Agua Fria Grasslands Assessment

Prescott National Forest
Verde Ranger District

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Prepared by CEEM XII
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Introduction of CEEM and the Project

Continuing Education in Ecosystem Management (CEEM) is a program in which resource professionals from various agencies receive six weeks of classroom instruction on physical, biological and social environments as related to natural resource management. Course modules are conducted at Utah State University, Northern Arizona University, and Colorado State University, respectively. The course culminates in a practical application of knowledge gained to address needs for change in a particular geographic location.

The assessment area for participants of CEEM XII was the Agua Fria Grasslands, located on the Verde Ranger District (VRD) of the Prescott National Forest (PNF) approximately 18 miles from Camp Verde, Arizona, in Yavapai County (see Map 1, General Location). It encompasses 95,166 acres and is inclusive of the Ash Creek-Sycamore Creek, Bishop Creek and Fossil Creek-Lower Verde River watersheds. It is bounded by the Bureau of Land Management Agua Fria National Monument on the southwest, Interstate Highway 17 on the west, Forest Roads 732 and 511 on the north, Cedar Bench Wilderness on the northeast, Sycamore Creek on the east, and Pine Mountain Wilderness on the southeast. The area includes National Forest System land and private land, and is bordered by land administered by the Bureau of Land Management and the State of Arizona, and private land. The analysis focused generally on grassland ecosystem restoration concepts with an emphasis on fire/fuels, wildlife (pronghorn) habitat, and range improvement. It is believed that the Agua Fria Grasslands are outside their historic fire return interval, which has modified the shrub/juniper component of the area and may influence the habitats of pronghorn and their associated predators. The specific focus of the assessment addressed the following topics:

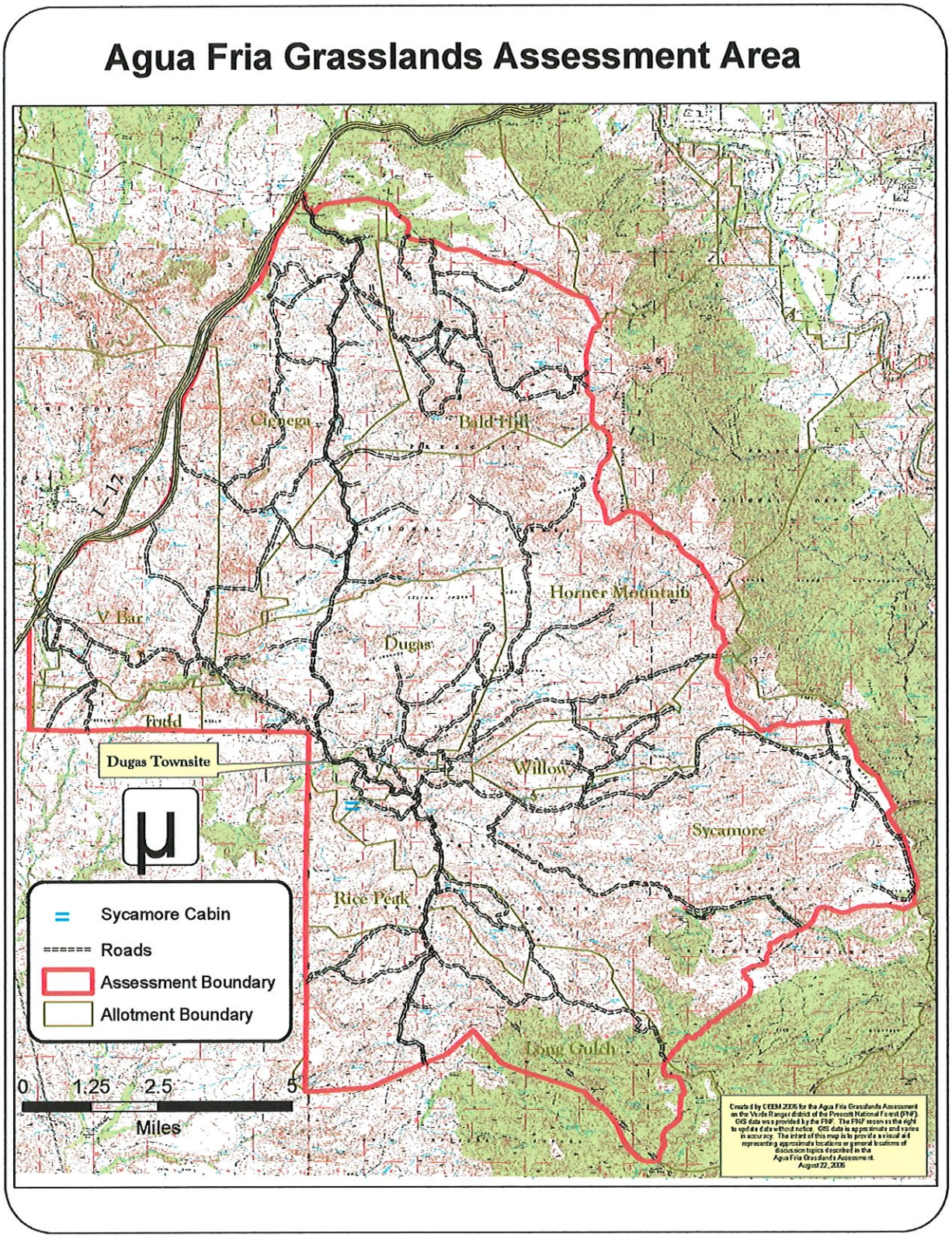
1. areas where a shrub/juniper component has encroached on grassland ecotypes
2. areas where high-quality pronghorn habitat is limited or could be expanded or improved
3. improvement of pronghorn transitional habitat (travel corridors) between ranges
4. impact of prescribed burning on active range allotments
5. opportunities for improvement of rangeland health through treatment
6. opportunities for soil/watershed health improvement
7. ability to implement Wildland Fire Use in the future

The team first met with Forest personnel, gathered information and toured the grasslands. They next met with range allotment permittees as a group, then visited the allotments with individual permittees and conducted interviews. Elected officials, a representative of the neighboring Yavapai-Apache Tribe and members of the community were also

interviewed. Much information was gathered in this manner regarding historic and current uses of the grasslands, and opinions on how the area should be managed. Data was collected and analyzed from Forest records. The resulting grasslands assessment provides an informed and representative summary of historic and existing conditions, desired conditions, past and present activities, and opportunities for resource management activities and partnerships.

Within the document, resource areas (Wildlife, Range, Watersheds etc.) incorporated topic headings applicable to that particular area of research into the narrative. Not all topic headings were utilized by all resource areas.

Map 1. General Location



Background/History of Project and Area

The Prescott National Forest is one of six National Forests in Arizona. Ranging from 3,000 to 8,000 feet in elevation, it is administered as three Ranger Districts (Bradshaw, Chino Valley and Verde) encompassing 1.25 million acres. The Verde Ranger District is inclusive of the Ash Creek-Sycamore Creek, Bishop Creek, and Fossil Creek-Lower Verde River watersheds. Originally designated as the Prescott Forest Reserve in 1898 by Presidential Proclamation (the second Forest Reserve to be set aside in Arizona), the reserve near Prescott was created to protect the community's domestic watershed. In 1908 the reserve was reorganized, incorporating the Verde National Forest which had been established in 1907 to protect the Verde River watershed, and renamed the Prescott National Forest. Today the Forest provides opportunities for recreation, hunting, grazing, mining, timber harvest, watershed protection and wildlife habitat.

