types and species’ habitats of the Prescott NF. Below are considerations of consequences of activities that will likely occur on adjacent or nearby ownerships to the Prescott NF.

The cumulative consequences analysis area includes the twenty-two 5<sup>th</sup>-level watersheds that encompass the forest planning area. Further description of the hierarchical relationship of these watersheds can be found in the “Need for Change 2” section of this EIS.

Groundwater demands from expanding residential home and commercial development on private lands are reducing streamflows and available groundwater, and thus, aquatic habitat on the forest. The impacts from this development will be greater in the Big Chino Wash and upper Verde River sub-basins, as they have a higher amount of private land ownership. The cumulative consequences from groundwater removal are also discussed in the “Riparian Areas, Seeps, and Springs” section in “Need for Change 2.”

The city of Prescott has a water right of 2,700 acre-feet per year from Del Rio Springs, near the headwaters of the Verde River in the Big Chino Wash sub-basin. The Arizona Groundwater Transportation Act (A.R.S. 45-555) also contains an exemption for the city of Prescott that allows the city to transfer between 8,000 and 14,000 acre-feet per year from the Big Chino aquifer. As a potential mitigation measure for these water transfers, the city has purchased lands with water rights in the area with the intent of retiring about 3,600 acre-feet per year of water. Even with mitigation, these groundwater withdrawals in the Big Chino aquifer have the potential to reduce in-river flow levels in the upper Verde River and negatively affect the quantity and quality of existing and potential aquatic habitats.

The riparian dependent birds and mammals analyzed are not confined to the boundaries of the Prescott NF. Ownership in the areas containing occupied and suitable habitat consists of a mix of private, State, Bureau of Land Management (BLM), and other Forest Service (Coconino and Tonto NFs) lands. Conservation status of suitable habitats and potential future impacts due to management on non-Federal lands is not known. For federally listed species such as southwestern willow flycatcher and western yellow-billed cuckoo, the requirements of the Endangered Species Act ensure that habitats are managed to support the species on adjacent national forests, BLM, and other Federal lands. It is also expected that all habitats and populations for regionally sensitive species will be maintained in adjacent areas of the Coconino and Tonto NFs. On lands under the jurisdiction of the Arizona Game and Fish Department, management consideration is given to species of greatest conservation need. Two of the species analyzed fall into this category; yellow-billed cuckoo, due to its Tier 1A classification, and common black-hawk, which is classified as a Tier 1C species.

## **Need for Change 5**

*Enhance the value of open space provided by the Prescott National Forest by defining visual character within areas near or viewed by those in local communities.*

This section summarizes the current scenic environment and open space conditions on the Prescott NF and the consequences of implementing the revised plan or its alternatives. It addresses the “Need for Change 5” in chapter 1. This includes retaining scenic integrity near communities adjacent to the forest, and pursuing land acquisition opportunities that provide riparian benefit and retain open space. The full analysis can be found in the “Prescott National Forest Plan Revision Scenery and Open Space Specialist Report” (Forest Service, 2011j).

## **Affected Environment**

### **Scenery**

The scenery of the Prescott NF is diverse and includes mountains, pine forests, grasslands, lakes, streams, rugged canyons, and high desert plains. Visitors are drawn to the area for its open spaces, remoteness, tranquility, beautiful scenery, and cool high elevation climate which provides an escape from the desert heat. The variety of historic elements is rich in character and culture.

As noted in the 2009 National Visitor Use Monitoring results (Forest Service, 2009d), visitors to the Prescott NF value scenery. The participation rate for “Viewing natural features (scenery)” was almost 82 percent, and over 18 percent of visitors said that this was their primary activity on the forest. This was the highest overall participation rate, and the second highest primary activity

behind the 44.5 percent rate for hiking or walking. When asked about facilities or areas used, over 16 percent indicated that they used the scenic byway.

The Scenery Management System (SMS) was developed to determine the relative value and importance of scenery on national forest lands and provides a framework to effectively inventory, assess, and manage scenic resources in sustainable and multiple-use contexts. It replaces the older Visual Management System (VMS), and the intent is that each national forest will change to the new system at the time of the next plan revision. The condition of the scenic resources of the Prescott NF is quite good (table 40), but the other resources can have an effect on scenery. Some, like certain mining activities, can cause short term impacts and long term degradation to visual quality. Other activities, like fire and recent vegetation management techniques, can have short term impacts and long term benefits to visual quality.

One measure of the condition of the scenic resource that is used in the SMS is existing scenic integrity (ESI). It indicates the degree to which the landscape matches a desired appearance of naturalness, and notes features which are incompatible with the surrounding area. The 2007 ESI mapping revealed that just over eight percent of the forest, primarily the designated wilderness areas, received a rating of “very high.” For the majority of the remaining forest land, 83 percent is naturally appearing and has an ESI of “high.” Only about seven percent of the forest was considered “moderate,” and “low” and “very low” combined accounted for less than one percent of the acreage on the forest. There were no areas rated as “unacceptably low.” The highest scenic integrity ratings are given to those landscapes which most resemble the desired ideal.

**Table 40. Existing scenic integrity on the Prescott NF**

Existing Scenic Integrity	Acres	Percent
Very High	104,487	8.3
High	1,045,737	83.3
Moderate	93,929	7.5
Low	2,795	0.2
Very Low	8,535	0.7

Preservation of the scenic integrity on the forest is an important public concern. The “big mountain views” and the importance of the Black Mountain Range as a scenic backdrop were specifically mentioned in the community vision for the Verde Valley (Forest Service, 2009c), and Prescott NF lands on Mingus Mountain, Granite Mountain, and in the Santa Maria and Bradshaw Mountains provide scenic vistas to the residents of the “Quad Cities” (Prescott, Prescott Valley, Chino Valley, and Dewey-Humboldt).

Some of the threats to maintaining the relatively high level of ESI on the Prescott NF include: loss of natural landscapes due to increased recreation use; expansion of the communication and energy infrastructure; removal of materials associated with mining and quarrying; and visual impacts associated with changes in climate.

### Land Ownership

The Prescott NF is approximately 1.2 million acres in size. Within the proclamation boundaries of the forest, there are an estimated 168,000 acres in a fragmented pattern of private and other non-

Federal land ownership. This mixed ownership is a result of the granting of Federal land to the State of Arizona and to individuals in the form of mining and homestead claims.

In the northwestern section of the forest, the ownership of approximately 50,000 acres alternates every other section between Federal and non-Federal land, creating a checkerboard appearance. This is the result of the Federal government granting land along proposed railway routes to railroad companies. In these checkerboards, private sections surround each Federal section on all four sides, and these islands of National Forest System land have been a challenge to manage since the passage of the Forest Reserve Act of 1891 (16 U.S.C. 471).

In November of 2005, Congress passed the Northern Arizona Land Exchange and Verde River Basin Partnership Act (P.L. 109-110). The purpose of the act was to sanction an exchange of approximately 15,000 acres of Federal land, including parcels in the checkerboard, and acreage in and adjacent to the communities of Flagstaff, Williams, and Camp Verde, for approximately 35,000 acres of non-Federal land in the checkerboard. This exchange would consolidate both the Federal and private ownership within the checkerboard and provide land for the expansion of the adjacent communities. A date for final resolution is not yet known, but once completed, the Forest Service will have acquired approximately two-thirds of the private sections on the west and south end of the checkerboard and improved public access and manageability on this tract.

Between 1980 and 2000, Yavapai County's population growth outpaced that of Arizona, which had the fastest growth rate of any state in the Nation. As a response, in the last 10 years the conversion of private parcels from farming and ranching to more rural residential urban land has increased dramatically in the areas around the Prescott NF. This shift has been especially visible in the Verde Valley, Williamson Valley, Prescott Valley, and Dewey-Humboldt. These private parcels include a number of patented mining claims that have since been subdivided and developed as year round and seasonal residences. Some of the homesteaded lands in and around the Prescott NF have also been subdivided and converted to housing developments. Those that do remain as ranches are generally associated with national forest grazing allotments.

### **Open Space**

Preservation of open space is a predominant land use issue, given both the public's desire to maintain the "rural character" of their communities and the need to accommodate rapidly growing populations and municipalities. National forest lands that abut private lands, by their very nature, fill that niche. As the population of the area increases, private lands in and around the forest are increasingly subject to subdivision and development. It is common for the buyer to view the adjacent portion of public land as their "little slice of national forest." This can be especially true when private lands surround small portions of public lands and may be inaccessible to the public in general.

### **Environmental Consequences**

The environmental consequences of the alternatives focus on the "Need for Change 5" in chapter 1. This includes the retention of scenic integrity near communities adjacent to the forest and the acquisition of land by the forest to retain open space values and provide riparian benefits.

### **Alternative A**

In alternative A, management of the scenic resources of the Prescott NF would remain under the goals, objectives, standards, and guidelines in the 1987 plan (as amended), and this direction fails to address current issues regarding open space and threats to the scenic integrity of the forest. This could result in degradation of the scenic integrity near communities that are adjacent to the forest. In addition, the lack of specific direction to consider open space values during land exchanges could negatively affect communities adjacent to the forest.

All of the visual quality analysis would be under the outdated 1986 Visual Quality Objectives (VQO) developed under the old VMS. These are not in line with current levels of visitor use and do not reflect the public's concern for open space and scenery. They do not provide the guidance or flexibility needed to respond to current threats to the scenic resource. In particular, the Black Mountain Range, the backdrop for the communities in the Verde Valley, currently has a VQO of partial retention. This VQO only provides a moderate amount of protection for the scenic resource, and the visual quality could be compromised by management activities, resulting in a failure to meet the desired conditions for the Verde Valley Management Area.

The 1987 plan does provide guidance and criteria for the acquisition and exchange of land parcels, but the primary focus is on facilitating forest management and meeting public and community needs for infrastructure growth. As such, acquisition guidelines include direction for the preservation of wetlands and riparian areas, but they do not provide guidance for encouraging the retention of open space, either on Prescott NF lands or those in adjacent ownership. According to the "Verde Valley Regional Management Plan" (Yavapai County, 2006), "...open space is possibly the most prized asset of the Verde Valley Region's residents," and the residents are concerned with "... preventing the loss of openness, which epitomizes the sense of place in the Verde Valley." These concerns contributed to the development of both forestwide and management area level desired conditions promoting the retention of open space. The lack of open space guidance in alternative A could result in continuing loss of open space in and near communities adjacent to the Prescott NF and a failure to meet desired conditions.

This alternative contains standards and guidelines for visual quality which are no longer needed or are not feasible to accomplish. This results in the need to devote additional time and resources to project-level analysis because the VQOs do not reflect the current conditions of the scenic resource and a plan amendment is often required to update the VQO in the project area.

There would be some protection for the visual quality of designated wilderness areas and inventoried roadless areas (IRAs) due to the restrictions placed upon development, but there is little to protect visual quality from the impacts of utility lines or mining activities outside of these areas. There would be no potential wilderness areas (PWAs) recommended for wilderness designation; therefore, there would be no additional acreage receiving higher scenic integrity protection or that was withdrawn from consideration for conveyance.

### **Common to Alternatives B, C, D and E**

The long term positive and short term negative changes in visual quality would be the result of prescribed fire and mechanical vegetation treatments. The vegetation treatments needed to meet Objectives 1 to 5 in the action alternatives would have initial negative consequence on scenery due to the activity, but over time, these landscapes would recover to a more natural state and the visual quality would be the same or improved.

Where prescribed burning treatments are applied to grasslands, the area will suffer an initial degradation in visual quality due to the presence of char and fire scorch, but within one season new growth will appear, and within 3 years the visual quality will recover.

Forest thinning projects open up dense stands and allow more light to reach the forest floor, promoting the growth of understory vegetation. An increase in the diversity of vegetation in the understory contributes to the visual quality of a landscape. They also allow crowns to spread, improving the health and attractiveness of individual trees, and open up the views into and through forest stands. Scenic guidelines 2 through 4 specifically address the retention and enhancement of SIOs during vegetation treatments.

Some land uses which have a large visual impact, such as utility corridors and some mining activities, would occur under any of the alternatives. However, the action alternatives propose high SIOs that would require more mitigation to better blend these uses into the existing landscape. These SIOs would also help protect scenic integrity from smaller projects such as road building or the expansion of recreation facilities. The action alternatives would also provide more protection for the scenic integrity surrounding the Verde Valley and the “Quad Cities.” More of the land surrounding these communities would receive a high SIO under these alternatives, and the amount in the low and very low categories would be reduced.

#### **Alternative B**

The adoption of the Scenery Management System (SMS) and resulting scenic integrity objectives (SIOs) in alternative B would lead to improved guidance and flexibility for protecting the scenic resources of the forest and addressing threats to the scenic integrity. Alternative B would also provide specific direction to retain open space values and protect riparian habitat by pursuing land acquisition opportunities. The result of this alternative would be increased protection for visual quality, especially near communities that are adjacent to the forest, which in turn would provide positive benefits by retaining scenic integrity and helping to preserve the sense of openness and rural character in these communities. The rural character and sense of openness would be furthered by plan guidance to act on opportunities to acquire land, as feasible, to retain open space values.

The recommendation of wilderness designation for 43,440 acres of potential wilderness would ensure that the highest level of protection of the scenery for those acres of the forest would be retained. If the areas become designated wilderness, the SIO would change to “very high.” The naturalness of designated wilderness areas is protected through numerous restrictions to activities as stated in the Wilderness Act of 1964 (P.L. 88-577). Recommended wilderness areas, like designated wilderness areas, would not be identified for conveyance out of Federal ownership. Wilderness designation for Black Canyon PWA, in particular, would benefit the communities of the Verde Valley and address their particular concerns by increasing the adjacent visual quality and protected open space on the forest.

#### **Alternative C**

Alternative C adopts the SMS and resulting SIOs used in the other action alternatives. As noted in alternative B, this would provide guidance and flexibility for protecting the scenic resources of the forest and addressing threats to scenic integrity. Alternative C also contains the same direction to retain open space values and protect riparian habitat by pursuing land acquisition opportunities as alternatives B and D, but it would not provide the additional protection to open space and

scenic integrity granted by the recommendations for wilderness designation. With its emphasis on vegetation and wildlife habitat restoration, this alternative would provide the most long term improvement in visual quality, although it would result in more negative changes in the short term.

#### **Alternative D**

Alternative D provides the same guidance and flexibility for protecting visual quality, addressing threats to scenic integrity, and pursuing land acquisition opportunities to retain open space values and protect riparian habitat as alternatives B and C. Alternative D differs from the other action alternatives in that it places an emphasis on developing dispersed recreation opportunities. The visual impacts from the increased recreation activities in alternative D are generally localized, not landscape scale and would have little consequence on the Verde Valley and “Quad Cities” communities.

Although this alternative recommends the most wilderness for designation, the PWAs recommended are not close enough to be seen from the Verde Valley or most of the “Quad Cities.” Alternative D would not recommend Black Canyon PWA for wilderness designation, so there would be no additional benefit to the communities of the Verde Valley from the protection of open space and scenic integrity provided by wilderness. In this respect, alternative D would not meet the local desire for stronger protection of open space and visual quality.

#### **Alternative E**

Alternative E also adopts the SMS and resulting SIOs and thus provides the same guidance and flexibility for protecting visual quality and addressing threats to scenic integrity as the other action alternatives. The direction to pursue land acquisition opportunities is more broadly defined in alternative E; it does not contain the language emphasizing lands along the Verde River and in the Verde Valley, nor does it specify acquisitions to protect and enhance riparian habitat.

Similar to alternative D, the PWAs recommended for wilderness designation in alternative E are not close enough to be seen from the Verde Valley or most of the “Quad Cities” and do not include Black Canyon PWA. As with alternative D, alternative E would not meet the local desire in the Verde Valley for stronger protection of open space and visual quality.

### **Cumulative Environmental Consequences**

Cumulative consequences are those consequences of foreseeable activities on lands that are not managed by the Prescott NF that, in conjunction with management activities likely to occur on the forest, may intensify, negate, improve, or otherwise affect the open space and scenic values on the forest. Viewsheds containing portions of the forest affect the quality of life for many people living in the Verde Valley and the “Quad Cities” area. Urbanization of lands adjacent to the forest affects the visual quality and recreation setting on the Prescott NF. In some areas, in particular, the “Quad Cities” and Verde Valley, development is encroaching on the forest boundary, reducing the amount of open space in private ownership and increasing the demand for open space on public lands. When limited development is designed to blend into the landscape, the effect is minimal; however, if the structures or associated developments are not blended into the landscape or are large in scale, they can have a negative impact on the visual quality and perception of open space. Increasing development on private land adjacent to the forest also has the effect of increasing the value of the remaining open space as it becomes scarcer.

Lands managed by other government agencies at the county, State, and Federal levels have the potential to affect the visual quality of the Prescott NF. Although it can be reasonably expected that visual quality management would be consistent between the Prescott NF and adjacent national forests, appropriate differences in agency missions and the management of scenic resources could result in inconsistencies between the Forest Service and other agencies. This can create the potential to negatively alter the appearance of lands adjacent to the forest. Other agencies’ management activities that do not result in a natural landscape can affect the experience of forest users who are viewing scenery.

## Social and Economic Values

The environmental consequences in the following sections focus on the components of the social and economic environments that are useful to the decisionmaker and the public. The specific social and economic topics addressed include: socioeconomic resources, environmental justice, heritage resources, livestock grazing, minerals, forest products, special uses, and transportation systems of the Prescott NF.

### Socioeconomic Resources

This section summarizes the current socioeconomic conditions on the Prescott NF and the social and economic consequences of implementing the revised plan or its alternatives. The full analysis, including methodology and economic models, can be found in the “Socioeconomic Resource Report” (Forest Service, 2011a).

### Affected Environment

The study area for this analysis is Yavapai County, Arizona, which occupies approximately 8,124 square miles of land. Prescott NF lands are almost exclusively in Yavapai County (97 percent) with a very small portion (3 percent) extending into neighboring Coconino County. Information for Coconino County was excluded from the socioeconomic analysis because the county’s relatively large size and population would skew the demographic and economic data and mask important consequences of the proposed alternatives.

Table 41 displays land ownership categories for both Yavapai County and the State of Arizona. National Forest System lands (Forest Service) account for 15 percent of the land in Arizona. As a whole, land ownership within Yavapai County resembles the ownership pattern in the rest of Arizona, with the highest proportions falling under Federal management. Forest Service managed lands account for the largest percentage of total land ownership in the county (38 percent) while private lands total only 25 percent of the county land area. This suggests the potential for intensive public interest in Prescott NF management issues.

**Table 41. Land ownership patterns for Yavapai County compared to Arizona**

	State	Private	Indian	U.S. Forest Service	Other Federal Lands	Total Area (square miles)
Yavapai County	24%	25%	<1%	38%	13%	8,124
State of Arizona	13%	17%	27%	15%	28%	113,594

Source: Forest Service, 2009b and Arizona State Senate Issue Brief September 2011

Yavapai County land use ranges from traditional low density uses such as ranching in rural areas to higher concentrations of residential, industrial, and commercial uses in and around urban centers. Tourism and recreation industries are reliant on public lands (Federal and State) for a variety of recreation opportunities involving day use as well as overnight stays.

The preservation of open space is of particular importance given the desire by some communities to both maintain the “rural character” of county lands and to accommodate rapidly growing populations. The provision of adequate, affordable infrastructure and sustainable water supplies is also a growing concern for planners, residents, and land managers throughout the region (Forest Service, 2009b).

The Forest Service manages five revenue generating goods and services on the Prescott NF: outdoor recreation, minerals extraction, livestock grazing, forest products, and special uses. These are described in detail below.

Of these five, the **outdoor recreation** program produces the largest indirect influence on the local economy by providing features that draw tourists to the area. The mild climate of the Prescott NF encourages year round recreation activity. Trail and day use are primary activity types and include: off-highway vehicle (OHV) riding, horseback riding, hiking, biking, hunting, fishing, and wildlife viewing. The developed sites on the Prescott NF encompass campgrounds, picnic areas, lake access, equestrian areas, rental cabins, and a recreational shooting range. Prescott Basin, the area surrounding the city of Prescott, has the highest concentration of recreation activity on the Prescott NF and limits dispersed camping to designated sites. The Prescott NF also contains over 800 miles of both motorized and nonmotorized trails, 8 designated wilderness areas containing over 100,000 acres, and a portion of the Verde Wild and Scenic River.

The Prescott NF had an estimated 1,230,500 annual visitors in 2007. Top recreation activities on the forest include hiking and walking, viewing natural features, and driving for pleasure (Forest Service, 2009d). Most visitors to the forest live in Yavapai County, although Maricopa County residents comprise the next largest group, as portions of the Prescott NF are located less than 90 miles from the Phoenix metropolitan area.

The Prescott NF has abundant mineral deposits, and **mining** is a common activity both on and off the forest. Existing mining activities on the Prescott NF includes mineral material contracts for removal of flagstone, schist, decomposed granite, and limestone and recreational gold placer mining. There are 1,800 active placer claims and 1,484 active lode claims with 10 tunnel site claims. The Prescott NF does not produce any energy or fuel minerals such as uranium, oil, natural gas, or coal.

About 74 percent of the Prescott NF is used for **livestock grazing** by permit holders on 62 of 68 total range allotments. There is no indication that there will be a major increase or decrease in grazing on Prescott NF lands over the next 20 years; however, herd size and management strategies are expected to fluctuate in response to drought, wildfire, prescribed fire, and other factors that change range conditions. Grazing on the Prescott NF contributes to the rural ranching lifestyle, culture, and economy and is a tool for achieving management objectives.

The sustainable mix of **forest products** that contribute to the social, economic, cultural structure, and stability of rural communities are the result of management activities designed to restore and

maintain healthy forests, mitigate insect and disease damage, reduce hazardous fuels, improve wildlife habitat, and create recreation opportunities. The Prescott NF offers a variety of forest products including saw timber, small diameter wood, firewood, and Christmas trees. The nearest saw and pulp mills that provide a market for these forest products are located outside of Yavapai County in Phoenix, Arizona (Maricopa County).

**Special use** permits authorize services that support the Forest Service mission and meet the needs of the public. These permits are a partnership between the Forest Service and private businesses or individuals to provide services and facilities. Special use permits allow for occupancy and use of National Forest System lands. The Prescott NF has issued over 400 active special use permits for a variety of uses, including recreation residences, organizational camps, research studies, rights-of-way, communications towers, power lines, and wildlife water catchments. Permits may be short term, such as for recreation events or non-commercial group uses, or longer term such as energy corridors or electronic sites.

### **Demographic Conditions and Trends**

Demographic conditions and trends describe the social environment of Yavapai County and help tell the story of how many people live here (population growth and density), what they are like (age, gender, and education), and who they are (race and ethnicity). The topics of race, ethnicity, and low income populations are discussed subsequently in “Environmental Justice.”

### **Population Growth and Density**

Current population levels influence the use of natural resources, and rates of growth can indicate whether there may be the potential for increased pressures on Prescott NF lands and resources. Rapid population growth may signal expanding economic opportunities, desirable amenities, or both.

Population density can serve as an indicator of a number of socioeconomic factors of interest such as urbanization, availability of open space, socioeconomic diversity, or civic infrastructure (Horne and Hayes, 1999). More densely populated areas are generally more urban and diverse and offer better access to infrastructure. In contrast, less densely populated areas provide more open space, which may offer natural amenity values to residents and visitors.

As displayed in table 42, Arizona and Yavapai County have experienced rapid population growth during the past 2 decades; the population of Yavapai County has almost doubled since 1990 and both the county and State grew 25 to 26 percent between 2000 and 2010. The national growth rate during the same period was more moderate, at almost 10 percent.

Even with rapid population growth, the county population density remains quite low relative to Arizona and the Nation, suggesting that most of Yavapai County remains quite rural. The largest communities in the county are Prescott (43,230), Prescott Valley (38,962), and Chino Valley (13,069) (Arizona Department of Commerce, 2008). Much of the county’s population is concentrated near Prescott, which suggests that the city provides the commercial and cultural center of the county. The economic and social environment and opportunities near Prescott, therefore, are likely to be very different than in more rural areas of the county.

**Table 42. Population trends for Yavapai County compared to Arizona and the U.S.**

	1990	2000	Percent Growth 1990-2000	2010	Percent Growth 2000-2010	Density (people / sq. mile)
Yavapai County	107,714	167,517	55.5	211,033	26	26.0
Arizona	3,665,228	5,130,632	27	6,482,505	24.6	56.3
U.S.	—	281,421,906	—	308,745,538	9.7	87.4

Source: U.S. Census Bureau, 1990, 2000, and 2010

### Age and Gender

Age and gender data are relevant to Forest Service management decisions because the average age of citizens may affect community values and uses associated with Prescott NF lands. For example, older populations are more likely to desire easily accessible recreation opportunities (Forest Service, 2011a).

As shown in table 43, the median age in Yavapai County exceeds the median age in both Arizona and the United States by nearly a decade; 44.5 years versus 35 years for Arizona and 36.7 for the country as a whole. Yavapai County also has a higher percentage of female residents (51.1 percent) relative to Arizona (49.9 percent) and the U.S. (50.7 percent). This high median age and gender discrepancy in Yavapai County is mostly a reflection of the large retiree population, but it may also indicate a large number of single parent households. Retiree populations are systematically different than populations composed primarily of working age adults and families with children, and because of differences in life expectancy, they often result in a higher concentration of women.

**Table 43. Age and gender patterns for Yavapai County compared to Arizona and the U.S.**

	Females Percent Total Population	Males Percent Total Population	Median Age
Yavapai County	51.1	48.9	44.5 years
Arizona	49.9	50.1	35.0 years
U.S.	50.7	49.3	36.7 years

Source: U.S. Census Bureau, American Community Survey, 2008

### Educational Attainment

Educational attainment, the measure of people with at least a high school diploma or bachelor's degree, is an important indicator of an area's social and economic opportunities and its ability to adapt to change.

The vast majority of adult residents of Yavapai County are high school graduates (table 44). The county has a higher percentage of high school graduates (87.5 percent) than either Arizona (81 percent) or the U.S. (80.4 percent). However, the difference in educational attainment nearly disappears when higher education (bachelor's or advanced degree) is measured. Yavapai County, Arizona, and the U.S. all have a similar percentage of residents with a bachelor's degree or higher: 23 percent, 23.5 percent, and 24.4 percent, respectively. This finding suggests that the county is relatively well educated, and an educated population is a signal that an area provides

economic and cultural opportunities. In contrast, areas with low levels of educational attainment have lower levels of human capital, which reduces an area's ability to capitalize on economic change (Florida, 2002).

**Table 44. Educational attainment, percent of persons age 25+ for Yavapai County**

	High School Graduate	Bachelor's Degree or Higher
Yavapai County	87.5%	23.0%
Arizona	81.0%	23.5%
U.S.	80.4%	24.4%

Source: U.S. Census Bureau, American Community Survey, 2008

### Economic Conditions and Trends

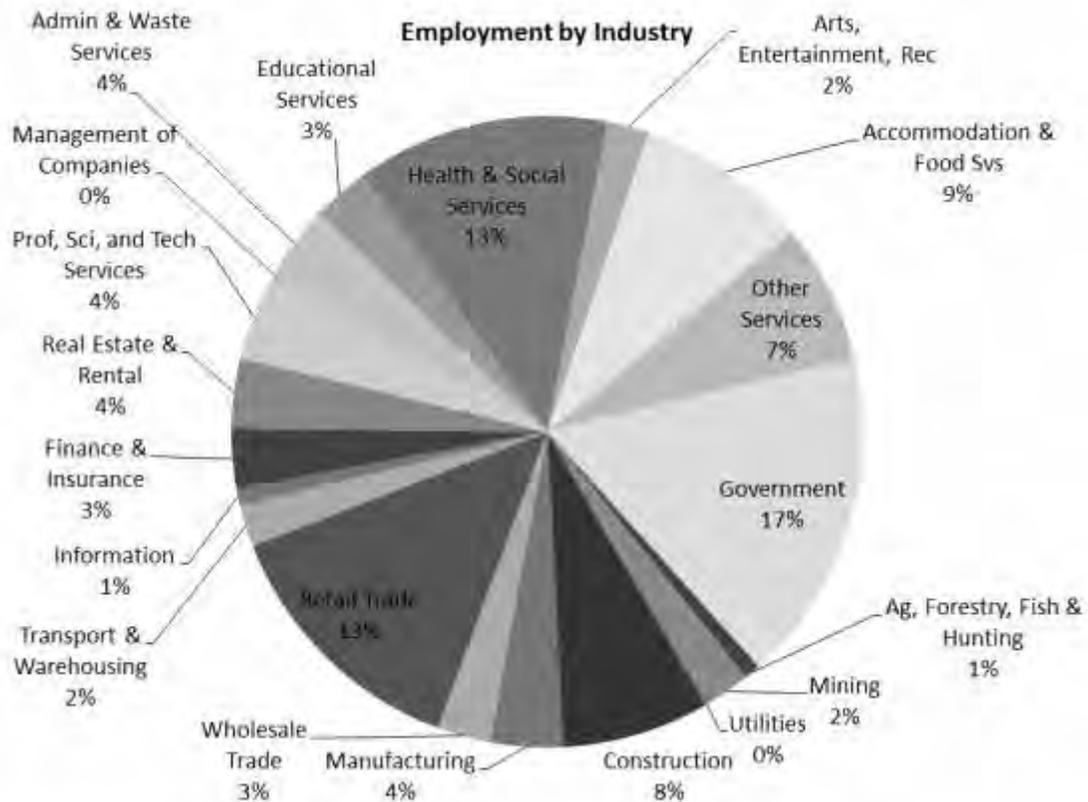
Economic conditions and trends help tell the story of what people in Yavapai County do for a living (employment by industry), and how much they make doing it (income). Also described is the mix of labor income (salary and wages) versus non-labor income (e.g., retirement investment, state support). Payments to counties are reported because they are based on the amount of National Forest System lands within the county and are a direct contribution to local infrastructure and community services.

### Employment

Job variety along with levels of employment and unemployment in an area are important indicators of economic health. Economic diversity (e.g., various types of jobs distributed among differing industrial sectors) generally promotes stability and offers greater employment opportunities. Highly specialized economies are prone to cyclical fluctuations and offer more limited job opportunities. Determining the degree of specialization in the economy is important for Forest Service decisionmakers, particularly when the dominant industries can be affected by changes in policy. This is the case for Yavapai County where government sector employment and the local tourism and recreation industries are reliant on local public lands.

Figure 3 shows the proportion of employment by industry for Yavapai County. The government sector supports the largest percentage of jobs in the area (17 percent). Retail trade and health and social services each account for 13 percent of local employment. These industries are consistent with a substantial government presence due to public land management, a large retiree population that consumes health and social services, and amenities that attract tourists who support the retail trade sector.