The Verde River flows through the Verde Valley, which lies beneath the cliffs of Central Arizona's Mogollon Rim. The area is a biological transition of vegetative zones between desert, semi-desert grassland and forest and serves as the break between northern and southern Arizona. The valley and associated watershed canyons fall within another geographic demarcation between the highlands of the Colorado Plateau to the north, and the Basin and Range Geologic Province to the south. The assessment area is in a transition zone between the two.

About 12 million years ago, ancient waters flowing from the Colorado Plateau over volcanic cliffs and canyons to the lowlands formed a large shallow lake or series of lakes 27 miles long and 15 miles wide, depositing rich silt in the Verde Valley. Lake Verde contained algae which, through the process of photosynthesis, transformed dissolved limestone in the water into small crystals that sank to the lake's bottom and formed a layer of limestone (travertine) over a period of several million years. About two million years ago, the sediment dam at the lake's southern end eroded away and the water escaped to form what is now the Verde River Valley. The former lake bed became a fertile farmland, successfully cultivated by prehistoric and historic cultures as well as present-day agriculturalists.

Archeological evidence suggests human presence in the Verde Valley during the Archaic period, nearly 10,000 years ago. However, the earliest occupation of the area is more recent, dated to the Squaw Peak phase (A.D. 1 – 700). Archeological features from this period include the remains of pit houses with plastered floors and hearths, and bell-shaped storage pits. Over time, population settlement patterns became more sophisticated. Locally produced goods became more advanced, and more trade items were introduced into the region. Improved agricultural techniques and the expansion of trade led to population growth and cultural changes during the Camp Verde (A.D. 900 – 1125) and Honanki (A.D. 1125 – 1300) phases. Features from these phases include large pit houses, transitional surface masonry architecture, and irrigation networks.

More significant cultural changes in the Verde Valley occurred during the Hononki/Tuzigoot phase (A.D. 1125 – 1400). The regional population tended to

converge in densely settled communities. Architecture shifted to the construction of cliff dwellings such as Montezuma Castle, and hilltop pueblos such as Tuzigoot along major drainages in the valley. This phase was the climax of prehistoric occupation in the valley. Around 1425, residents abandoned the area for reasons unknown. The archeological record stops at this point, until it resurfaces with the coming of the Spanish in the sixteenth century.

Upon arrival into the Verde Valley in the late sixteenth and early seventeenth centuries, Spanish explorers observed remnants left behind by the prehistoric cultures. They made contact with the region's contemporary occupants, the Yavapai, a Yuman-speaking people, which inhabited a large area including the valley. Due to limited contact with the explorers and later arrivals of mountain men, the Yavapai's lifestyle was not substantially changed by their presence.

During the early eighteenth century the Tonto Apache, an Athabascan-speaking people, moved into the Yavapai's eastern range. By the 1850s they had become established. (The assessment area was used extensively by the Yavapai and Tonto Apache during this time due to the relative abundance of natural resources.) There were many cultural similarities between the two groups. This coupled with their close relations led to confusion regarding their identities by the Spaniards and European Americans.

With the discovery of gold near present-day Prescott in 1863, large numbers of miners joined the swale of homesteaders moving into the area. Conflicts between the Indian People, miners and settlers led to the establishment of Camp Lincoln, which later became Camp Verde and then Fort Verde, to provide protection for the new arrivals. Following years of open warfare, the Yavapai and Tonto Apache were placed on a reservation, to be released years later when they were no longer considered to be a threat to the emergent Anglo population. Many returned to their homelands, where they and their descendants reside at present as the Yavapai-Apache Nation.

Currently the Verde Valley has a relative abundance of water compared to the surrounding areas. Rock lying beneath nearby Flagstaff, Arizona and the Mogollon Rim is composed primarily of heavily fractured limestone and sandstone. Precipitation falling upon these rocks seeps underground to emerge as springs in the valley, where the waters run into the impermeable limestone of the Verde Formation. The availability of water, temperate climate, and topographic and environmental diversity have drawn a number of people to the valley. Contemporary uses of the area include mining, farming, ranching, hunting, tourism and a variety of recreational activities.

Human Dimensions

Condition

Historic Condition

Early inhabitants of the Verde Valley included the Hohokam (from the Piman description for "those who have gone") of south and central Arizona, and the Southern Sinagua (the word being derived from the Spanish definitions sin – "without," and agua – "water," reflecting upon the dry conditions of their environment), who flourished in the area for thousands of years.

The Hohokam were the first known people to farm the Verde Valley, arriving some time between A.D. 700 and A.D. 900. Living in one-room pit houses, they were sophisticated agriculturalists for their time, utilizing methods they had developed in the deserts to the south. Constructing irrigation canals to move water, they were able to grow corn, beans, squash and cotton. They were joined by the Southern Sinagua around A.D. 1125. Dwellings in the first Sinagua settlements in the Verde Valley resembled Hohokam pit houses. The Sinagua also adopted the Hohokam's farming techniques to complement their hunting and gathering subsistence cycle.

The Southern Sinagua were a branch of a people, the Northern Sinagua, who had settled to the north in the vicinity of the San Fransisco Peaks near Flagstaff, Arizona. The southern culture was influenced by their northern neighbors in the form of above-ground masonry. Small structures, and later pueblos similar to those built by Ancestral Puebloan people living north of the Mogollon Rim, were constructed along major streams. By A.D. 1150 the Southern Sinagua were building large pueblos, often set into cliffs or upon hilltops. They farmed successfully (corn, beans, squash and cotton) in the fertile soil, utilizing canal irrigation as the Hohokam had done before them. With some of their villages lying along major trade routes, they bartered their salt, argillite, malachite, azurite and cotton with groups traveling along the Verde River. In return they received shells, obsidian, painted pottery and exotic bird feathers. The population thrived. The villages of Montezuma Castle and Tuzigoot reached their maximum sizes in the 1300s, and were occupied for another century. For unknown reasons, the Southern Sinagua abandoned their pueblos by 1425.

Human inhabitation of the Verde Valley continued. In the sixteenth century and prior to Spanish exploration, the Yavapai (Yuman-speakers) migrated into the area. They were well-established among the ruins left by the Sinagua when the Spanish arrived. In A.D. 1583, Antonio Espejo was the first European to find the deserted pueblo villages. In A.D. 1598 Captain Marco Farfan entered the valley searching for riches. The Yavapai accepted his party, and showed them the location of copper deposits. The party departed, believing copper mining to be too labor intensive to be profitable. In A.D. 1605 Governor Onate traveled through the valley while returning to Mexico. No other Europeans would enter the area over 200 years.

During the late eighteenth century, the Yavapai were joined by the Tonto Apache (Athabaskan-speakers). Much interaction took place between the groups. Both made adaptive reuse of the valley's caves and rock shelters. They also constructed domed huts of poles and brush partially covered with skins and dirt, larger mud-covered houses, and ramadas. Both relied on hunting and gathering subsistence cycles, the Yavapai supplementing this with farming.