It is worth noting that mining accounts for only 2 percent of employment in the county—a seemingly trivial figure until it is placed in a statewide context. A resident of Yavapai County is approximately 4.5 times more likely to be employed in the mining industry compared to residents of Arizona as a whole (Minnesota IMPLAN Group, 2009).



**Figure 3. Employment by Industry, Yavapai County**  
**Source: Minnesota IMPLAN Group, 2009**

### Unemployment

Another indicator of economic health is the level of unemployment. The unemployment rate provides insight into the correspondence between residents' skills and employment opportunities. The natural rate of unemployment, which is around 5 percent, is the level that allows for movement between jobs and industries but does not signal broad economic distress.

During much of the past decade, Yavapai County had an unemployment rate below the national average. However, in 2008, the unemployment rate in the county converged with the unemployment rates for both the State and Nation: 5.9 percent for the county and State and 5.8 percent for the Nation. In 2009, the county unemployment rate (9.5 percent) surpassed the rates for the State (9.1 percent) and Nation (9.1 percent) (Forest Service, 2011a).

### Per Capita Income and Earnings per Job

Income available to local residents directly impacts their ability to purchase goods and services. As such, per capita income is a key indicator of the economic well-being of a county and may signal greater job opportunities, highly-skilled residents, greater economic resiliency, and well-developed infrastructure. Per capita income considers all sources of income, including wage and

salary payments, transfer payments, investment earnings, dividends, and rents. Earnings per job are a subset of per capita income that includes only wage and salary earnings.

In Yavapai County, little difference exists between per capita income and earnings per job (table 45). The per capita income in the county is \$24,880, slightly below Arizona’s per capita income (\$25,639) and several thousand dollars below per capita income for the U.S. as a whole (\$27,466).

Per capita income comparisons are incomplete without consideration of local cost of living expenses. Of the contributions to cost of living, housing costs are often among the most expensive. Although Yavapai County has relatively low per capita income and earnings per job relative to the State and the Nation, home values in the county exceed both the State and National medians (table 45). This means that Yavapai County residents spend a relatively high percentage of their income on housing, leaving less available to spend on leisure activities such as national forest visitation and enjoyment.

**Table 45. Per capita income, earnings per job, and median home values**

	Per Capita Income	Median Earnings Per Job	Median Home Values
Yavapai County	\$24,880	\$24,125	\$247,200
Arizona	\$25,639	\$29,206	\$234,600
U.S.	\$27,466	\$29,530	\$192,400

Source: U.S. Census Bureau, American Community Survey, 2008

**Non-labor Income**

Non-labor income is money earned from investments (e.g., dividends, interest, and rent) and transfer payments (e.g., payments from governments to individuals, age related, including Medicare, disability insurance payments, and retirements). Increases in non-labor income may indicate increases in leisure time and opportunities for national forest visitation, volunteerism, and enjoyment.

Table 46 displays the role of labor and non-labor income in total personal income for 1970 and 2006. Non-labor income accounts for a higher percentage of total personal income in Yavapai County (51 percent) than it does in either the State (32 percent) or the Nation (32 percent). Non-labor income proportions have increased over time for all geographic areas considered.

**Table 46. Contribution of labor and non-labor income to personal income**

	1970		2006	
	Percent Labor Income	Percent Non-labor Income	Percent Labor Income	Percent Non-labor Income
Yavapai County	58	42	49	51
Arizona	74	26	68	32
U.S.	77	23	68	32

Source: Headwaters Economics, 2009

High percentages of non-labor income likely indicate higher concentrations of retirees, since older populations rely in large part on non-labor income, including rents, dividend, and transfer (e.g., Social Security) payments. This non-labor income is not directly tied to employment, so it can be more resistant to job loss during economic downturns. However, asset markets can be quite volatile, and non-labor income that depends on investment returns may be unstable.

### **Payments to Yavapai County**

The Forest Service owns 38 percent of the land in Yavapai County, including the Prescott, Coconino, and Tonto National Forests (Arizona Department of Commerce, 2008). The Forest Service makes payments to the counties that contain National Forest System lands. These payments fall into two categories: Secure Rural Schools and Community Self-Determination Act payments (SRSCS) and Payments in Lieu of Taxes (PILT).

SRSCS payments are intended to improve public schools, maintain infrastructure, improve the health of watersheds and ecosystems, protect communities, and strengthen local economies. In fiscal year 2009, the Prescott NF paid Yavapai County approximately \$1.77 million in SRSCS money.

Federal agencies do not pay property taxes; therefore, PILT is distributed to counties to compensate for the local services that support activities on Federal lands. These services include law enforcement, road maintenance, and fire departments. In fiscal year 2010, Yavapai County received approximately \$394,000 from the Prescott NF under the PILT program.

## **Environmental Consequences**

### **Background**

The section below, “Economic Impact Analysis” describes the economic impact of Prescott NF management actions by alternative. These impacts are estimated from the number of jobs and labor income generated from the sale of products, permits for various activities, and mineral royalties. The program areas generating revenue are recreation, range, minerals, forest products, and permitted special uses.

Economic impacts were modeled using IMPLAN<sup>13</sup> Professional Version 3.0, using data from 2009. Projected use levels for each alternative were determined by Forest Service resource specialists. In most instances, the precise change is unknown. Therefore, any changes noted are based on the professional expertise of Forest Service resource specialists (1982 Planning Rule Provisions, 219.12(g)).

The second section is the “Financial Efficiency Analysis.” The efficiency analysis estimates the present net value (PNV) for each alternative based on a 15-year projection period. PNV is the measure of the economic value of an alternative when expenditures (costs) and revenues (benefits) from various program areas occur in different time periods. This analysis allows the decisionmaker to compare the value of managing these program areas across the alternatives.

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<sup>13</sup> Data reported by the Minnesota IMPLAN Group (MIG) is used to assess the relative size of sectors in a local economy. MIG reports annual data for all counties in the United States. IMPLAN employment data is reported by economic sectors grouped together according to similarities in the goods and services offered. IMPLAN data used for this analysis is for the year 2009. IMPLAN stands for “Impact Analysis for Planning.”

Financial efficiency is required by the 1982 Planning Rule. Estimating PNV is required by 219.12(g); however, the decisionmaker is not required by 219.12(j) to select the alternative that maximizes PNV. He or she only needs to identify each alternative’s PNV and compare them to the selected alternative.

Financial efficiency analysis was conducted with QuickSilver<sup>14</sup> Version 6. Data on program revenues and program expenditures were provided by the Prescott NF budget staff and resource specialists (1982 Planning Rule, 219.12(e)).

The third section summarizes the social and economic consequences by alternative. The social consequences are qualitative; the economic consequences are quantitative using the values reported in the impact and efficiency analyses.

**Economic Impact Analysis**

Table 47 displays employment estimates from Prescott NF program areas by alternative. The recreation program is the largest economic contributor, supporting 283 to 291 jobs. Forest Service expenditures (e.g., operations and salaries) is the next largest economic contributor, supporting 281 government sector jobs. The timber and minerals program areas are expected to contribute the fewest jobs (0 to 9). The total number of jobs contributed to the economy by the Prescott NF is expected to vary by less than 2 percent between alternatives (656 to 664 jobs).

**Table 47. Employment by program area by alternative**

Program Area	Number of Jobs Contributed				
	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	283	291		290	287
Range			42		
Minerals			9		
Forest Products			0		
Payments to Counties			41		
Forest Service Expenditures			281		
<b>Total</b>	<b>656</b>	<b>664</b>		<b>663</b>	<b>660</b>

Source: IMPLAN, 2009

Table 48 displays labor income estimates from Prescott NF program areas by alternative. The program area with the largest income contribution is Forest Service operations/expenditures, followed by recreation. The timber resource program area is not expected to contribute any labor income. The total labor income generated by Prescott NF management activities is expected to vary by less than 2 percent between the alternatives (\$24 to \$24.2 million).

<sup>14</sup> Quick Silver is a Forest Service program for economic analysis of long term, on-the-ground resource management projects. It provides a consistent benefit/cost, efficiency analysis framework to determine if one management action costs less, or has a better payoff than others.

**Table 48. Labor income by program area by alternative**

Program Area	Labor Income Contributed				
	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	\$8,461,000	\$8,727,000		\$8,695,000	\$8,580,000
Range	\$446,000				
Minerals	\$406,000				
Forest Products	\$0				
Payments to Counties	\$1,728,000				
Forest Service Expenditures	\$12,575,000				
<b>Total</b>	<b>\$23,616,000</b>	<b>\$23,882,000</b>		<b>\$23,850,000</b>	<b>\$23,735,000</b>

Source: IMPLAN, 2009

**Financial Efficiency Analysis**

Table 49 shows the average annual expenditures for the Prescott NF by program area. These figures are based on average expenditures experienced over a 3-year fiscal period (FY08–FY10). Estimated changes in expenditures between alternatives were based on the professional judgment of Prescott NF staff. Expenditures for all program areas except recreation are expected to remain unchanged between alternatives. More recreation expenditures are expected for alternatives B and D due to the construction of additional facilities and infrastructure associated with developed and dispersed sites and additional special use permit administration compared to alternatives A and C.

**Table 49. Average annual program expenditures, Prescott NF (FY08–FY10)**

Program Area	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	\$1,483,067	\$1,631,374	\$1,557,220	\$1,631,374	
Range	\$501,056				
Minerals	\$250,349				
Forest Products	\$447,006				
Special Uses	\$434,520				

Source: Prescott NF Budget Staff

Table 50 shows the average annual revenues for the Prescott NF by program area. Where available, these figures were based on average revenues experienced over a 3-year fiscal period (FY08–FY10). When 3 years of data were unavailable, the most recent year has been used. Estimated changes in revenues between alternatives were based on the professional judgment of Prescott NF staff. Revenues for all program areas except recreation are expected to remain unchanged between alternatives. Alternatives B and D would generate more revenue from fees associated with increased use of developed and dispersed recreation sites and recreation special uses compared to alternatives A and C.

**Table 50. Average annual program revenues, Prescott NF (FY08–FY10)**

<b>Program Area</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. C</b>	<b>Alt. D</b>	<b>Alt. E</b>
Recreation	\$482,851	\$516,071	\$507,235	\$521,576	\$507,235
Range	\$141,158				
Minerals	\$225,351				
Forest Products	\$93,854				
Special Uses	\$255,850				

Source: Prescott NF Budget Staff

The recreation, range, minerals, forest products, and special uses programs are funded from three sources: under the general budget, by externally funded activities such as volunteer and service agreements, and through in-kind sharing. The financial efficiency analysis is limited to only the revenues received from management activities and the costs of annually funded programs. The costs included in this analysis are just a portion of the total operating budget. Present net value (PNV) is defined as the discounted sum of benefits minus the discounted sum of costs; however, since not all costs are actually accounted for, this analysis should primarily be used to evaluate benefits. The values reported in table 51 should only be used to compare the expected differences between alternatives and not the actual value of implementation.

Table 51 displays estimates of PNV by program area and alternative. PNV is the difference between program revenues (benefits) and program expenditures (costs) projected over a 15-year period, using a 4 percent discount rate.

**Table 51. Present net value (PNV) by alternative**

<b>Program Area</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. C</b>	<b>Alt. D</b>	<b>Alt. E</b>
Recreation	-\$12,121,005	-\$13,515,673	-\$12,724,125	-\$13,448,962	-\$13,622,752
Range	-\$4,361,383				
Minerals	-\$302,935				
Forest Products	-\$4,279,632				
Special Uses	-\$2,165,192				
<b>Total PNV</b>	<b>-\$23,230,148</b>	<b>-\$24,624,817</b>	<b>-\$23,833,268</b>	<b>-\$24,558,106</b>	<b>-\$24,731,896</b>

Source: QuickSilver6, 2011

## **Social Consequences**

### **Common to All Alternatives**

Changes to resource availability and uses of the Prescott NF can affect the quality of life for area residents and forest visitors. For the most part, anticipated resource availability is consistent across alternatives. As shown in tables 48 and 49 above, livestock grazing, mineral removal, timber and forest product collection, and payments to local governments remain the same under all alternatives. Those who primarily value these forest uses and activities are unlikely to have their quality of life affected by decisions made under any of the alternatives. This leaves

recreation and recommended wilderness as the sources of potential social consequences between the proposed alternatives.

As explained in the demographic conditions and trends section, the median age of Yavapai County residents is nearly a decade higher than Arizona as a whole, which indicates a substantial retiree population. The combination of an older population (who have more discretionary time) and a high degree of public land ownership within Yavapai County (75 percent), suggests that recreation opportunities are an important contributor to local quality of life. Alternatives B, C, D and E are expected to increase the quantity and quality of recreation opportunities on the Prescott NF. Therefore, in comparison to alternative A, these alternatives are likely to improve the quality of life for those who value recreation. Alternative B strikes the best balance between developed recreation and dispersed recreation opportunities. Alternative D places an emphasis on dispersed recreation, and alternatives C and E increase recreation opportunities but to a lesser extent than alternatives B and D.

Of the approximately 1.28 million annual Prescott NF visits, about 40,000 are estimated to be visits to designated wilderness areas (Forest Service, 2009d). Although wilderness visits account for a relatively small percentage of total visits (only 3.5 percent), wilderness visitors are likely to spend more time on the forest than the average visitor (Forest Service, 2009d). In addition, wilderness areas provide opportunities for solitude and wildlife watching that may be difficult in more heavily used areas of the forest. In addition to providing unique recreation opportunities, wilderness areas can promote forest health and ecosystem services.

Individuals who value resource protection above resource use are likely to derive benefit from the recommendation of additional wilderness areas, regardless of intention to recreate in the wilderness. Alternatives B, D, and E recommend the designation of additional wilderness acres. These alternatives are expected to appeal to people and groups who seek additional wilderness recreation opportunities or the protection of forest resources. Alternatives A and C maintain current levels of wilderness and, therefore, they would not affect social well-being related to wilderness values.

## **Economic Consequences**

### **Common to All Alternatives**

#### ***Range***

Under all alternatives, livestock grazing on the Prescott NF would contribute up to 42 jobs and \$446,000 in labor income to Yavapai County annually. These figures assume that permitted stocking levels are fully utilized.

The benefit to permittees of public forage is approximately \$800,000 when compared to market price. The average private land grazing fee is \$9 per animal unit month (AUM) in Arizona, compared to \$1.35 per AUM for public land grazing (NASS, 2011). If Prescott NF grazing permittees had to replace their public land forage with private land forage, the annual cost of livestock grazing would increase by over \$940,000.

### ***Minerals***

The extraction of minerals from the Prescott NF would support approximately 9 jobs and \$406,000 in labor income annually in Yavapai County. Mineral activity is not expected to change based on actions taken under any of the alternatives.

### ***Forest Products***

Under all alternatives, it is estimated that the forest products program would not produce a measurable contribution to jobs or labor income in Yavapai County (tables 47 and 48). This estimate assumes a continuation of existing conditions where commercial forest products harvested from the forest are transported and processed at businesses located outside of the analysis area in neighboring Maricopa County. Additionally, it was assumed that loggers and truck drivers employed by timber sale purchasers also reside outside of the Yavapai County analysis area. It is likely that some contribution to the local economy (e.g., retail sales involving food and gas) would occur during periods when timber sale contracts are active.

### ***Payments to Yavapai County***

Under all alternatives, payments to the county, in the form of SRSCS and PILT, would support approximately 41 jobs and \$1.72 million in annual labor income in Yavapai County.

## **Alternative A**

### ***Recreation***

Almost 1.28 million people visit the Prescott NF annually (Forest Service, 2009d), and continuation of current management under alternative A is not expected to affect visit frequency or composition. Local day trips and overnight visits account for the highest proportion of visitation (65 percent) compared to non-local day and overnight visits (16 percent). These forest visitors spend money in the local economy, which supports employment and income in Yavapai County.