In the early to mid-1800s large tracts of land were added to the United States by the Treaty of Guadalupe Hildago and the Gadsden Purchase. Many European Americans moved westward to claim homesteads. In 1863, the New Mexico Territory was divided, creating the Arizona Territory. The Territorial Capitol was established in 1864 in Prescott. Also in 1863, gold was discovered in the Bradshaw Mountains near Prescott. In the ensuing years, the surrounding mountains were heavily mined and the timber severely cut, despite federal laws prohibiting timber harvest on the Forest Reserve. By 1898 most of the mature timber was gone. In 1898 the Prescott Forest Reserve was expanded to afford the mountains and their natural resources more protection.

As early settlers to the Prescott vicinity spread the word of bountiful conditions they found there, cattlemen drove large herds into the Verde Valley. The cattle business thrived, with some early drives to destinations as far away as Kansas. With the arrival of the Atlantic and Pacific railroads into northern Arizona, later drives to Flagstaff became more common. During the 1880s came the emergence of large ranches owned by outside investors. Until the 1920s cattle roamed freely across the range. In the spring and fall, families would gather to round up their animals and move them to individual home places or trail or ship them to market. This way of life came to an end as the Forest Service became established and worked to enhance rangeland health through grazing on individual allotments.

With the discovery of gold, miners flocked to central Arizona. This led to the establishment of Jerome, the Cherry Creek Mining District, and diggings in the Black Hills. Competition arose for land and resources.

The lush valley also attracted farmers. The military discouraged them from settling so far from the protection of Ft. Whipple, near Prescott, due to potential problems with native people. The premonition was proven to be true.

With the massive westward expansion and movements into the Verde Valley, conflicts arose between the settlers and the Yavapai and Tonto Apache over incompatible subsistence patterns. The Indian People, who had no concept of land ownership nor value for gold, raided farms and ranches for crops, livestock, and other materials as a means to survive and accumulate wealth. Settlers fought back, and the hostilities escalated. Military forces were sent to halt the raiding, and to subjugate the indigenous people. In 1865, two encampments were established in the area. One of these, Camp Lincoln, would be renamed Camp Verde, and later, Fort Verde. The post was plagued with malaria, and in 1870 the Army made the decision to move. Construction of present-day Fort Verde began in 1871 and was completed in 1873. Consisting of 22 buildings

arranged around a parade ground, the camp housed Company C of the 21st Infantry, and Companies A, E and G of the Third Cavalry. It also served as a staging base for military operations in the surrounding countryside.

Camp Verde was home to General George Crook, during his 1872 to 1873 campaign which ended major Indian resistance in central Arizona. The push kept the Indian People moving, and disrupted their hunting and gathering lifestyle. Highly skilled in warfare, they engaged the Army in the hills and canyons. However, they were overcome. This outcome did not result from high levels of skill and courage, rather from available resources and organization, which would determine which side could outlast the other in a mobile war of attrition. The Army had many resources in the form of personnel, communications, and supplies. The native people were accompanied by their entire villages, which brought family concerns in the field. They surrendered at Camp Verde in April of 1873.

During this time, in response to conflicts between native people and settlers, federal Indian policy focused on creating reservations as a method for control of indigenous cultures. Between 1873 and 1875, nearly 1,500 Indian People from various bands of the Yavapai and Tonto Apache were placed on the Rio Verde Reservation, which was headquartered near present-day Cottonwood, Arizona. In 1875, Congress ordered the entire population relocated to the San Carlos Agency near what is now Globe, Arizona. During the ten-day, 180 mile trip made on foot, about 100 Native Americans disappeared or died from exposure, insufficient food supplies, or factional fighting. Despite tribal rivalries, the bands were forced to live together on the same reservation. Scattered across the landscape within the boundaries, each had a separate chief, and peace was difficult to negotiate. Even so, by 1882 the major action of what were referred to as the northern Apache wars was over. Camp Verde had been renamed Fort Verde in 1879. With the end of the warfare and raiding, the need for the post was diminished. It was abandoned in 1891 to the U.S. Department of the Interior, and sold at public auction in 1899. The site is currently a State Historic Park managed by the Arizona State Parks Department.

By 1899 the Indian People were considered to be more a nuisance than a threat to neighboring settlers. Military funding decreased, and the native people were allowed to leave the Reservation. Some stayed at San Carlos, others made their way back to the Verde Valley. In 1934, under the Indian Reorganization Act, the Yavapai and Tonto Apache were combined into the Yavapai-Apache Tribe, which became the Yavapai-Apache Nation in 1992.

Existing Condition

Ownership

The current ownership of the Agua Fria Grasslands (AFG) assessment area is primarily National Forest System land with the exception of some scattered private in-holdings. No access issues were identified during interviews.

Interview Process

Social perspectives are an important component in ecosystem management. Therefore, the CEEM team interviewed U.S. Forest Service (USFS) resource specialists, an Arizona Game and Fish Department Unit Manager, all ten grazing allotment permittees, three public officials, an adjacent land developer, and a Yavapai-Apache tribal representative/archeologist. Agency reports of very low public use of the assessment area suggested connected public and recreationist interviews or surveys would not be worthwhile. Because grazing permittees have close connections to the assessment area, a gathering was organized at Sycamore Cabin with the CEEM team, Verde Ranger District resource specialists, and permittees. Permittees expressed shared and individual concerns to the CEEM team prior to small group site visits and interviews. The on-site interviews paired CEEM team members with individual permittees to review specific questions as related to corresponding allotments. The grazing related responses have been summarized in the Range chapter. Specific fire and fuels reduction comments are outlined in Appendix A. The most significant human dimension conflict identified by a consensus of permittees was a disconnect between local perspectives and those of decision-making officials from the Arizona Game and Fish Department. Further themes highlighted by permittees as related to user conflicts are outlined in Appendix B. To summarize, a majority cite off-highway-vehicle (OHV) use as a concern regarding grazing operations and resource damage. Vandalism, theft, littering, dumping, and gates being left open were also listed as specific problems in the assessment area, but not on all allotments.

Agency resource specialists presented current conditions and concerns for the assessment area. Personal conversations and interviews were later conducted for each resource area to clarify and supplement the presentations. The Arizona Game and Fish Department presented specific concerns related to pronghorn habitat to the CEEM team.

Community interview responses were of limited utility due to a lack of direct connection to the assessment area and the small number of interviews conducted (see Appendix C). Pertinent responses, although not expressed by all, are as follows:

- It is not feasible to expect volunteer efforts to emerge from the town of Camp Verde.
- Pronghorn populations have been less visible to the community.
- The Forest Service should manage the land for pronghorn populations.
- The area should retain natural character.
- The Forest Service should promote land stewardship and volunteer opportunities.
- Some community members support prescribed fire and Wildland Fire Use.
- Brush and tree skeletons left from mechanical treatments should be burned or removed although thinning is supported in principle.
- The Forest Service should focus on travel management in the area. More signage needed.
- The Forest Service should create staging areas for equestrian and OHV uses.

Tribal Connections

Current known uses by the Yavapai-Apache Nation within the assessment area are limited to a tribal grazing allotment. Tribal representative and archeologist Chris Coder recognized that the area was historically and significantly utilized by the overlapping Yavapai and Tonto Apache cultures due to the richness of natural resources. Yavapai cultural history is often overshadowed by that of the Apache and is under-represented in the area's historical knowledge. Historical connections to the Agua Fria Grasslands cause tribal beliefs concerning land management activities to be valuable viewpoints. The sentiment "leave it alone" describes the general Tribal Council response to significant land management proposals. The following represent standard Tribal Council responses and are not specific to the assessment area (Coder interview):

- Avoid the use of toxic chemicals to treat invasive species in land management activities.
- Minimize grazing activities to the extent possible.
- Keep cattle out of permanent water sources.
- Do not modify water sources without a holistic review of the effects on other species.
- Do not initiate unilateral predator removal programs.
- Do not destroy juniper-type vegetation communities for preference of pronghorn habitat.
- Prescribed burning may be implemented, but should be for holistic reasons rather than single species' habitat manipulation.

Economic Connections

Grazing operations comprise the core of economic benefits derived from the Agua Fria Grasslands. Dispersed recreation activities have some positive impacts to area communities derived from the personal acquisition of recreation equipment and supplies. Limited outfitter-guide operations also derive income from the assessment area.

Desired Condition

Community connections to the Agua Fria Grasslands should be maintained or managed to provide social satisfaction while preserving the healthy ecosystem characteristics that make the area desirable from a social and ecological perspective.

Future Activities

On private land between Dugas and the Agua Fria National Monument, a single-family residential subdivision called "Sycamore Creek Preserve" is planned for initial construction of 83 homes in 2008 at the Forest boundary. All residential lots will be at least five acres and may contain equestrian facilities. Approximately 16 miles of trails are planned within the community with the intent that they will also provide access to the National Forest. Assumptions are that recreation will increase on the Agua Fria Grasslands as the development is completed.

Resource Opportunities

Table 1 highlights some areas for opportunity within the human dimension component of the assessment.

Table 1. Human Dimensions Resource Opportunities

Opportunity	Desired Outcome	Tools to Implement
Collaborate with Yavapai-Apache Tribal Council regarding interpretive information content and location to best capture and present accurate human history of the area.	Increase awareness of the often under-represented Yavapai culture and history.	Draft an interpretive plan for the AFGL and research grant opportunities. Solicit funds generated from Prescott NF map sales to be applied to interpretive signage.
Collaborate with the future "Sycamore Creek Preserve" community or homeowners' association to create a grasslands stewardship program agreement in exchange for the community trails accessing forest lands.	Encourage future residents' sense of civic responsibility and forest resource stewardship by promoting connection to surrounding public lands. As use increases, form a volunteer OHV peer patrol to assist with education and documentation of violations.	Coordination with community to accomplish trail maintenance and construction targets. Negotiate the terms of a community/forest trails plan, and a forest stewardship program agreement between Verde Ranger District staff and community land developer.
Recognize Sycamore Cabin as a location where the renting public can provide and receive resource information.	Increase public compliance with area regulations. Improve information flow to district staff regarding public and resource issues.	Coordinate with the Enterprise Team that maintains the cabin to stock pertinent handouts regarding area information and use. Establish a sign-in registration book that allows the visitors to comment on any issues or experiences during their visit.

Table 1. Human Dimensions Resource Opportunities Continued.

Opportunity	Desired Outcome	Tools to Implement
Encourage area permittees to assist with clean-up of household trash "dump sites."	Develop partnership in reducing amount of litter and dump refuse.	District personnel may negotiate with the nearby landfill/transfer station for a permittee waiver system for refuse involving AFGL clean-up events.
Promote the defensible space concept for all landowners.	Reduce risk to structures reducing future fire suppression activities related to structures.	Allow area residents to drop brush debris from defensible space projects at an approved burn pile location.
Encourage an information sharing event between permittees and Arizona Game and Fish Department.	Increase understanding of conflicts and opposing concerns. Promote coordination of efforts for more effective game management and land stewardship.	Communicate to the Arizona Game and Fish Department the need for the information sharing event. The permittees have stated that they are willing and interested in improving pronghorn habitat.

Vegetation

Condition

Historic Condition

Based on available data, it appears that the percentage of grassland has diminished due to both juniper and shrub encroachment. "This invasion of semidesert grasslands by scrubby trees and shrubs (brush) since Anglo settlement is well documented. Mesquite and juniper have invaded large areas of former grassland" (Brown, 1982). "As a result of fire suppression and restrictions on Wildland Fire Use, vegetation communities on the Prescott National Forest and throughout the southwest have continued to shift further and further away from pre-European settlement conditions. Historically, low-intensity wildland fires occurred relatively frequently, maintaining a low tree density and open forest structure with abundant grasses, forbs, and low shrubs" (Draft Environmental Assessment for Wildland Fire Use Amendment to the Prescott National Forest Land and Resource Management Plan, 2006).

Soil data indicates the majority of the assessment area consisted of semidesert grassland with pinyon-juniper scattered throughout, particularly in the shallow, rocky soils on steeper slopes. Another observation was noted from Chuck and Trudy Birkemeyer whose (Trudy's) grandfather homesteaded the town of Dugas in 1877. Based on what Chuck and Trudy Birkemeyer heard from their family and their personal observations, there was more vine mesquite (*Panicum obtusum*) (a grass) in the area and tobosa (*Pleuraphis mutica*) was not as prevalent. Water was also more plentiful. Extended drought has affected the composition of the vegetation.

Existing Condition

The Agua Fria Grasslands consist primarily of a mix of grasses, forbs, shrubs and juniper trees. The current percentages of the vegetation groups (Terrestrial Ecosystems Units current plot data from Forest GIS layer) shows Pinyon-juniper 59%, Grasslands 19%, Chaparral 10%, Desert scrub 9%, Ponderosa Pine/Gambel Oak <2%, and Riparian 1% (Figure 1). These vegetation groups are also shown by acre in Figure 2. Ecotypes (groupings of like vegetation) are shown on Map 2 and a breakdown of vegetation types are shown on Map 3. These terrestrial ecosystems' vegetation types are listed in Table 2. Prescribed burning occurred on 49,077 * acres between 1981 and 2001. During this twenty year period some acres were burned more than once and were counted twice toward the total acreage. Two recent wildfires also affected the vegetation within the analysis area. The Butte Fire impacted 7,700 acres and Cave Creek Complex impacted 11,624 acres.

*Note that all acre figures in this section are derived directly from GIS layers without refiguring with ARCMAP – XTOOLS.