Under alternative A, recreation on the Prescott NF would support approximately 283 jobs and \$8.46 million in labor income annually in Yavapai County.

As stated previously in the “Recreation Use on the Prescott NF” section (see “Need for Change 3”), the majority of visitors to the forest use the trails. The size of the trail system, combined with its popularity has led to a decline in the condition of existing trails. As trail conditions deteriorate, they create safety issues for visitors and cause damage to other resources such as localized soil compaction and loss of vegetation.

### ***Financial Efficiency***

The present net value of alternative A is -\$23,230,148. This is the least negative PNV of the alternatives. This means that the cost of implementing alternative A exceeds the anticipated revenue of alternative A by the smallest amount, compared to the other alternatives.

## **Alternative B**

### ***Recreation***

Recreation visits to the Prescott NF are expected to increase by about 7 percent overall with implementation of alternative B, compared to alternative A. The largest increase in visitation is

expected from local residents on day trips, followed by smaller increases in local and non-local overnight visitors.

Under alternative B, recreation on the Prescott NF would support approximately 291 jobs and \$8.73 million in labor income annually in Yavapai County.

The expected increases in forest visitation under this alternative are likely to result in localized soil compaction or loss of vegetation along heavily used trails, OHV routes, and popular recreation sites (both developed and designated dispersed). These impacts would be offset by the increased emphasis given to trail improvements and developed site maintenance proposed under this alternative.

### ***Financial Efficiency***

The present net value of alternative B is -\$24,624,817. This is the second most negative PNV of the alternatives. This means that the program expenditures (costs) of alternative B exceed the anticipated revenues (benefits) more than for alternatives A, C, and D, but less than alternative E.

### **Alternative C**

#### ***Recreation***

Recreation visits to the Prescott NF are expected to increase by about 5 percent overall with the implementation of alternative C, compared to alternative A. The pattern of visitation is projected to be similar to alternative B but with a smaller increase in local residents on day trips.

Under alternative C, recreation on the Prescott NF would support approximately 291 jobs and \$8.73 million in labor income annually in Yavapai County.

The estimated increases in forest visitation under this alternative are expected to have the same type of environmental impacts as discussed under alternative B but to a slightly lesser degree.

### ***Financial Efficiency***

The present net value of alternative C is -\$23,833,268. This is the second least negative PNV of the alternatives. This means that the program expenditures (costs) of alternative C exceed the anticipated revenues (benefits) more than for alternative A, but less than alternatives B, D, and E.

### **Alternative D**

#### ***Recreation***

Recreation visits to the Prescott NF are expected to increase by about eight percent overall with implementation of alternative D, compared to alternative A. Of the three action alternatives, alternative D projects the largest increase in visitation from local residents on day trips and overnight visits but the smallest increase in non-local overnight visitation.

Because most of the increase in visitation is from local users, alternative D generates less labor income and contributes fewer jobs than alternatives B and C, even though it projects the largest increase in visitation. Under alternative D, recreation on the Prescott NF would support approximately 290 jobs and \$8.69 million in labor income annually in Yavapai County.

The estimated increases in forest visitation under this alternative are expected to have the same type of environmental impacts as discussed under alternative B but to a slightly greater degree.

### ***Financial Efficiency***

The present net value of alternative D is -\$24,558,106. This is the third most negative PNV of the alternatives. This means that the program expenditures (costs) of alternative D exceed the anticipated revenues (benefits) more than for alternatives A and C, but less than alternatives B and E.

### **Alternative E**

#### ***Recreation***

Recreation visits to the Prescott NF are expected to increase by about five percent overall with the implementation of alternative E, compared to alternative A. The pattern of visitation is projected to be similar to alternative B but with a smaller increase in local residents on day trips due to a reduced emphasis on developed day-use facilities.

Under alternative E, recreation on the Prescott NF would support approximately 287 jobs and \$8.58 million in labor income annually in Yavapai County.

The estimated increases in forest visitation under this alternative are expected to have the same type of environmental impacts as discussed under alternative B.

### ***Financial Efficiency***

The present net value of alternative E is -\$24,731,896. This is the most negative PNV of the alternatives. This means that alternative E is the alternative where the cost of implementation exceeds the anticipated revenue by the largest amount, when compared to the other alternatives.

### **Cumulative Environmental Consequences**

Cumulative consequences are those consequences of foreseeable activities on lands that are not managed by the Prescott NF that, in conjunction with management activities likely to occur on the forest, may intensify, negate, improve, or otherwise affect labor income and job opportunities contributed by the forest.

Within Yavapai County, the cumulative effects area around the Prescott NF is primarily the lands managed by municipalities, the State of Arizona, the Bureau of Land Management (BLM), and adjacent national forests. The Prescott NF plays a central role in providing jobs associated with outdoor recreation within Yavapai County as it accounts for approximately 23 percent of the 5.2 million acres, but it is not the sole provider.

On the Federal level, one of the foreseeable future actions that would have cumulative consequences on recreation job opportunities in Yavapai County is direction within the “Bureau of Land Management Bradshaw-Harquahala Resource Management Plan” (RMP) to complete the Black Canyon National Recreation Trail to connect with trails on the Prescott NF. This would provide visitors with access to the national recreation trail and expand opportunities for long distance trail rides. This plan also contains guidance to locate and develop staging and camping areas to service the north section of this nonmotorized trail and to locate a motorized route that generally parallels the Black Canyon Trail.

The government of Yavapai County has developed the “Yavapai County Master Trails Plan” that would expand trail-based recreation by creating links between the forest trail system and other

trail systems in the county. Participants in the master trails plan would include the BLM, State of Arizona, Prescott and Coconino National Forests, cities of Prescott and Sedona, and town of Prescott Valley, all of which have existing trail systems or trail plans.

Management decisions by other Federal agencies, the State of Arizona, and municipalities may result in additional government sector jobs or may provide amenities that attract tourists who support private businesses associated with outdoor recreation and tourism.

## **Environmental Justice**

Executive Order (EO) 12898 (Office of the President 1994) directs Federal agencies to focus attention on the human health and environmental conditions in minority<sup>15</sup> and low income communities<sup>16</sup>. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects<sup>17</sup> on minority and low income populations.

Environmental justice means that, to the extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment.

Environmental justice is the fair treatment and meaningful involvement of people of all races, cultures, and incomes, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The goal of environmental justice is for Federal agency decisionmakers to identify impacts that are disproportionately high and adverse with respect to minority and low income populations<sup>18</sup> and identify alternatives that will avoid or mitigate those impacts.

The emphasis of environmental justice is on health effects and/or the benefits of a healthy environment. The Council on Environmental Quality (CEQ) has interpreted health effects with a broad definition: “Such effects may include ecological, cultural, human health, economic or social impacts on minority communities, low income communities or Indian tribes...when those impacts are interrelated to impacts on the natural or physical environment” (Council on Environmental Quality, 1997).

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<sup>15</sup> Minority means a person who is a member of the following population groups: American Indian or Alaska Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (USDA DR 5600-002, 1997).

<sup>16</sup> Low income population means any readily identifiable group of low income persons who live in geographic proximity to, and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities. Low income populations may be identified using data collected, maintained, and analyzed by an agency or from analytical tools such as the annual statistical poverty thresholds from the Bureau of the Census’ Current Population Reports, Series P-60 on Income and Poverty (USDA DR 5600-002, 1997).

<sup>17</sup> Human health and/or environmental effects as used in this Departmental Regulation include interrelated social and economic effects (USDA DR 5600-002, 1997).

<sup>18</sup> Minority population/communities means any readily identifiable group of minority persons who live in geographic proximity to, and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities (USDA DR 5600-002, 1997).

**Affected Environment**

Table 52 shows that the population of Yavapai County is predominantly white, non-Hispanic (82.3 percent), followed by Hispanic or Latino origin (13.2 percent), and American Indian (1.7 percent). Compared to Arizona and the U.S. as a whole, Yavapai County is less racially and ethnically diverse. However, this finding does not eliminate the need to consider potential disproportionate impacts of Forest Service management actions. Both the Hispanic and American Indian populations have a presence in the analysis area. These populations have strong ties to the land and its natural resources and associate important values with use of the resources found on the Prescott NF. Additionally, the analysis area may have a low overall concentration of minority residents, but it may still have areas with a high concentration of minority residents who could be adversely affected by management actions. The impact analysis that follows considers the potential for management actions to disproportionately negatively affect an environmental justice population.

**Table 52. Race and ethnicity for Yavapai County compared to Arizona and the U.S.**

Race and Ethnicity	Yavapai County	Arizona	U.S.
Black	1.0%	4.4%	12.9%
American Indian/Alaska Native	1.7%	4.9%	1.0%
Asian	0.9%	2.6%	4.6%
Hawaiian/Pacific Islander	0.1%	0.2%	0.2%
Two or more races	1.6%	1.8%	1.7%
Hispanic or Latino origin	13.2%	30.8%	15.8%
White, non-Hispanic	82.3%	57.3%	65.1%

Source: U.S. Census Bureau, American Community Survey, 2008

Table 53 displays the proportion of Yavapai County individuals living below the poverty level for the years 2005 to 2009. Poverty rates are highest for American Indians (28.6 percent), Hawaiian/Pacific Islanders (22.5 percent), and Hispanics (20.5 percent). Such rates suggest that a measurable proportion of the existing population should be considered as a low income group. Therefore, decisions regarding future management actions on the Prescott NF should carefully assess the effects on low income populations.

**Table 53. Poverty rates for Yavapai County by race and ethnicity**

Race and Ethnicity	Total Number	Number Below Poverty Level	Percent
Black	1,335	130	9.7
American Indian/Alaska Native	3,702	1,057	28.6
Asian	1,401	199	14.2
Hawaiian/Pacific Islander	240	54	22.5
Two or more races	4,630	744	16.1
Hispanic or Latino origin	26,022	5,344	20.5

Race and Ethnicity	Total Number	Number Below Poverty Level	Percent
White, non-Hispanic	186,673	22,487	12.0

Source: U.S. Census Bureau, 2005-2009 American Community Survey

## Environmental Consequences

### Common to All Alternatives

In cases where management decisions are expected to create jobs and income in the local economy, it is unlikely that there would be a disproportionate adverse effect on minority and low income populations. Individuals in those populations may benefit from any increase in jobs and income in the area.

Alternatively, future management decisions that may negatively impact local employment and income conditions should include consideration of the distribution of effects across population demographics, paying careful attention to Hispanic, American Indian, and low income populations.

From the economic impact analysis, the total number of jobs contributed to the economy by the Prescott NF is expected to range between 656 and 664 jobs (table 47, employment by program area by alternative). All of the action alternatives (alternatives B, C, D, and E) would provide more jobs than the current management direction (alternative A), but the difference between alternatives is not significant.

### Cumulative Environmental Consequences

Under all alternatives, no measurable cumulative consequences can be discerned from the proposed management changes.

### Heritage Resources

This section summarizes the current heritage resources environment on the Prescott NF and the potential consequences to heritage resources when projects are implemented under the revised plan and alternatives. Data compilation and analysis of the condition of heritage resources found on the Prescott NF, along with estimation of effects by alternative, were provided by Prescott NF staff and resource specialists.

A variety of laws, regulations, and policies provide direction for managing heritage resources. Section 106 of the National Historic Preservation Act of 1966 (P.L. 89-665) lays out the legal framework for considering the effects to heritage resources, preserving them, and consulting with appropriate tribes on Federal undertakings. The Archaeological Resources Protection Act of 1979 (P.L. 96-95) and the Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601) provide additional direction for managing heritage resources. Additional direction for heritage resource management is provided by 36 CFR 60, Forest Service Manual 2360.2, and Forest Service Handbook (in prep).

Numerous heritage resources on the forest are considered culturally significant (eligible for or listed in the National Register of Historic Places) or sacred by federally recognized American Indian tribes. A number of additional laws may pertain to heritage resources in these cases,

including the American Indian Religious Freedom Act of 1978 (P.L. 95-341), the Religious Freedom Restoration Act of 1993 (P.L. 103-141), Executive Order 13007- Indian Sacred Sites, Executive Order 13175—Consultation and Coordination with Tribal Governments, and the Food, Conservation, and Energy Act of 2008 (P.L. 110-234). Corresponding Forest Service direction is provided by Forest Service Manual 1563 and Forest Service Handbook 1509.13.

This guidance is independent from forest plan direction and does not change across alternatives.

### **Affected Environment**

The Prescott NF occupies a unique area within the State of Arizona with regard to prehistoric and historic resources. Because of its central location, topography, and abundance of resources, the Prescott NF has been used by several prehistoric cultural groups as far back as 9,000 years ago. The area has been home to such groups as the Yavapai and Apache people, and others, including the Hualapai and Hopi, have declared an affiliation as well. Because the Prescott NF has been used by American Indians for thousands of years, various site types can be found around the forest. Some of these include large and complex habitations, small seasonal occupations, rock art, and a system of trails. Traditional cultural properties are also known to exist within the Prescott NF.

Once gold was discovered in 1863, it did not take long for the area to experience an influx of people. The town of Prescott was established and soon became the territorial capital of Arizona. Other towns sprang up around the forest as the search for gold widened. Soon afterwards, military forts, ranches, homesteads, and a more extensive transportation system, including several railroads, were built. In 1898, the Prescott Forest Reserve was established, and a short time later the Rio Verde Forest Reserve (1901) was added. In 1908 the Prescott NF was officially designated as a national forest. Roads, trails, and recreation sites were added, with a significant number of these being built during the 1930s and early 1940s by the Civilian Conservation Corps (CCC). In the following decades, the population continued to grow in the communities surrounding the Prescott NF.

The presence of prehistoric and historic sites reflects the human use of the Prescott NF. The forest has been intensively surveying lands for heritage properties since the late 1970s. It is estimated that about 15 percent of the Prescott NF has been inventoried, resulting in the discovery of approximately 3,235 heritage properties. Currently, 36 sites are officially listed on the National Register of Historic Places.

Prescott NF archaeologists typically monitor selected archaeological sites before, during, and after project implementation. In rare cases, monitoring has shown isolated unintended impacts to heritage properties as a result of project implementation. However, project-specific mitigation measures have largely been successful in avoiding impacts to heritage resources. Furthermore, many impacts to heritage properties identified during monitoring are not associated with agency activities, such as off-road vehicular travel, recreational use (e.g., camping), unauthorized digging (e.g., vandalism), and older activities that were implemented prior to the National Historic Preservation Act.

In recent years, most adverse impacts to heritage resources are caused by off-road vehicular travel, high-intensity wildfires, and increased soil erosion. While a large number of archaeological sites on the forest are classified as artifact scatters that are not regarded as “fire

sensitive” under low intensity fire conditions, there are some sites, particularly historic properties and prehistoric sites having certain features that are considered to be fire sensitive under any situation. Importantly, all archaeological sites are susceptible to adverse impacts from high-intensity burning as is well documented after recent wildfires on adjacent national forests (Reid et al., 2008; Forest Service, 2012c ).

## **Environmental Consequences**

### **Alternative A**

Alternative A continues the current management as directed in the 1987 plan and would have no measurable direct effects on any heritage resources. This is because planned projects involving ground-disturbing activity (e.g., locating recreation sites or trails, range improvements, timber and firewood sale areas, and prescribed fire units) include project-specific mitigation measures to ensure protection of heritage resources.