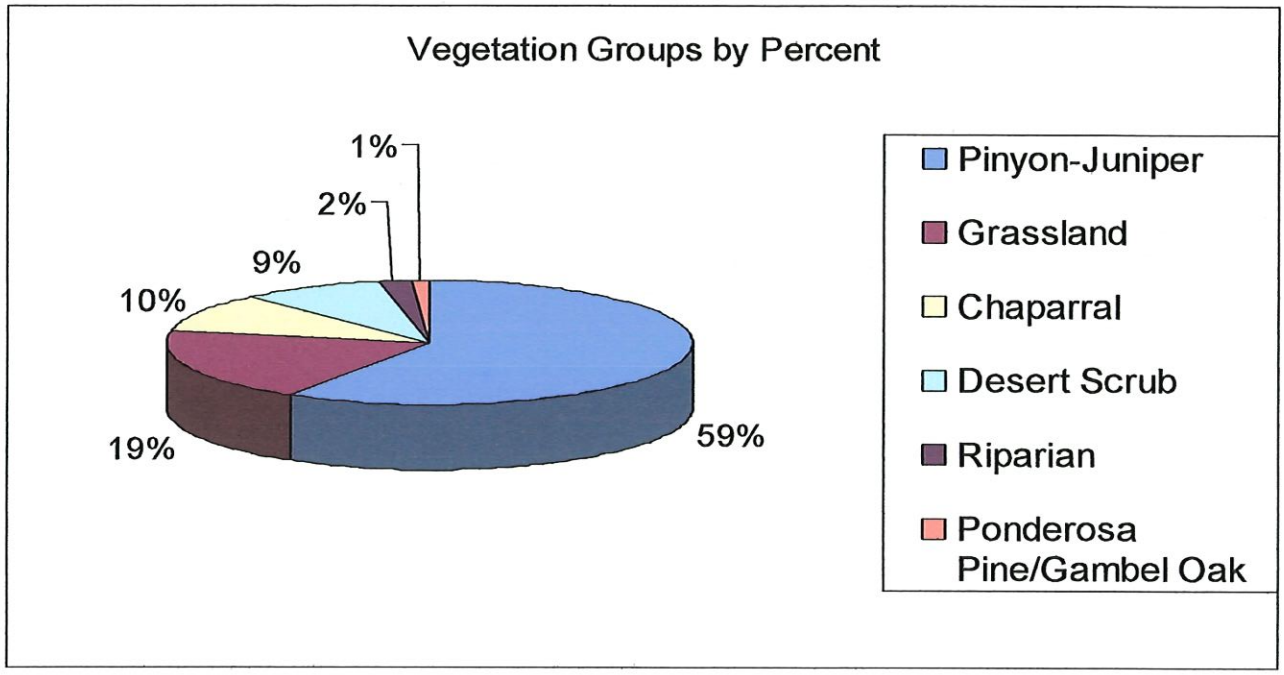


Figure 1. Visual of the vegetation groups by percent as listed in the above paragraph.

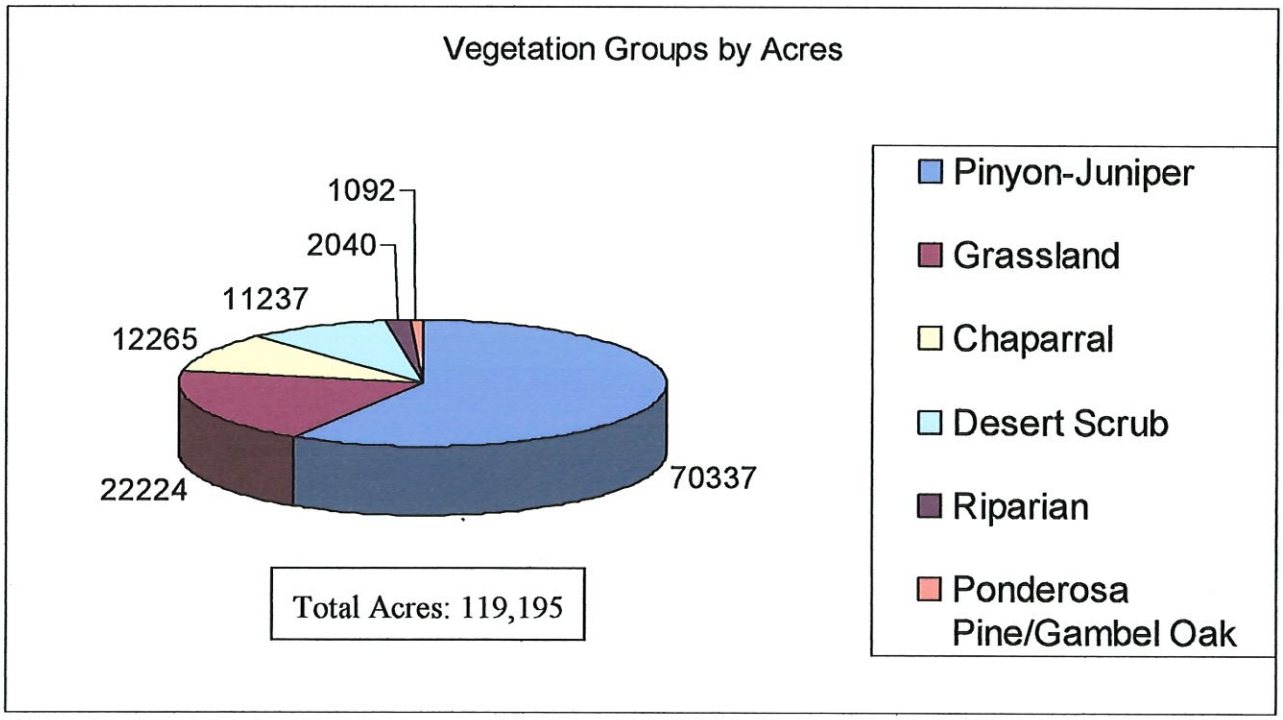
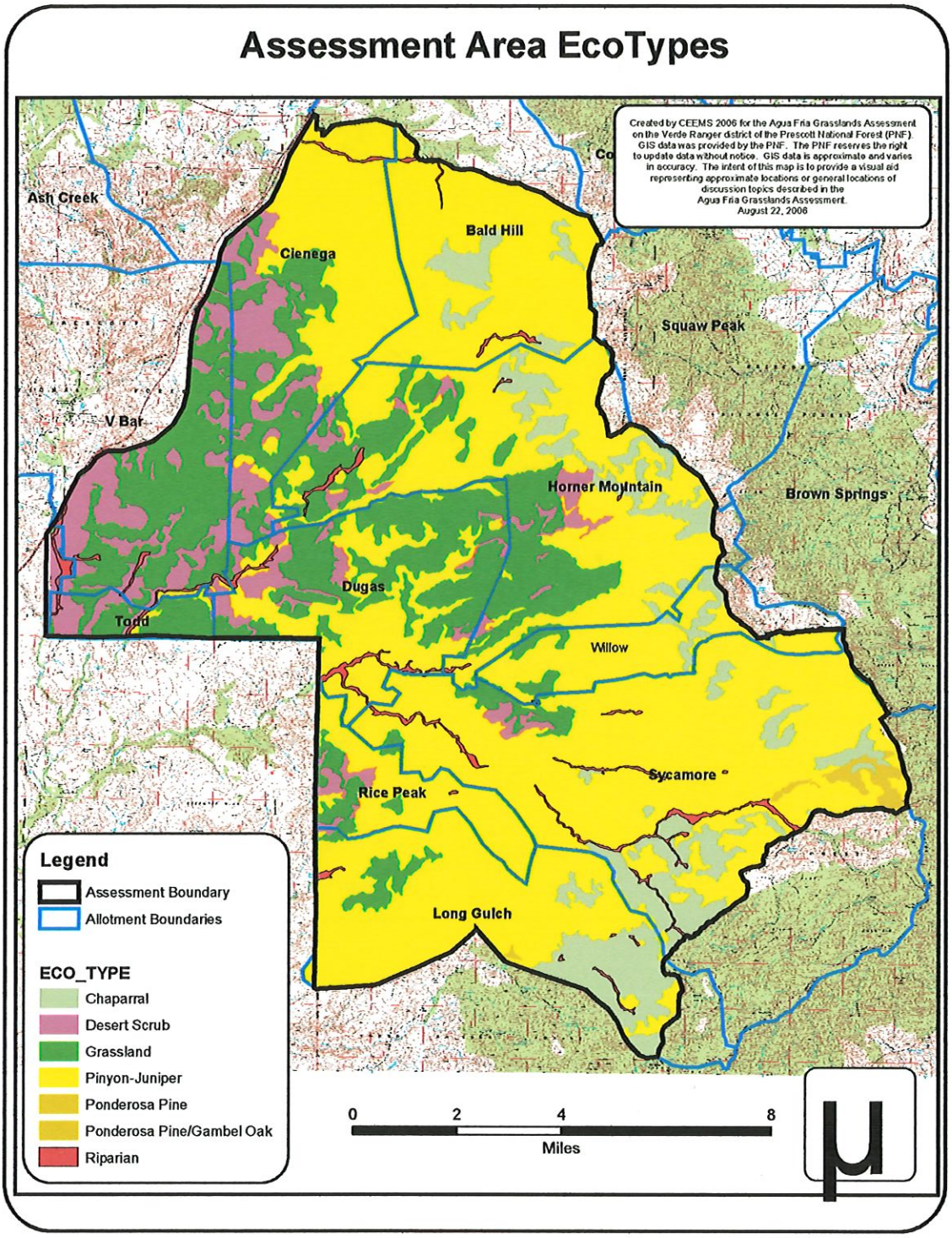
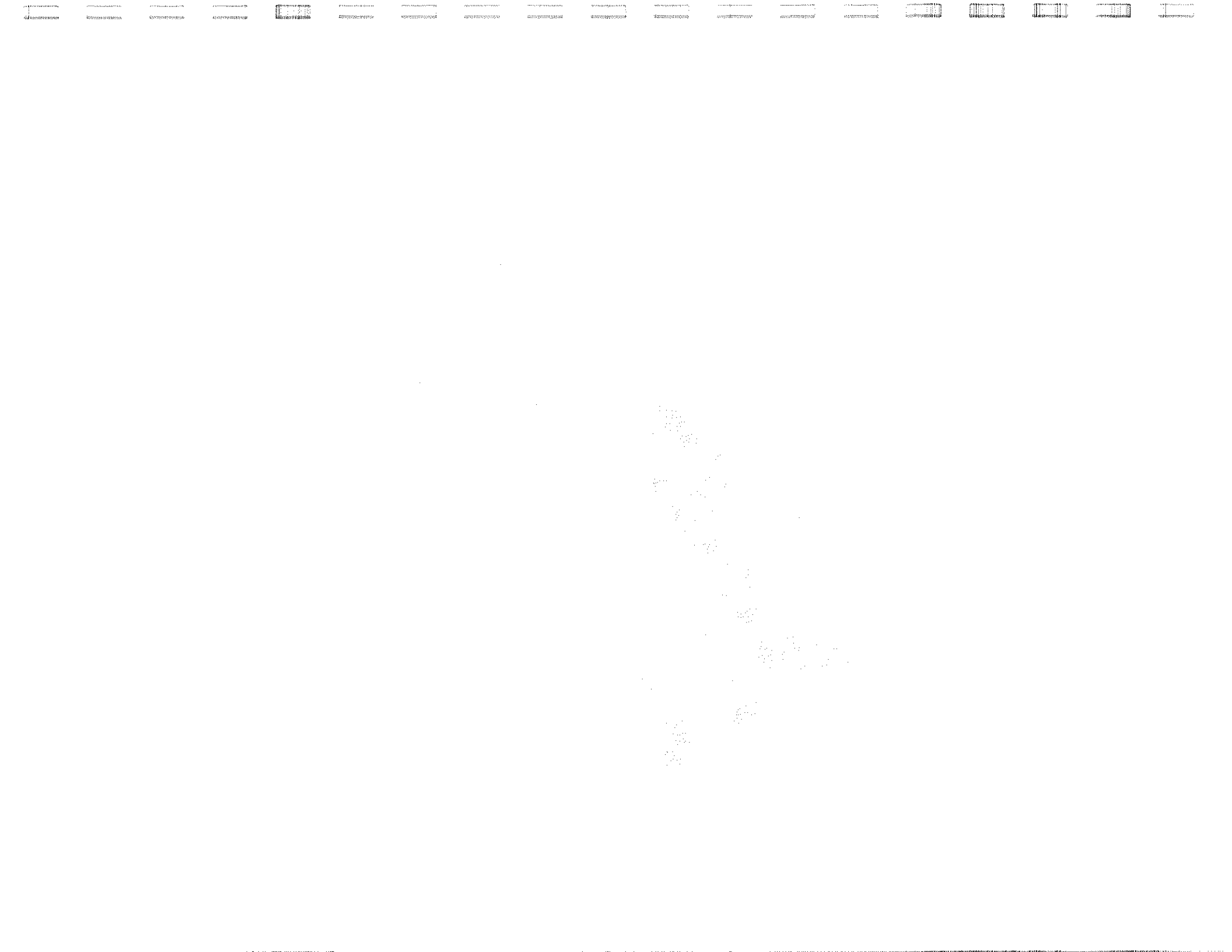