Under alternative A, there remains the risk of high-intensity wildfires from overgrown forests and long term accumulation of organic fuels which could have an indirect effect on heritage sites. Historic sites with wooden, glass, and other similar components (fire sensitive sites) would remain at the greatest risk from fire damage. All heritage sites would remain at risk from increased soil erosion associated with high-intensity fires.

### **Alternative B**

Alternative B would have no measurable direct effects on any heritage resources, similar to alternative A. Alternative B would place more emphasis on forest restoration activities and the reduction of fuels; as a result, there would be a comparatively lower risk of high-intensity fire and associated soil erosion near historic sites.

Alternative B recommends more potential wilderness areas (PWAs) for designation than alternative A. If the PWAs were to be designated, the increase in the number and acreage of wilderness areas would help protect more known and unknown sites from direct human impacts. Sites located within designated wilderness benefit from the restrictions on motorized use; they are not impacted by mechanical vegetation treatments and remote sites are not legally accessible by OHVs.

### **Alternative C**

Alternative C would have no measurable direct effects on any heritage resources, similar to alternatives A and B. Alternative C would have the highest emphasis on forest restoration activities and reduction of fuels, and thus, the comparatively lowest risk of high-intensity fire and associated soil erosion near historic sites. Therefore, alternative C would result in the quickest restoration to conditions favorable for heritage resources.

Alternative C does not recommend any PWAs for designation, and thus, there is no potential for the additional protection from motorized impacts afforded by designated wilderness.

### **Alternative D**

Alternative D would have no measurable direct effects on any heritage resources, similar to alternatives A, B and C. Alternative D would place the same emphasis on forest restoration

activities and reduction of fuels as alternative B, resulting in the same reduction in risk of high-intensity fire and associated soil erosion near historic sites.

Alternative D recommends the most potential wilderness for designation. It provides the most potential for protection from impacts due to administrative and recreational use of motorized equipment of any of the alternatives. As with alternative B, an increase in wilderness areas would help protect more known and unknown sites from direct human impacts.

### **Alternative E**

Alternative E would have no measurable direct effects on any heritage resources, similar to alternatives A, B, C, and D. Alternative E would place the same emphasis on forest restoration activities and reduction of fuels as alternative B, resulting in the same reduction in risk of high-intensity fire and associated soil erosion near historic sites.

Alternative E recommends more potential wilderness areas (PWAs) and acres for designation than alternatives A and C, but fewer acres than alternatives B and D. As with alternatives B and D, an increase in designated wilderness areas would help protect more known and unknown sites from direct human impacts.

### **Cumulative Environmental Consequences**

The Prescott NF manages for “no effect” or “no adverse effect” to heritage resources for all planned management activities. Monitoring data indicate that project activities, such as those related to forest restoration work, may result in unplanned or inadvertent adverse impacts to heritage resources in rare cases. Such unplanned or inadvertent adverse impacts are addressed and mitigated on a case-by-case basis and are more than offset by the benefits of ecological restoration. Therefore, no measureable cumulative consequences are expected under any of the alternatives.

### **Livestock Grazing**

This section addresses the issue of providing livestock grazing, and summarizes the current rangeland environment on the Prescott NF and the consequences to livestock grazing of implementing the revised plan or its alternatives. The full analysis of the land base suitable for livestock grazing can be found in the “Prescott National Forest Determination of Livestock Grazing Capability and Suitability Report” (Forest Service, 2011q).

Grazing, as discussed here, refers to domestic livestock on National Forest System lands under a grazing permit. The desired conditions for grazing are: (1) vegetation provides sustainable amounts of forage authorized livestock and wildlife species; (2) herbivory aids in sustaining or improving native vegetation cover and composition; and (3) livestock grazing contributes to aspects of the social, economic, and cultural structure and stability of rural communities (Desired Condition-Vegetation-3).

### **Affected Environment**

In 2011, 49 permittees were issued permits to graze cattle on the Prescott NF, covering 62 of the 68 allotments across the forest; 4 allotments are closed to grazing and 2 allotments are vacant without an active grazing permit. The active grazing is permitted on 5 seasonal allotments

encompassing spring or summer use periods, 14 fall and/or winter seasonal, and 43 yearlong allotments. Fall and/or winter seasonal allotments may contain riparian areas with streamside vegetation that is grazed during the dormant season. Permitted grazing areas generally are contiguous with privately-owned rangeland, and ranch owners or managers depend on the Prescott NF for grazing to provide ranch income (Forest Service, 2009c).

Federal livestock grazing permits and use levels are expressed in terms of animal units per area or total animal unit months (AUMs). An animal unit (AU) is defined as a mature (1,000-pound) cow or the equivalent. If one AU grazes on an area of rangeland for six months, that tenure is equal to six AUs for one month or six AUMs. In general, the number of animal units, multiplied by the number of months they are on the range equals the number of AUMs used (Ruyle and Ogden, 1993). In 2010, there were 135,767 AUMs permitted for cattle and 1,237 AUMs permitted for horses. Of those, use by cattle totaled 90,928 AUMs (67 percent of permitted stocking level) and use by horses totaled 876 AUMs (71 percent). No animal units were authorized for sheep or goats. In 2013, due to recurrent drought and below average forage production in some areas, stocking levels remained at about 68 percent of the 134,412 AUMs authorized for cattle.

Since the inception of the 1987 plan, 50 of the 68 allotments on the Prescott NF have received site-specific environmental review. These allotments were evaluated on the ecological conditions and usage trends for forage areas as part of the NEPA process associated with permit renewal. Forage production has been properly matched with permitted livestock numbers, and adaptive management strategies have been used to maintain and improve the rangeland resource.

The 1987 plan identified three recreation areas as unsuitable for livestock grazing. In addition, the Prescott Municipal watershed (Goldwater Lake) was excluded from grazing based on a 1924 agreement. Lane Mountain watershed was also excluded, beginning in 1975. Desired conditions for these recreation areas and watersheds include management for their original purpose; thus, they continue to be unsuitable for livestock grazing. Several large, contiguous areas (at least 1,000 acres) were also excluded from grazing in project-level NEPA decisions. The results of recent grazing suitability analysis show that there are 913,078 acres of suitable grazing lands on the Prescott NF (Forest Service, 2011q).

A major increase or decrease in grazing on the grasslands over the next 20 years is not foreseen; however, livestock use and strategies are expected to continue to fluctuate in response to drought, wildfire, prescribed fire, and other factors that influence range conditions.

## **Environmental Consequences**

### **Common to All Alternatives**

All alternatives would provide for continued availability of forage for domestic livestock and opportunities for ranching lifestyles consistent with the other desired conditions. Permitted grazing would likely remain consistent across alternatives for a 10-year timeframe, but authorized grazing could vary year-to-year based on which alternative is chosen. The more acreage treated, especially in grassland and chaparral vegetation types, the greater both the short term impact on available forage and yearly livestock authorization and the long term increase in available forage.

Fluctuations in yearly authorized livestock could be influenced by the amount of acreage treated each year with prescribed fire, thinning, or other mechanical vegetation manipulation. The magnitude of the yearly effect to available forage and range infrastructure, as described below,

depends on the amount of coordination that occurs between resource managers and range management personnel. For example, treatments could be scheduled to coincide with planned grazing rotations to minimize impacts on any single allotment in any given year.

Prescribed fire consumes vegetation that could serve as forage for livestock, and the amount of forage lost depends upon the vegetation type that is being burned. Grassland fires tend to consume vegetation completely and uniformly; while fires in chaparral are more often intermixed mosaics of burned and unburned vegetation. If vegetation is consumed by fire, then it is not available to livestock. This is a short term effect that will take 1 to 2 growing seasons to recover, given adequate precipitation. Under drought conditions, recovery could take 3 to 5 years.

Other vegetation treatments, such as mechanical crushing or brush mastication, would have short term effects on the available forage that are similar to fire treatments. These would include 1 to 2 growing seasons to recover under normal conditions or 3 to 5 years during a drought. Juniper thinning treatments would not affect available forage significantly since livestock do not consume juniper, although mechanical treatments can damage some forage grasses through crushing.

In the long term, vegetation treatments will increase the amount of available forage by opening up canopy conditions and allowing for increased growth of grasses and forbs.

Less available forage to graze will likely mean fewer cattle authorized for that year in the treatment area, unless alternate areas such as vacant or non-use allotments are made available. However, this short term impact is countered by the long term benefit of increased forage production in treated areas after recovery. Livestock grazing under all alternatives would be managed with adaptive management to match livestock numbers with annual forage production.

Fall and/or winter seasonal allotments may permit grazing in riparian areas; however, there are concerns about the impacts of yearlong grazing in these areas. These impacts include the loss of vegetative ground cover and riparian vegetation, soil compaction, accelerated erosion, sedimentation, and decreased water quality. As noted in the discussion on recreation and management impact to watershed, these factors can degrade the quality of the aquatic and riparian habitats. Livestock can also have a negative impact on regeneration in ponderosa pine types, primarily through the trampling of seedlings (Kingery and Graham, 1991). This is of particular importance in recently treated areas.

Under warmer and drier climate conditions, the suitable rangeland found on the Prescott NF would be susceptible to decreases in plant productivity from water limitations and increased heat and changes in the timing, intensity, and frequency of rain events. Rangeland grasses make use of moisture in the upper soil layers, and an increase in intense precipitation events may lead to increased runoff and decreased effective water infiltration (McAuliffe, 2003). This could decrease the vigor of native grasses, leading to an increase in nonnative invasive plant species populations and a decrease in available forage. As noted above, adaptive management would be used to match livestock numbers with forage production.

It is important to note that long term sustainability of the available forage is dependent upon the implementation of vegetation treatments that seek to restore ecosystem health and increase resilience and adaptability to changes in climate. Forage benefits from efforts to reduce woody plant encroachment and to reestablish proper fire regimes in fire-adapted systems such as chaparral. If left untreated, woody vegetation will increase in density and cover at the expense of the herbaceous vegetation that is preferred livestock forage. Although this scenario would likely

take more than 10 years to occur, permitted livestock numbers would be affected negatively in the long term if vegetation is left untreated.

#### **Common to all Action Alternatives**

Alternatives B, C, D, and E contain direction (Standard-Range-1 and 2, Guideline-Range-1 to 6) aimed at minimizing the impacts from livestock grazing on other program areas. These include the impacts that can accompany grazing in riparian areas, the trampling of seedlings, grasses and forbs in treatment areas, entrapment of wildlife in range improvements, and the impediments to wildlife movement caused by fences. The range standards and guidelines proposed in the action alternatives would address these issues and provide guidance for site-specific decisions. The result would be fewer negative impacts from livestock grazing on native terrestrial and aquatic wildlife and habitats and more successful vegetation restoration efforts.

#### **Alternative A**

Alternative A would have the least impact on yearly available forage for livestock of any of the alternatives because it would not increase the number of acres burned in the grassland and chaparral vegetation types. However, because it would not increase the number of acres treated, it would also provide the least long term increase in available forage.

Impacts from yearlong livestock grazing in riparian areas and wetlands would most likely be addressed at the site-specific level, as the current direction regarding this issue (Forest Service, 1987, p. 32) is vague compared to the direction in the action alternatives (Standard-Range-2, Guideline-Range-5). This could result in a delay in mitigation action and a continued accumulation of impacts while site-specific analysis was performed.

In alternative A, there are no potential wilderness areas (PWAs) recommended for wilderness designation. The result would be that there would be no restrictions on grazing activities that are incompatible with the maintenance of wilderness character in these areas and a much lower probability that any of these areas would become designated wilderness.

#### **Alternatives B, D, and E**

The vegetation treatments for grasslands in alternatives B, D, and E (Objectives 1 and 2) would have a greater impact on yearly available forage for livestock and a greater long term increase in available forage than alternative A but less than alternative C. The acreages of treatment in the piñon-juniper vegetation and chaparral (Objectives 3 and 4), and thus, the long term increase in available forage, would be comparable or greater than alternatives A and C.

The recommendation of new and expanded wilderness areas in alternatives B, D, and E would not impose any new restrictions on grazing. However, if any of these areas were to become designated wilderness, there would be additional restrictions and conditions associated with the permit, per Forest Service policy (FSM 2323.22) regarding grazing in national forest wilderness areas.

Range infrastructure such as fences, corrals, and stock tanks in designated wilderness cannot be maintained with motorized equipment unless approved by the regional forester. The process to approve mechanized use is documented in a prepared minimum requirements decision guide (MRDG) that compares the feasibility of alternatives for completing the work by mechanized

means versus by non-mechanized means. An analysis using the NEPA process is required to disclose effects to resources from mechanical disturbance. Delayed maintenance on necessary range improvement may mean that fewer livestock can be authorized on the allotment until the work is completed. New range infrastructure in designated wilderness must also meet the intent of maintaining wilderness values and should be primarily for the purpose of resource protection and the more effective management of these resources rather than to accommodate increased numbers of livestock.

If an area is chosen to be designated as wilderness, further study of the particular area may show that recreational-livestock conflicts are a substantial concern. As a result, livestock grazing may be eliminated in some areas to address these user conflicts. A previous example is in the Granite Mountain Wilderness area where a portion of the Burnt Ranch allotment was closed due to conflicting uses between livestock and recreation.

Vegetation treatments, such as prescribed burns, that improve forage availability are more difficult to implement in wilderness areas, and mechanical treatments are prohibited. In designated wilderness areas that contain juniper woodland communities, it is unlikely that natural fire will serve to reduce the juniper overstory unless there is extreme fire behavior. These dense juniper woodlands have reduced herbaceous understory and a lack of available forage for both livestock and wildlife habitat.

### **Alternative C**

Alternative C would have the highest impact on yearly available forage for livestock and the greatest long term increase in available forage because it provides direction for the greatest increase in acres of grassland treated (Objectives 1 and 2). In addition, it directs treatment for at least as much acreage in the piñon-juniper vegetation and chaparral as alternatives B, D, and E (Objectives 3 and 4).

Alternative C contains the same range standards and guidelines (Standard-Range-1 and 2, Guideline-Range-1 to 6) as alternatives B, D, and E, and thus, would also result in fewer negative impacts from livestock grazing on native terrestrial and aquatic wildlife and habitats and more successful vegetation restoration efforts.

As with alternative A, there are no potential wilderness areas (PWAs) recommended for wilderness designation in alternative C. The result would be that there would be no restrictions on grazing activities that are incompatible with maintenance of the wilderness character in these areas, and a much lower probability that any of these areas would become designated wilderness.

### **Cumulative Environmental Consequences**

Cumulative consequences are those consequences of foreseeable activities on lands not managed by the Prescott NF that, in conjunction with management activities likely to occur on the forest, may intensify, negate, improve, or otherwise affect livestock grazing opportunities on the forest.

The cumulative effects area off the Prescott NF is primarily private, State of Arizona, Bureau of Land Management, and adjacent national forests. Livestock grazing occurs in the majority of these areas. Private lands within communities are not typically grazed by livestock except for by horses. Private lands outside of communities typically provide forage for smaller livestock operations but can support larger livestock operators when the private land is in larger blocks.

These larger private blocks of lands are typically used for late spring and summer grazing for forest permitted livestock. State lands are also typically used for late spring and summer grazing of the forest permitted livestock. The BLM has both year round grazing and seasonal grazing. Forest permitted livestock occasionally use these lands during late spring and summer. Vegetative treatments, primarily burning and thinning of trees, would occur on these other lands. These types of treatments would increase forage for livestock and improve rangeland conditions in these areas. There are no indications that livestock use within these areas is going to change much over the next 10 years.

## **Minerals**

This section addresses the concerns of extracting mineral resources and summarizes the current minerals environment on the Prescott NF and the consequences to mineral resources of implementing the revised plan or its alternatives.

Data compilation and analysis of the mineral resources found on the Prescott NF along with estimation of effects by alternative were provided by Prescott NF staff and resource specialists.

## **Affected Environment**

The Prescott NF has abundant minerals deposits and mining is common both on and off the forest. Existing mining activities on the Prescott NF includes five mineral material contracts for removal of flagstone, one contract for schist removal, one contract for removal of decomposed granite, one limestone operation with an approved commercial plan of operations, and recreational gold placer mining.

Gold mining is limited to small-scale placer and/or lode mining. Placer operations involve methods such as excavation and panning from alluvial deposits and are most common on the forest in the Bradshaw Mountains. Most placer mining is recreational use or small commercial operators; the Gold Basin Project is the only commercial mine with an approved plan of operations. Lode operations, also known as hard rock mining, consist of mining a vein bearing gold or a rock in-place valuable mineral deposit. There are 1,800 active placer claims and 1,484 active lode claims with 10 tunnel site claims. Claims can be up to 20 acres per placer claim with a maximum of 160 contiguous acres with 8 or more people (an association). Lode claims are limited to a maximum size of 1,500 feet in length along the vein or lode and width of 600 feet. Mining claims are not filed on the forest, but rather with the Bureau of Land Management. It should be noted that the vast majority of mining claims do not have any on-the-ground operations associated with them; many of them are for speculative purposes.

Copper is the most abundant metallic mineral on the Prescott NF, and there is an active plan of operation for exploratory drilling of copper on the Verde Ranger District. High demand growth is expected for copper in the United States, and this is likely to increase the interest of mining on the Prescott NF (appendix C, Forest Service, 2009c). It is anticipated that most major mineral exploration and development will occur in the Bradshaw Mountains (Bureau of Mines, 1995).

Geologic surveys and studies suggest that the highest concentrations of metallic minerals exist in the western parts of the forest. Areas with exploration potential for large tonnage deposits of copper and gold are near Copper Basin, Groom Creek, Big Bug Creek, Crooks Canyon, Crown King, and Goodwin.

Demand for copper will continue to be highly dependent on market price. As prices increase, private industry will invest more in research and development making new areas open for exploration. The supply and demand for copper on national forests is influenced by market forces and available technology. The level of demand stimulates investment in new technology, which in turn increases available supply by locating new deposits and bringing some deposits previously considered unextractable into development.

The Prescott NF does not produce any energy or fuel minerals such as uranium, oil, natural gas, or coal. There is no method for predicting future demand, but current conditions and trends indicate that development interests should remain low due to the unlikelihood of suitable deposits on the forest.

There is substantial production of construction related materials on the forest. Table 54 reports sale contracts for cinders, crushed stone, dimension stone, and landscape rock for 2007 thru 2009. Demand tends to be highly influenced by local conditions and has varied considerably in recent years, so mining activity for these minerals has been sporadic. The total value of minerals sold in 2009 was \$217,648, which is down from \$329,261 in 2008. Overall this is a small level of demand relative to the rest of Arizona. It is likely that demand will continue to fluctuate in the future because it is highly speculative and dependent on private and commercial construction activities in the local area. The recent downturn in the economy has slowed demand growth for construction materials, but as markets recover, demand should rebound and the Prescott NF minerals program will need to adapt to these changes. Demand may be predicted by monitoring future construction activities and investments in public infrastructure in the local area. These activities are usually followed by an increase in population, which would consequently contribute to an increase in demand for construction related materials.

**Table 54. Construction related material sale contracts**

Commodity	2007		2008		2009	
	Sale Contracts (short tons)	Value	Sale Contracts (short tons)	Value	Sale Contracts (short tons)	Value
Cinders	67	\$60	67	\$60	—	—
Crushed Stone	—	—	1,481	\$4,111	—	—
Dimension Stone	2,028	\$12,168	54,149	\$324,894	36,255	\$217,528
Landscape Rock	64	\$388	32	\$196	20	\$120
<b>Totals</b>	<b>2,159</b>	<b>\$12,616</b>	<b>55,729</b>	<b>\$329,261</b>	<b>36,275</b>	<b>\$217,648</b>

Source: Forest Service, 2009f

## Environmental Consequences

### Common to All Alternatives

Most of the direction that affects minerals activities comes from the Forest Service Manual and Handbook. These laws, regulations, and policies governing minerals can be found in the Forest Service Manual, FSM 2800 (Mining Claims FSM 2810, Mineral Leases FSM 2820, Mineral Materials FSM 2850) and Forest Service Handbook, FSH 2809.15 and under Title 36 CFR part

228, subpart A. This guidance is independent from forest plan direction and does not change across alternatives.

Mining interests are most abundant for gold and copper, and exploration for both commodities is highly influenced by market conditions. Productive copper mines could be located on various parts of the forest, and future development proposals are possible. It is likely that demand for both copper and gold will increase in the future.

Extraction of construction related materials (e.g., cinders, crushed stone, dimension stone, and landscape rock) has occurred to a varying degree in recent years. Demand for construction materials is influenced by local industrial activities and economic conditions. As current markets rebound, Prescott NF managers may face an increase in the demand for these types of minerals. Overall, the forest's capacity is expected to allow for sustainable mining operations, and additional proposals are likely to appear during the next 10 to 15 years.

The effects of new mining operations would be addressed on a site-specific basis and mitigated individually following the Forest Service policy regarding the approval of mining plans of operation.

The effects of these new and ongoing mining operations can include negative impacts to other resource areas. As noted in the "Water Quality" section in "Need for Change 2," remediation is required to mitigate the impacts to water quality from mining operations in the Black Canyon Creek and Upper Hassayampa River watersheds. In addition to the leaching of pollutants from shafts, adits, and tailings, the surface disturbance caused by mining operations and related access infrastructure can contribute to a loss of vegetation and increase in soil compaction and erosion that leads to reduced water quality due to turbidity.

The reduction in water quality through pollutants and turbidity degrades the existing and potential habitat for both riparian and aquatic dependent species, as noted in the "Aquatic and Riparian Species Viability" section in "Need for Change 4." Terrestrial species may also be affected through the direct loss of habitat or through displacement caused by increased noise and activity at the operations site.

#### **Alternatives A and C**

Alternatives A and C do not contain any recommendations for wilderness designation; therefore, there would be no restrictions on locatable, leasable, or saleable minerals imposed by the need to preserve wilderness character in these alternatives. The result would be that these alternatives have the greatest potential for negative impacts to other resources and the greatest potential to expand the development of minerals resources.

#### **Alternatives B, D, and E**

The wilderness area recommendations in alternatives B, D, and E have no effect on the establishment of new mining claims for locatable minerals such as gold, silver, copper, or tungsten within the area until they are established as designated wilderness by Congress. Claims for locatable minerals are processed through the Bureau of Land Management, and until recommended wilderness areas are designated and the lands are withdrawn, they are still open to mineral entry. If established, they would be closed to new claims, but any valid existing claim would not be affected.

For leasable (e.g., coal, oil shale, oil and gas, phosphate, potash, sodium, and geothermal resources) and salable minerals (including sand, stone, gravel, and clay), lands that are identified as recommended wilderness would become closed to new mineral leases and new mineral materials development at the discretion of the forest supervisor.

Existing salable materials pits within the recommend wilderness areas may be closed upon recommendation, or they may be closed as they become depleted or are no longer needed. The continued operation of existing salable materials sites and the establishment of new sites in recommended wilderness would be at the discretion of the forest supervisor. The forest supervisor's decision would be dependent on the site-specific impacts of the proposed development upon the wilderness character of the recommended area. These alternatives would effectively reduce the number of acres available for leases and mineral materials development by about 43,000 acres in alternative B, about 116,000 acres in alternative D, and about 23,000 acres in alternative E. The result would be that these alternatives have less potential for negative impacts to other resources and less potential to expand the development of minerals resources.

### **Cumulative Environmental Consequences**

Population growth and development are expected to increase demand for minerals and mineral materials. Materials are in demand for construction, landscaping, and road projects, and it is expected that there will be increased pressure to develop these resources in the future. One example is the portion of the forest north of Drake; it is a major flagstone production area for northern Arizona. The proposed alternatives for the forest plan would have little to no effect on these quarries or mineral materials production for this area of the forest.

The Prescott NF is adjacent to both the Coconino and Kaibab NFs. These national forests are guided by the same laws, regulations, and policies as the Prescott NF and both have potential wilderness areas that may be recommended for wilderness designation. Areas recommended for designation may be closed to new mineral leases and new mineral materials pits to preserve the wilderness character of the area, and if they become designated wilderness, the existing materials pits within the boundaries may be closed as they become depleted or are no longer needed.

As the communities in and around the forest continue to expand, more emphasis could be placed on clean air and water, which would increase the pressure on mining industries to use production methods that produce fewer environmental impacts. If the price of locatable minerals, such as copper and gold, continues to climb, it could be expected that more new mines will be proposed on the Prescott NF and adjacent Federal lands that contain suitable ore-bearing deposits.

### **Forest Products**

This section addresses the subject of providing forest products and summarizes the current environment on the Prescott NF in terms of estimated available forest product quantities by alternative and the resources associated with harvest of those forest products. Forest products discussed in this section include those that would be harvested on both suitable and unsuitable lands, as determined in the timber suitability analysis. This analysis, along with the long term sustained yield capacity and the allowable sale quantity can be found in the "Prescott National Forest Timber Suitability, Long term Sustained Yield Capacity, and Allowable Sale Quantity Report" (Forest Service, 2011r).

The desired conditions for forest products are: (1) a sustainable mix of forest products are offered for sale in response to local and regional needs and these products contribute to the social, economic, and cultural structure and stability of rural communities; (2) harvest activities on lands deemed suitable for timber production provide for the diversity of plant and animal communities and other resources to meet overall multiple-use objectives; and (3) forest products are removed from unsuitable lands to benefit forest health, mitigate insect and disease damage, reduce hazardous fuels, improve wildlife habitat, create recreation opportunities, or to perform research or administrative studies. (Desired Condition-Vegetation-2).

### **Affected Environment**

Forest products sold on the Prescott NF include both sawtimber and firewood. Since approximately the mid-1990s, demand for sawtimber on the Prescott NF has shifted from a commodity driven need to an ecological need. In other words, the harvest of sawtimber on the Prescott NF has been the result and a byproduct of thinning forested areas with the primary objective of improving forest health, resiliency to disturbance, and wildlife habitat or to reduce hazardous fuels in the wildland-urban interface, not to produce sawtimber. The demand for wood products other than sawtimber has been driven by local and regional need for firewood. Under management of the 1987 plan, over a 10-year span sawtimber sales averaged 2,340 hundred cubic feet (ccf) annually and firewood sales averaged 2,040 ccf of firewood annually.

Juniper Grassland and Piñon-Juniper Evergreen Shrub PNVTs are the two vegetation types on which firewood is currently harvested and are generally characterized by moderate to low similarity to desired ecological conditions in terms of vegetation structure. As noted in the “Vegetation and Fire” section in “Need for Change 1,” fire exclusion over the past century has created increases in canopy cover and tree density and a related decrease in growth and germination of grasses and shrubs in the understory. On erosive soil types within these communities, shrub, tree, and herbaceous ground cover help to lessen raindrop intensity and soil movement.

Sawtimber is harvested from both the Ponderosa Pine-Evergreen Oak and Ponderosa Pine-Gambel Oak PNVTs. These vegetation types can be described as having a low similarity to desired ecological conditions. The current fire regime is one of low frequency and high-intensity as opposed to the desired regime in which fire would occur at high frequency with low intensity. Results of this change in the fire regime are: there are too many young and mid-aged trees and too few mature trees which create high canopy cover and stands that have a single overstory canopy layer; both fine and coarse fuels have accumulated on the forest floor; and there has been a decrease in the growth and germination of grasses and forbs in the understory. Healthy pine forests provide important habitat for a variety of wildlife species and are essential to maintaining bird populations such as the northern goshawk and Mexican spotted owl. A considerable amount of these two PNVTs include areas that are deemed wildland-urban interface.

## Environmental Consequences

**Table 55. Projected 10-year harvest volume by product type and alternative**

Product	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Sawtimber	23,385 ccf	40,447 ccf	40,447 ccf	40,447 ccf	40,447 ccf
Firewood	20,397 ccf	152,215 ccf	81,246 ccf	81,246 ccf	152,215 ccf
<b>Totals</b>	<b>43,782 ccf</b>	<b>192,662 ccf</b>	<b>121,693 ccf</b>	<b>121,693 ccf</b>	<b>192,662 ccf</b>

**Table 56. Projected 10-year harvest acres by PNVT and alternative**

PNVT	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Ponderosa Pine PNVTs	5,540 acres	8,000 acres	8,000 acres	8,000 acres	8,000 acres
Piñon-Juniper PNVTs	3,140 acres	22,000 acres	12,000 acres	12,000 acres	22,000 acres
<b>Totals</b>	<b>8,680 acres</b>	<b>30,000 acres</b>	<b>20,000 acres</b>	<b>20,000 acres</b>	<b>30,000 acres</b>

### Alternative A

Based on historic averages, alternative A would provide approximately 23,385 ccf of sawtimber and 20,397 ccf of firewood per decade (table 55). Sawtimber harvest would occur across 5,540 acres of the ponderosa pine PNVTs and firewood would be harvested on 3,140 acres of the piñon-juniper PNVTs (table 56). This would result in the lowest volume of both sawtimber and firewood production among any of the alternatives.

However, alternative A would also create the fewest short term impacts on scenic quality and have the least potential for possible delays or denial of access due to temporary road, trail, and area closures due to harvest activities. The negative impacts to soil, such as compaction and erosion, and the potential for introduction of nonnative plants would be minimized due to the limited harvest levels.

In the long term, alternative A achieves the smallest increase in perennial grass cover and open state conditions, leaving a greater threat of uncharacteristic and damaging crown fire occurrence within and between PNVTs. The lack of improvements to vegetation structure and composition would leave soil and watershed conditions mostly unaddressed and would provide the lowest quality and quantity of wildlife habitat compared to the action alternatives. Resistance to insect epidemics in the ponderosa pine and piñon-juniper PNVTs would continue to decline over time.

### Alternatives B and E

Alternatives B and E would produce approximately 40,447 ccf of sawtimber and 152,215 ccf of firewood per decade (table 55) on 8,000 acres of ponderosa pine PNVTs and 22,000 acres of piñon-juniper PNVTs, respectively (table 56). This would result in a volume of sawtimber higher than alternative A and equal to the volume in alternatives C and D and the highest volume of firewood production among any of the alternatives.

Compared to the other alternatives, alternatives B and E would have the most short term impacts on scenic quality and potential for possible delays or denial of access due to temporary road, trail, and area closures due to harvest activities. These alternatives would also have the greatest short term impact to soils in terms of compaction and erosion and the greatest potential for the introduction of nonnative plants due to the highest proposed firewood harvest levels among the alternatives.

In the long term, alternatives B and E achieve the greatest increase in perennial grass cover and open state conditions in the piñon-juniper PNVTs, resulting in a reduced threat of uncharacteristic and damaging crown fire occurrence within and between PNVTs. Vegetation treatments in piñon-juniper PNVTs can reduce tree and shrub density and canopy cover to levels that allow for the establishment and growth of perennial grasses and forbs. As grass and forb communities establish in the understory, soils would move toward a satisfactory condition. As organic matter and ground cover increase, the three primary soil functions of stability, hydrology, and nutrient cycling would recover in these treated areas. As discussed in the effects analysis for the “Water Quality” section (see “Need for Change 2”), conditions in impaired watersheds that have a high percentage of piñon-juniper PNVTs could improve as a result of implementing alternatives B or E. The increased quality and quantity of palatable forage would improve the most amount of wildlife habitat when compared to the other alternatives. Additionally, alternatives B and E would create a greater area of piñon-juniper PNVTs that are resistant to insect epidemics.