Figure 2. Visual of vegetation groups by acres, including the total acres.

Map 2.


Assessment Area EcoTypes
Created by CEEMS 2006 for the Agua Fria Grasslands Assessment on the Verde Ranger district of the Prescott National Forest (PNF). GIS data was provided by the PNF. The PNF reserves the right to update data without notice. GIS data is approximate and varies in accuracy. The intent of this map is to provide a visual aid representing approximate locations or general locations of discussion topics described in the Agua Fria Grasslands Assessment.
August 22, 2006
Ash Creek
Cienega
Bald Hill
Squaw Peak
V Bar
Horner Mountain
Brown Springs
Dugas
Todd
Willow
Sycamore
Rice Peak
Long Gulch
Legend
Assessment Boundary
Allotment Boundaries
ECO_TYPE
Chaparral
Desert Scrub
Grassland
Pinyon-Juniper
Ponderosa Pine
Ponderosa Pine/Gambel Oak
Riparian
0
2
4
8
Miles



Vegetation Type Map

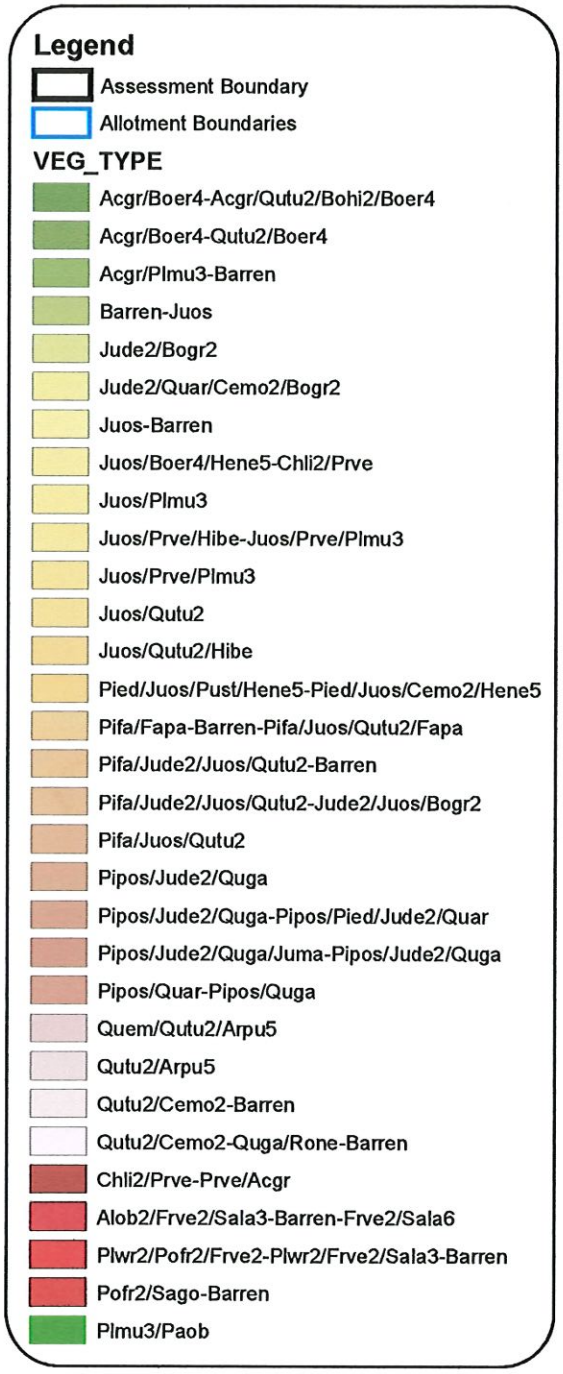


Table 2. Vegetation Types

MUS	VEG_TYPE	Vegetation
0030	Pofr2/Sago-Barren	Freemont's Cottonwood/Gooding's Willow - Barren
0034	Chli2/Prve-Prve/Acgr	Dessert Willow/Velvet Mesquite - Velvet Mesquite/Catclaw Acacia
0041	Plwr2/Pofr2/Frve2-Plwr2/Frve2/Sala3-Barren	Arizona Sycamore/Freemont's Cottonwood/Velvet Ash - Arizona Sycamore/Velvet Ash/Red Willow - Barren
0042	Juos/Boer4/Hene5-Chli2/Prve	Utah Juniper/Black Gramma/New Mexico Porcupine Grass - Dessert Willow/Velvet Mesquite
0043	Pifa/Fapa-Barren-Pifa/Juos/Qutu2/Fapa	Arizona Pinyon Pine/Apache Plume - Barren - Arizona Pinyon Pine/Utah Juniper/Turbinella Oak/Apache Plume
0050	Alob2/Frve2/Sala3-Barren-Frve2/Sala6	Arizona Alder/Velvet Ash/Red Willow - Barren - Velvet Ash/Arroyo Willow
0055	Pipos/Jude2/Quga/Juma-Pipos/Jude2/Quga	Ponderosa Pine/Alligator Juniper/Gambel's Oak/Arizona Walnut - Ponderosa Pine/Alligator Juniper/Gamble's Oak
0370	Acgr/Boer4-Qutu2/Boer4	Catclaw Acacia/Black Gramma - Turbinella Oak/Black Gramma
0371	Acgr/Boer4-Acgr/Qutu2/Bohi2/Boer4	Catclaw Acacia/Black Gramma - Catclaw Acacia/Turbinella Oak/Hairy Gramma/Black Gramma
0372	Plmu3/Paob	Tobosa/Vine Mesquite
0373	Acgr/Plmu3-Barren	Catclaw Acacia/Tobosa - Barren
0425	Qutu2/Arpu5	Turbinella Oak/PointLeaf Manzinita
0427	Juos/Prve/Plmu3	Utah Juniper/Velvet Mesquite/Tobosa
0428	Juos/Prve/Plmu3	Utah Juniper/Velvet Mesquite/Tobosa
0430	Juos-Barren	Utah Juniper - Barren
0431	Juos/Prve/Hibe-Juos/Prve/Plmu3	Utah Juniper/Velvet Mesquite/Curly Mesquite - Utah Juniper/Velvet Mesquite/Tobosa
0432	Juos/Qutu2/Hibe	Utah Juniper/Turbinella Oak/Curly Mesquite
0436	Qutu2/Cemo2-Barren	Turbinella Oak/True Mountain Mahogany - Barren
0446	Pied/Juos/Pust/Hene5-Pied/Juos/Cemo2/Hene5	Two Needle Pinyon Pine/Utah Juniper/New Mexico Porcupine Grass - Two Needle Pinyon Pine/Utah Juniper/True Mountain Mahogany/New Mexico Porcupine Grass
0448	Qutu2/Cemo2-Barren	Turbinella Oak/True Mountain Mahogany - Barren
0457	Qutu2/Cemo2-Barren	Turbinella Oak/True Mountain Mahogany - Barren
0461	Pifa/Juos/Qutu2	Arizona Pinyon Pine/Utah Juniper/Turbinella Oak
0462	Pifa/Juos/Qutu2	Arizona Pinyon Pine/Utah Juniper/Turbinella Oak
0463	Juos/Plmu3	Utah Juniper/Tobosa
0464	Juos/Qutu2	Utah Juniper/Turbinella Oak
0466	Barren-Juos	Barren - Utah Juniper
0475	Qutu2/Cemo2-Barren	Turbinella Oak/True Mountain Mahogany - Barren
0476	Quem/Qutu2/Arpu5	Emory Oak/Turbinella Oak/Point Leaf Manzinita
0479	Pifa/Jude2/Juos/Qutu2-Barren	Arizona Pinyon Pine/Alligator Juniper/Utah Juniper/Turbinella Oak - Barren
0485	Pifa/Jude2/Juos/Qutu2-Jude2/Juos/Bogr2	Arizona Pinyon Pine/Alligator Juniper/Utah Juniper/Turbinella Oak - Alligator Juniper/Utah Juniper/Blue Gramma
0490	Jude2/Bogr2	Alligator Juniper/Blue Gramma
0491	Jude2/Quar/Cemo2/Bogr2	Alligator Juniper/Arizona White Oak/True Mountain Mahogany/Blue Gramma
0540	Pipos/Quar-Pipos/Quga	Ponderosa Pine/Arizona White Oak - Ponderosa Pine/Gambel's Oak
0551	Qutu2/Cemo2-Quga/Rone-Barren	Turbinella Oak/True Mountain Mahogany - Gambel's Oak/New Mexico Locust - Barren
0560	Pipos/Jude2/Quga-Pipos/Pied/Jude2/Quar	Ponderosa Pine/Alligator Juniper/Gambel's Oak - Ponderosa Pine/Two Needle Pinyon Pine/Alligator Juniper/Arizona Oak
0570	Pipos/Jude2/Quga	Ponderosa Pine/Alligator Juniper/Gambel's Oak

*This vegetation key accompanies the vegtype map.

Both the timing and amount of rainfall significantly affect vegetation composition. The vegetation in the assessment area is equally dependent on both winter/spring rains and monsoonal rains. The growing season begins with the winter/spring rains. These rains are most beneficial to the cool season forbs and woody plants. A dry period usually follows the rains during which the vegetation goes dormant. Plant growth continues in the summer when the monsoonal rains begin. These rains are most beneficial to warm season plants. Since most native herbaceous species germinate later in the growing season, desirable perennial grasses and forbs are dependent on monsoonal rains.

Tobosa grass is a coarse perennial bunchgrass which grows over a wide range of climatic conditions and shows considerable variation in form depending on growing conditions. The forage value varies from good during the summer months when it is green, to very poor during the winter months. Within the assessment area, tobosa provides valuable forage until it reaches a decadent stage, in which it becomes woody and unpalatable.

Tobosa appears to be fairly resistant to grazing. However, it is generally under utilized due to its coarseness and low palatability. It should be grazed during the summer months while it is still green and has high forage value.

Optimal tobosa quality is obtained by removing as much of the old growth as possible. This may be done by mowing, burning or heavy grazing. Burning every third or fourth year in late winter or early spring has been successful in many cases.