#### **Alternatives C and D**

Alternatives C and D would produce approximately 40,447 ccf of sawtimber and 81,246 ccf of firewood per decade (table 55) on 8,000 acres of ponderosa pine PNVTs and 12,000 acres of piñon-juniper PNVTs, respectively (table 56). This would result in a higher volume of both sawtimber and firewood than alternative A and an equal volume of sawtimber but less firewood than alternatives B or E.

Alternatives C and D would have fewer short term impacts on scenic quality and potential for possible delays or denial of access due to temporary road, trail, and area closures due to harvest activities than alternatives B or E but more than alternative A. Alternatives C and D would also have a short term impact to soils in terms of compaction and erosion and a potential for the introduction of nonnative plants between what is expected to occur as a result of implementing alternatives A, B, or E .

In the long term, alternatives C and D would achieve a little less than half the amount (46 percent) of changed condition in piñon-juniper PNVTs than what would be expected under alternatives B or E. Some of the expected changed conditions include: reduced threat of uncharacteristic and damaging crown fire occurrence within and between PNVTs; vegetation treatments in piñon-juniper PNVTs would reduce tree and shrub density and canopy cover to levels that allow for the establishment and growth of perennial grasses and forbs; soils would move toward a satisfactory condition; as organic matter and ground cover increase, the three primary soil functions of stability, hydrology, and nutrient cycling would recover in treated areas; an increased quality and quantity of palatable forage would improve wildlife habitat; and piñon-juniper PNVTs would be resistant to insect epidemics.

### **Cumulative Environmental Consequences**

The Prescott NF is adjacent to both the Coconino and Kaibab NFs. These national forests are guided by the same laws, regulations, and policies as the Prescott NF and both have potential wilderness areas that may be recommended for wilderness designation. Areas recommended for designation may be closed to firewood or sawtimber harvest to preserve the wilderness character of the area.

If the price of natural gas increases, there could be an increased demand on firewood as a residential heat source. As communities in and around the forest continue to expand, more emphasis could be placed on clean air and water, which could increase the emphasis on improving watershed conditions with vegetative treatments such as sawtimber and firewood harvest.

Two national forests adjacent to the Prescott NF are proposing to carry out landscape scale restoration of ponderosa pine forests in northern Arizona. Restoration activities include the thinning of trees, prescribed fire treatments, and watershed and road restoration within 988,764 acres of the Coconino and Kaibab National Forests. Proposed treatments include more than 205,000 acres of prescribed fire treatments and more than 388,000 acres of thinning and watershed restoration treatments (Forest Service, 2011k). Thinning activities are estimated to occur over a 10-year period with an average of 30,000 acres being thinned each year. This increased level of thinning and the resulting removal of forest products from adjacent national forests could create new wood products markets and new opportunities for utilization of wood from the Prescott NF.

### **Special Uses**

This section addresses the concerns of managing special uses and summarizes the current special uses environment on the Prescott NF and the consequences to special uses of implementing the revised plan or its alternatives.

Data compilation and analysis of the special uses managed on the Prescott NF along with estimation of effects by alternative were provided by Prescott NF staff and resource specialists.

### **Affected Environment**

Special use permits authorize services that support the Forest Service mission and meet the needs of the public. These permits are a partnership between the Forest Service and private businesses or individuals to provide services and facilities. Special uses authorize occupancy and use of Forest Service lands for appropriate, safe activities that meet demonstrated public needs when consistent with the desired conditions for the specific area. The Prescott NF has issued over 400 active special use permits for a variety of uses, including recreation residences, organizational camps, research studies, rights-of-way, communications towers, power lines, and wildlife water catchments.

Special use permits allow for occupancy and use of National Forest System lands. Permits may be short term, such as for recreation events or non-commercial group uses, or longer term, such as energy corridors or electronic sites.

The Prescott NF has issued an average of 15 recreation event permits per year for the last 10 years and currently has 17 active outfitter/guide permits. The recreation event permits are short term, generally spanning a period of 3 to 5 days to cover setup, takedown, and the event itself. Categories of events include non-commercial events such as club gatherings or weddings and commercial ventures like festivals and races. Permits for this latter category require a fee, non-commercial permits do not.

The emphasis on providing for energy needs is expected to increase in the next decade, focusing on energy development and transmission corridors. As the demand for alternative power sources continues to grow, many companies will likely look to Federal lands as possible locations for wind and solar farms. The “West-wide Energy Corridor Programmatic Environmental Impact Statement” reviewed and evaluated the need to establish transmission corridors to connect these new energy sources to the existing power grid. As noted in appendix C, the West-wide Corridor segment 61-207 crosses the Prescott NF from south to north from about 0.75 mile northeast of Dewey, to the northern forest boundary just west of County Road 173.

The consolidation of ownership of Federal, State, and private lands within the proclaimed forest boundary could affect the demand for special use authorizations. There are no alternative energy developments under a permit or lease on the Prescott NF; however, in the spring of 2011, the Forest Service received a proposal to site 68 wind turbines within the proclaimed boundary of the northwestern part of the forest. The proposal includes turbines located solely on private land, with underground connectivity along 32 miles of established NFS roads to connect to the existing Western Area Power Authority (WAPA) transmission line. No data on power generation was provided. It is likely that WAPA will be the lead agency for the EIS.

The effects of major development projects such as for utilities and transportation systems would be addressed on a site-specific basis and mitigated individually following the Forest Service policy regarding special uses. Mitigations are typically accomplished by consolidation of new developments along existing routes and corridors or by construction techniques that disturb less land and improve reclamation success.

## **Environmental Consequences**

### **Common to All Alternatives**

Most of the direction that affects special uses comes from the Forest Service Manual and Handbook. The existing laws, regulations, and policies governing special uses on the forest can be found in the Forest Service Manual, FSM 2700 (Special Uses FSM 2720, Rights-of-Ways FSM 2730, Federal Power Act Projects FSM 2770) and Forest Service Handbook, FSH 2709.11, FSH 2709.12 and FSH 2709.14 and under Title 36 CFR part 251, subparts A and B, which are independent from direction in the forest plan. Special uses would be managed to be consistent with the plan components for other resource areas (e.g., recreation, heritage, wildlife).

Changes in forest plan direction would have little direct effect on special use permits as most of the changes would occur at the project, or permit issuance, level. Prior to authorization being granted for any special use, it would be assessed using an interdisciplinary approach with input from other resource programs in order to address potential resource conflicts with the proposed project or service. Impacts from the implementation of actions associated with a special use permit would be determined through site-specific NEPA analyses.

The effects of issuing special use permits would be common to all of the alternatives. These effects include the opportunity costs associated with the issuance of permits, the concentrated environmental impacts that can result from the permitted activity, and the benefits provided by the permitted activity.

When an area is removed from the resource base for temporary or permanent use under a special use permit, there is a loss of the opportunity to use the area for something else. This is commonly known as an opportunity cost. Opportunity costs can range from the loss of access for the general public, as would be the case with communications sites, to the loss of lands suitable for timber production or livestock grazing in energy corridors and rights-of-way, or temporary displacement from a recreation area or facility during a recreation event.

Special use permits can cause both short and long term environmental impacts by concentrating use into a short period of time and a particular area, such as during a recreation event or guided activity. The short term effects from this type of use can include the disruption of the social setting by bringing larger groups into areas than are typically present, and the displacement of non-participating visitors from the areas or facility. These are broad statements of possible effects that would have to be determined for individual permits through a project-level analysis.

In addition to the short and long term environmental impacts, special use permits also provide benefits in the form of supporting the Forest Service mission and helping to meet the needs of the public. Energy corridors and communication sites can contribute to the public good improving or expanding critical infrastructure elements. Recreation events and outfitter and guide services can increase the number and diversity of recreation opportunities available to Prescott NF visitors.

### **Cumulative Environmental Consequences**

Under all alternatives, no measurable cumulative consequences can be discerned from the proposed management changes.

### **Transportation System**

This section addresses the concerns of managing the transportation system and summarizes the current roads and trails environment on the Prescott NF and the consequences to the Prescott NF transportation system of implementing the revised plan or its alternatives.

Data compilation and analysis of the transportation system on the Prescott NF along with estimation of effects by alternative were provided by Prescott NF staff and resource specialists.

### **Affected Environment**

The transportation system on the Prescott NF consists of roads and trails that provide access to both public lands and private inholdings. Virtually every activity that takes place on the Prescott NF uses the transportation system, including: outdoor recreation, wildfire management, livestock and wildlife management, natural resource development, private inholding access, and electronic communication sites and utility corridor maintenance, as well as management and monitoring of National Forest System (NFS) lands.

Motorized travel on the forest has evolved over time. Historically, the road system was constructed for commodity access, primarily administration, grazing, mining, and timber. Some

roads were used to access points of interest or areas used for specific activities, such as hunting and camping. While the transportation system continues to provide access for administration of the forest, the majority of use today is for public recreation and vegetation management activities.

However, there are some areas of the forest where system roads pass through private sections of property. For some of these roads, the Forest Service has formal easements or rights-of-way recorded. However, the majority of these roads have only “prescriptive access rights” involving commonly known, accepted, and continued road use, and there is no formal legal documentation establishing access across the private property to the public lands beyond. In some cases, the property owners have eliminated public access to national forest lands by installing gates and locks at the property boundaries.

The motorized transportation system for the Prescott NF is composed of 29.5 miles of roads managed and maintained for passenger cars (maintenance level 3 through 5), about 1,300 miles of roads managed and maintained for high-clearance vehicles (maintenance level 2), 28 miles of roads closed to all motorized vehicles (maintenance level 1), and 408 miles of trails open to motorized vehicles less than 50 inches wide. The miles of road open to motorized use include roads where access may be restricted on a seasonal basis. Any road, regardless of maintenance level, may be closed during extreme weather conditions for public safety or to minimize resource damage. The current road density (including motorized trails) of the Prescott National Forest is less than 0.97 miles per square mile. Road density is even less if designated wilderness areas are included in the calculations.

The Prescott NF also contains almost 140,000 unroaded acres in 11 inventoried roadless areas identified in the 2001 Roadless Area Conservation Rule. Their undeveloped nature is retained by restricting the occurrence of road construction within existing boundaries, although they do allow for motorized travel on designated trails.

The Travel Management Rule (November 9, 2005, 36 CFR 212.51) requires that each national forest designate a system of roads, trails, and areas for motor vehicle use by vehicle class and, if appropriate, by time of year. The rule addresses any future proliferation of unauthorized routes by prohibiting cross-country motorized travel, except in designated areas and for designated uses. Cross-country motorized travel is restricted to two designated areas on the Prescott NF, Alto Pit (41 acres) and Hayfield Draw (80 acres), and for motorized big game retrieval. The Travel Management Rule is consistent with forest plan direction established in 1989 through forest plan amendment 4.

The motor vehicle use map (MVUM) is produced by the Prescott NF to display the roads and trails that have been designated for motorized use. Roads used only for administrative purposes and unauthorized or user-created roads are not included on the MVUM. The designation of specific routes, trails, and areas for motorized vehicle travel is not within the scope of the plan revision process.

## **Environmental Consequences**

### **Common to All Alternatives**

Under the direction of all of the alternatives, the NFS roads and trails would be managed to provide a safe and efficient transportation system for travel and the administration of NFS lands. Unneeded roads (both NFS roads and unauthorized roads) would be removed from the system,

and roads slated for decommissioning would be restored to a more natural state. Travel would become more centralized on the remaining system roads, and natural and cultural resources would be less adversely affected by motor vehicle use.

Motorized access on NFS roads and trails is subject to the Prescott NF travel management decisions and is considered separate from forest plan revision. The lack of legal access to NFS lands has been identified as a management concern, and all alternatives would direct that rights-of-way should be obtained to address this concern. This increased access would facilitate management and improve the ability to provide goods and services in a variety of resource areas. The MVUM would continue to be the management approach used to clarify which routes are open to the public but would not vary between the alternatives.

### **Alternative A**

Under alternative A, management of the transportation system would continue under the direction set forth in the 1987 plan. This guidance is reactive in nature, as opposed to the proactive management direction found in the action alternatives. Current direction is focused on access restrictions to reduce potential vehicle impacts rather than mitigation and restoration of existing disturbance. An example of this is the restriction on cross-country motorized travel that predates the Travel Management Rule.

The impacts include soil erosion and compaction, loss of vegetation, and physical disruption of cultural sites. As noted previously, erosion from poorly located roads and trails with improper stream and drainage crossings is adding to the sediment load and impacting watershed integrity. It can be reasonably assumed that in the absence of a change in management direction, these impacts will continue to accumulate into the future.

This alternative does not contain any plan-level direction to secure legal access across private property in areas where historic access to the national forest has been lost. It could be reasonably expected that alternative A would maintain the status quo of limited public access to some areas of the Prescott NF.

Alternative A does not recommend any areas for wilderness designation. A recommendation for wilderness designation imposes restrictions on any activity that could affect the wilderness character of the area; this could include the creation of new or temporary roads in these areas that do not contain any NFS system roads or the designation of new motorized trails.

### **Alternatives B and D**

Alternatives B and D contain specific plan level guidance for watershed protection that would help to mitigate and restore the effects on water quality from the existing transportation system. The result would be that these alternatives would improve water quality at a faster rate than alternative A. Alternatives B and D do not contain direction to secure legal access along National Forest System roads where historic access to the national forest has been lost. In this respect, they are the same as alternative A.

As noted in the watershed section, roads, and to a lesser extent, trails, are the most significant source of increased sediments into stream channels on the Prescott NF. Hard surface roads create linear features with impermeable surfaces that have low roughness, and many roads and trails on the Prescott NF are located in proximity to surface water and concentrate runoff into these

drainages, increasing sediment transport and reducing infiltration rates. These concerns are addressed in Objective 20, which directs the maintenance, repair, or relocation of 20 to 100 miles of roads or trails, and in Objective 22, which provides direction to improve 15 to 25 stream or drainage crossings associated with roads or trails. These objectives would have the dual benefit of improving watershed conditions and the state of repair of the NFS transportation system.

Both alternatives B and D recommend additional acreage for wilderness designation. A recommendation for wilderness designation imposes restrictions on any activity that could affect the wilderness character of the area; this could include the creation of new or temporary roads in these areas that do not contain any NFS system roads. Further discussion of the consequences of wilderness recommendation can be found in the “Recommended Wilderness” section in “Need for Change 3.”

### **Alternative C**

Alternative C does not differ from alternatives B or D with respect to the watershed objectives and associated relevant guidelines or securing legal public access. Therefore, it could be expected to provide the same benefits to watershed and NFS transportation system conditions.

Alternative C does differ from the other action alternatives in that, like alternative A, it does not recommend any areas for wilderness designation. Thus, as with alternative A, there would be no restrictions on any activity, such as the creation of new roads or motorized trails that could affect wilderness character.

### **Alternative E**

Alternative E is similar to alternatives B, C, and D with respect to the watershed objectives and relevant guidelines, with a stronger emphasis on road and trail repair and relocation versus maintenance. Therefore, it could be expected to provide similar benefits to watershed and NFS transportation system conditions at a faster rate.

Alternative E differs from the other action alternatives in its approach to securing legal public access and road and trail maintenance. Objective 30 directs that the forest identify and act upon up to 10 opportunities to secure legal access to secure legal access along National Forest System roads that cross private land. This objective was added in response to public comments about actual and anticipated loss of access to some areas on the Prescott NF.

Objective 20 in alternative E focuses on repair and relocation of roads or trails impacting water quality and does not count routine maintenance towards meeting the 20 to 100 miles. This could improve water quality at a faster rate by directing resources towards efforts with potentially greater benefits. Objective 22 is the same as the other action alternatives; it provides direction to improve 15 to 25 stream or drainage crossings associated with roads or trails.

As with alternatives B and D, alternative E recommends additional acreage for wilderness designation and would impose the same restrictions on any activity that could affect the wilderness character of the area. Further discussion of the consequences of wilderness recommendation can be found in the “Recommended Wilderness” section in “Need for Change 3.”

### **Cumulative Environmental Consequences**

Under all alternatives, no measurable cumulative consequences can be discerned from the proposed management changes.

### **Unavoidable Adverse Consequences**

The revised plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carry out any project or activity. Therefore, decisions made in the land management plan do not cause, or have the potential to result in, actual irreversible or irretrievable commitment of resources (see next section). Application of the land management plan standards and guidelines during future project and activity decisionmaking would provide resource protection measures and limit the extent and duration of any adverse environmental impacts. For a detailed discussion of types of consequences expected from future activities, see specific topic areas in this chapter.

### **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 revised plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carry out any project or activity. Because the land management plan does not authorize or mandate any site-specific project or activity (including ground-disturbing actions), none of the alternatives cause an irreversible or irretrievable commitment of resources.

### **Short Term Uses and Long Term Productivity**

The National Environmental Policy Act (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). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101). Short term uses are those that generally occur for a finite time period. Long term productivity refers to the ability of the land to produce a continuous supply of a resource.

The change in the programmatic management of the Prescott NF under any action alternative would not jeopardize the short term or long term productivity of the lands and resources of the forest. Discussion of short and long term effects is included in the analysis of the environmental consequence for each need for change.

## Other Required Disclosures

The regulations for implementing the NEPA at 40 CFR 1502.25(a) 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.” As a proposed Federal project, the revised plan decisions are subject to compliance with other Federal and State laws. Determinations and decisions made in the revised plan have been evaluated in the context of relevant laws and executive orders. Throughout the development of the revised plan, there has been collaboration with various State and Federal agencies. The following actions have been taken to document and ensure compliance with laws that require consultation and/or concurrence with other Federal agencies.

- **Endangered Species Act, Section 7:** Consultation with the U.S. Department of the Interior, Fish and Wildlife Service, regarding federally listed threatened, endangered, and proposed species, and designated and proposed critical habitat is in progress.
- **National Historic Preservation Act:** Consultation with the Arizona State Historic Preservation Officer is mandated by Section 106 of the National Historic Preservation Act (NHPA). The Southwestern Region also subscribes to a programmatic agreement with the Arizona State Historic Preservation Office for ways in which consultation can be conducted. The various appendices of the programmatic agreement are particularly directed to Southwestern Region projects and issues.
- **Government-to-government consultation** was completed with American Indian tribes who have aboriginal territory within the lands now part of the Prescott NF, as required by the National Historic Preservation Act; Executive Orders 13007 and 13175; and the 2003 First Amended Programmatic Agreement cited above.



# Chapter 4. Consultation and Coordination

## Preparers and Contributors

The following individuals and Forest Service staff groups contributed to development of this environmental impact statement.

### Responsible Official

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### Official Responsible for Preparing the EIS

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Christine Thiel	Range Program Lead	<ul style="list-style-type: none"> <li>• M.S. Environmental Resources in Agriculture, Arizona State University</li> <li>• 16 years experience with the Forest Service</li> </ul>
Jodi Wetzstein	Planning Forester	<ul style="list-style-type: none"> <li>• B.S. Forestry, Northern Arizona University; certified silviculturist</li> <li>• 11 years experience with the Bureau of Land Management and 5 years experience with the Forest Service</li> </ul>

### **Other Forest Service Contributors**

Review and input in the development of the final plan and EIS were received from the staffs of the Bradshaw, Chino Valley, and Verde Ranger Districts; the Prescott NF Supervisor’s Office; and the Southwestern Region Regional Office.

### **Consultation and Coordination**

The Forest Service consulted the following tribes; Federal, State, and local agencies; groups; and individuals during development of this environmental impact statement.

#### **Tribes**

The following six tribes were consulted: Fort McDowell Yavapai Nation, Hopi Nation, Hualapai Tribe, Tonto Apache Tribe, Yavapai-Apache Nation, and Yavapai-Prescott Indian Tribe. In addition, the following tribes were notified of Prescott NF plan revision efforts at the time the

notice of intent to revise the plan was published in the Federal Register: Ak'Chin Indian Community, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mohave Indian Tribe, Gila River Indian Community, Havasupai Tribe, Pasua Yaqui Tribe of Arizona, Quechen Tribe of the Fort Yuma Indian Reservation, San Carlos Apache Tribe, and Zuni Tribe.

### **Federal, State, County, and Local Agencies and Organizations**

Numerous Federal, State, county, and local agencies and organizations have been consulted in development of the revised plan and this EIS. Complete mailing lists for the scoping periods are available in the planning record. Some of the agencies consulted include:

#### **Federal**

U.S. Department of Agriculture  
 Coconino National Forest  
 Kaibab National Forest  
 Natural Resources Conservation Service  
 Rocky Mountain Research Station  
 Southwestern Regional Office  
 Tonto National Forest

U.S. Department of Defense  
 Army Corps of Engineers

U.S. Department of Energy

U.S. Department of Homeland Security  
 Customs and Border Protection

U.S. Department of the Interior  
 Bureau of Indian Affairs  
 Bureau of Land Management  
 Bureau of Reclamation  
 Fish and Wildlife Service  
 National Park Service

U.S. Department of Transportation  
 Federal Highway Administration

U.S. Environmental Protection Agency

U.S. Small Business Administration

#### **State**

Arizona Department of Environmental Quality

Arizona Department of Mines and Minerals

Arizona Department of State Lands

Arizona Department of Transportation

Arizona Department of Water Resources

Arizona Farm Agency

Arizona Game and Fish Department

Arizona Geological Survey

Arizona Office of Tourism

Arizona State Parks  
 Arizona OHV Ambassador Program

Arizona State University

Northern Arizona Council of Governments

Northern Arizona University

Office of the Governor

University of Arizona  
 Coconino County Cooperative Extension  
 Yavapai County Cooperative Extension

#### **County**

Coconino County  
 Planning and Zoning

Yavapai County  
 Board of Supervisors  
 Planning and Design Review  
 Public Works  
 Regional Trails Planning  
 Sheriff's Office  
 Trails Committee  
 Water Advisory Committee

#### **Local Municipalities**

City of Flagstaff

## Chapter 4. Consultation and Coordination

City of Prescott  
City of Prescott Valley  
City of Sedona  
Phoenix City Council  
Town of Ash Fork  
Town of Camp Verde  
Town of Chino Valley  
Town of Clarkdale  
Town of Cottonwood  
Town of Dewey-Humboldt  
Town of Jerome

### **Unincorporated Communities**

Arcosanti

Bagdad  
Black Canyon City  
Breezy Pines  
Cherry  
Cordes Lakes  
Crown King  
Mayer  
Paulden  
Skull Valley  
Spring Valley  
Walker  
Wilhoit

### **Others**

Numerous groups and individuals participated in the process through written comments and by attending public meetings. Groups consulted include:

APS	Prescott Area Wildland Urban Interface Commission
Arizona Hispanic Chamber of Commerce, Prescott Valley	Prescott Open Trails Association
Arizona Wilderness Coalition	Prescott Valley Chamber of Commerce
Back Country Horsemen of Central Arizona	Sierra Club, Grand Canyon Chapter
Black Canyon Fire District	The Nature Conservancy, Verde River Program
Center for Biological Diversity	Upper Verde Wild and Scenic River Steering Group
Chino Valley Area Chamber of Commerce	Upper Agua Fria Watershed Partnership
Community Forest Stewardship Forum	Verde Front
Community Forest Trust	Verde Valley Cyclists Coalition
Highland Center for Natural History	Verde Valley Regional Economic Development Organization
Highland Pines Homeowners Association	Verde Valley Regional Planner's Group
Horsethief Basin Homeowners Association	Yavapai County Cattle Growers Association
Mingus Area Preservation Society	Yavapai Trails Association
Open Space Alliance	Yavapai Weed Management Association

## **List of Agencies, Organizations and Persons to Whom Copies of the EIS Were Sent**

Notice of the availability of this EIS was mailed to the public, forest employees, Federal and State agencies, and tribal and local governments.



# Glossary

**Best management practices (BMPs)** – Methods, measures, or practices selected by an agency to meet its non-point source control needs. BMPs include, but are not limited to, structural and non-structural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2(m)).

**Class 1 airsheds** – Also called Class 1 Federal areas. A classification where areas require the highest level of protection under the Clean Air Act (CAA). The CAA defines mandatory Class I Federal areas as certain national parks (over 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 acres), and international parks that were in existence as of August 1977.

**Connectivity** – The arrangement of habitats that allows organisms and ecological processes to move across the landscape; the opposite of fragmentation. Patches of similar habitats are either close together or linked by corridors of appropriate vegetation.

**Deferred maintenance** – Maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value. Deferred maintenance needs may be categorized as critical or non-critical at any point in time. Continued deferral of non-critical maintenance will normally result in an increase in critical deferred maintenance.

**Ecosystem services** – Benefits that people obtain from ecosystems. Some of the ecosystem services the Prescott NF provides include: clean water and air, productive soil, riparian and aquatic resources, diverse wildlife habitats, timber, forage, scenery, recreation, and educational and cultural values.

**Extirpate** – to expunge or to remove completely.

**Federally listed species** – Threatened or endangered species listed under the Endangered Species Act, as amended. Candidate and proposed species are species which are being considered for Federal listing.

**Fire regime** – The patterns, frequency, and severity of fire that occur over a long period of time across a landscape and its immediate effects on the ecosystem in which it occurs. There are five fire regimes which are classified based on frequency (average number of years between fires) and severity (amount of replacement of the dominant overstory vegetation) of the fire. These five regimes are:

- **Fire regime I** – 0 to 35 year frequency and low (surface fires most common, isolated torching can occur) to mixed severity (less than 75 percent of dominant overstory vegetation replaced)
- **Fire regime II** – 0 to 35 year frequency and high severity (greater than 75 percent of dominant overstory vegetation replaced)
- **Fire regime III** – 35 to 100+ year frequency and mixed severity
- **Fire regime IV** – 35 to 100+ year frequency and high severity
- **Fire regime V** – 200+ year frequency and high severity.

**Goshawk post-fledgling family areas (PFAs)** – The areas that surround northern goshawk nest areas. They represent an area of concentrated use by the northern goshawk family until the time the young are no longer dependent on adults for food. PFAs are approximately 420 acres in size (not including the nest area acres).

**Human geographic mapping** – Human geographic mapping defines map boundaries by natural elements and human interactions. It is based upon the notion that political boundaries do not naturally coincide with social, ecological, or other boundaries, and instead, it outlines the boundaries of these areas that naturally define human interactions in a region. Human geographic maps can be far more intuitive, natural, and descriptive of a community and its inhabitants than a political map.

**Intermittent (or seasonal) stream** – a stream that flows only at certain times of the year when it receives water from springs or from surface sources such as melting snow in mountainous areas.

**Invasive species** – Species that are not native to the ecosystem being described and that cause, or have the potential to cause, ecological or economic harm.

**Maintenance level** – Maintenance levels define the level of service and maintenance requirements for a road. Maintenance levels 1 to 5 are described below:

- **Level 1** – These roads have been placed in storage between intermittent uses. They are not shown on motor vehicle use maps and are closed to vehicular traffic but may be available for nonmotorized uses.
- **Level 2** – These roads are for use by high-clearance vehicles; passenger car use is discouraged or prohibited.
- **Level 3** – These roads are open and maintained for passenger car use. Roads in this maintenance level are typically low speed with single lanes and turnouts.
- **Level 4** – These roads provide a moderate degree of user comfort and convenience at moderate travel speeds. Roads in this maintenance level are typically double lane and aggregate surfaced.
- **Level 5** – These roads provide a high degree of user comfort and convenience. Roads in this maintenance level are typically double lane and paved.

**Mineral material** – Common variety minerals such as rock or gravel.

**National Forest System (NFS)** – As defined in the Forest and Rangeland Renewable Resources Planning Act of 1974 (P.L. 93-378), the “National Forest System” includes all national forest lands reserved or withdrawn from the public domain of the United States, all national forest lands acquired through purchase, exchange, donation, or other means; the national grasslands and land use projects administered under Title III of the Bankhead-Jones Farm Tenant Act; and other lands, waters, or interests therein administered by the Forest Service or are designated for administration through the Forest Service as part of the system.

**Old growth** – “Old growth” refers to specific habitat components that occur in forests and woodlands—old trees, dead trees (snags), downed wood (coarse woody debris), and structure diversity. These important habitat features may occur in small areas, with only a few components, or over larger areas as stands or forests where old growth is concentrated. Old growth is not equated to any particular successional stage, though late seral states are more likely to contain old

growth features. In the Southwest, old growth is considered “transitional,” given that the location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality) (Forest Service, 2012b). Some species, notably certain plants, require “old forest” communities that may or may not have old growth components but have escaped significant disturbance for lengths of time necessary to provide the suitable stability and environment. In Southwestern forested ecosystems, old growth is different than the traditional definition based on Northwestern infrequent fire forests. Due to large differences among Southwestern vegetation types and natural disturbances, old growth forests vary extensively in tree size, age classes, presence, and abundance of structural elements, stability, and presence of understory.

**Perennial stream** – a stream that flows continuously.

**Perennial intermittent stream** – a stream with alternating segments of perennial flow and dry stretches.

**Potential natural vegetation type (PNVT)** – Coarse-scale groupings of land that share similar aspect, elevation, vegetation, soil parent material, and natural disturbances such as fire or drought cycles. Identification of PNVTs is based on data from the terrestrial ecosystem survey (TES).

**Recommended wilderness** – A potential wilderness area within the National Forest System which has been recommended for official designation by the regional forester to the Chief of the Forest Service. The Chief may elect to forward the recommendation with wording for a congressional bill to the Secretary of Agriculture, who may then elect to transmit the proposed bill to Congress. It takes an act of Congress to designate a wilderness area.

**Southwestern Region sensitive species** – Those plant and animal species identified by the Southwestern Region’s 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 the existing distribution of a species (FSM 2670.5 Definitions).

**Traditional cultural property** – Defined in the National Register Bulletin as a location, building, structure, community, and individual objects that are considered eligible for inclusion in the National Register as a historic property because of its association with cultural practices or beliefs of a living community that are: (1) rooted in that community’s history and (2) important in maintaining the continuing cultural identity of the community.

**Wildland fire** – Wildland fire is any non-structural fire that occurs in vegetation or natural fuels. It includes both wildfires and prescribed fires. **Wildfires** are fires with unplanned ignitions including lightning or unauthorized and accidental human-caused actions. **Prescribed fires** are intentionally ignited by the Forest Service under an approved plan to meet specific objectives.

**Wildland-urban interface (WUI)** – Wildland-urban interface includes those areas of resident populations at imminent risk from wildfire and human developments having special significance. These areas may include: critical communications sites, municipal watersheds, high voltage transmission lines, church camps, scout camps, research facilities, and other structures that, if destroyed by fire, would result in hardship to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.



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