The available noxious weed information shows that along the Interstate Highway 17 corridor within the V-Bar Allotment Russian knapweed is present. According to Doug MacPhee, there is also cheatgrass (*Bromus tectorum*), an undesirable invasive, present in Little Ash Creek and most perennial streams. Fire benefits cheatgrass due to the ability of its seed to survive fire, reduced competition after the fire, and rapid spring growth that reduces soil moisture availability for other plants.

Desired Condition

The desired future condition of the vegetation in the assessment area is to return to earlier successional stages, thereby increasing the diversity of the landscape. This objective will increase the grassland component of the vegetative composition. Increasing the percentage of grasses and forbs will benefit both wildlife and livestock. The desired condition may be achieved by decreasing the pinyon-juniper, desert shrub and chaparral components. Both fire and mechanical treatments are effective management tools to increase the grassland component while decreasing the undesirable component in the analysis area. Fire would be most beneficial if it was returned to its natural regime of occurrence every three to seven years. Mechanical treatments combined with fire can be more effective on the removal of juniper due to its sprouting ability.

Findings Required by Laws

Based on available data, there are no known threatened or endangered plant species in the area. Therefore there are no legal requirements.

Consistency with Forest Plan

Based on Forest Plan direction for vegetation management, prescribed fire should be used as a tool where feasible under naturally occurring conditions (Forest Land and Resource Management Plan, page 15).

Based on direction from the Forest Land and Resource Management Plan, when the composition of the area is Grassland, Meadow and Alpine, the structure is open, with the function being no or few trees, and the vegetative management practice should be meadow maintenance and creation (Forest Land and Resource Management Plan, page 132).

Resource Opportunities

At present, the Terrestrial Ecosystem Survey (TES) is used not only for potential vegetation, but also for current vegetation. Use of TES in this way creates one opportunity: to create a current vegetation layer for the area, both on paper and in the Geographic Information Systems (GIS) electronic data base. This can be done in multiple ways including but not limited to: completing an extensive ground survey of the area, having aerial photos of the area (or the entire forest) analyzed, or utilizing satellite imagery analysis (particularly infrared analysis).

Pronghorn are thought to use areas with slope ranges of 0 to 20%. Cattle will use ground in most slope ranges if it is easily accessed. Juniper reduction benefits pronghorn with a wider visual range that allows them to feel comfortable in an area and increases the available ground for grass and forb production that benefits grazing for both species. To obtain the greatest benefit for project dollars juniper reduction should occur primarily on shallower slopes first and not exceed slopes greater than 35%.

Vegetation management is critical in the project area and prescribed fire can be a useful tool. Fire management within the project boundary can be used to reduce the number of encroaching junipers, returning the land to an earlier successional stage and reducing woody brush species that compete with forbs and grasses. Reduction of juniper and woody brush species would also benefit wildlife species such as the pronghorn by increasing their line of sight and reducing predator hiding cover. The relationship between fire, grasses and forbs is varied. Spring burns may harm forbs in favor of grass (Boren, 1985). Late spring burns, however, reduce the amount of red brome allowing for forbs to occupy the area. Research indicates that the burned areas can have 1.7 to 2.5 times more forbs than the unburned areas, depending on timing of the burn (Boren, 1985). The presence of cheatgrass in Little Ash Creek and perennial streams leads to the recommendation that fire be excluded from those areas.

Mechanical equipment can also be used for vegetation management. There are two types of heavy machinery that can perform these tasks: track-mounted and rubber tire-mounted. Track-mounted equipment, compared to rubber tire-mounted equipment, produces less soil compaction due to the weight dispersement and extended reach which reduces the need for movement. Topsoil disturbance can be greater with track based equipment due to methods of movement and limited maneuverability. Rubber tire-mounted equipment is also slope-limited to approximately 35% while some track-mounted self-leveling pieces of equipment may handle 50% slope.

Both types of machinery have multiple attachments for forest project use. The "Hydro" and "Agra" Axes are like scissors that clip the tree off at ground level. Both brands of axe come in several size capabilities ranging up to 30 inches. If the prescription calls for piling the cut trees, use of a rubber tire or track-mounted machine with a pushing attachment would be feasible. The choice of equipment type should depend on tolerance for resource damage, need for maneuverability, and percent slope. The axe can also carry cut trees a short distance for piling and burning. Grinder/chipper/mulchers come in a variety of sizes and shapes for different purposes. Smaller grinder/chipper/mulchers are shaped and mounted like lawn mower heads to equipment and "mow" over woody brush and thick grasses to create chips or mulch. This smaller "mowing" type of attachment can usually handle material up to a five-inch diameter. Larger grinder/chipper/mulchers can handle material up to a seven- or eight- inch diameter. On an excavator-type piece of equipment the dangle grinding head can be used to grind trees from the top down to four or five inches below ground surface, leaving nothing but chips as evidence. Chippers are also available as stand-alone equipment that can be towed on a trailer behind a vehicle. The potential benefits of leaving slash scattered for site protection, organic material, and temporary rest from grazing should be considered, especially where grass species other than tobosa are present.

There are several opportunities for fuelwood reduction in the assessment area. One prospect is to maintain a companion map located at the visitor information desk at the Verde Ranger District. A companion map is a map of the fuelwood cutting areas on which field going personnel can show locations where concentrations of fuelwood, especially dead and down material, are available. This type of map would allow the Forest Service to suggest specific areas where fuelwood is readily available. If suggested fuelwood is not being removed from those areas the District may choose to reduce the District-wide fuelwood cutting area to those suggested locations for the following season. Another option would be to allow green tree harvesting on a personal fuelwood cutting permit. The green tree option could be allowed only in specific areas or for a particular species with a set diameter limit at ground level or the root collar. An additional option would be to make the area a free firewood cutting area. In this specified area individuals could cut and collect specified species of trees whether live or dead without paying a fee.

Wildlife

Condition

Historic Condition

The assessment area has a rich history of wildlife use including that by the pronghorn (*Antilocarpa americana*). Pronghorn were reported to be common throughout the grasslands in the mid 1800s, prior to increased settlement and unregulated hunting. In the early 1900s it was reported "the pronghorn antelope is already a rare animal in the region of the Southwest, where it ranged in the thousands 25 years ago" (Arizona Game and Fish Department [AGFD], 2006). Prior to settlement and development, wildlife was able to migrate freely throughout its historic range. Free movement helped ensure the health and viability of herding animals through the exchange of genetic material. The area has supported numerous fish and wildlife species. Predator species such as the mountain lion (*Puma concolor*) and coyote (*Canis latrans*) have maintained population levels sufficient to keep populations of prey species such as the mule deer (*Odocoileus hemionus*), pronghorn and varmint species to levels compatible with the carrying capacity of the land.

Existing Condition

Within the Aqua Fria Grasslands assessment area, various developments and improvements have been made. Populations of pronghorn have continued to decline from their historic numbers, as noted by Ockenfels stating "pronghorn populations have never recovered to presettlement levels" (Ockenfels et al, 1996). Herds continue to move back and forth between habitat pockets although the number of acres of suitable habitat have been reduced due to improvements including fencing, developments, fire suppression, grazing impacts and shrub and Utah juniper (*Juniperus osteosperma*) encroachment. In addition to historic wildlife populations, Rocky Mountain elk (*Cervus elaphus nelsoni*) which historically was rare in the area has increased in number. The collared peccary (*Tayassu tajacu)*, or javelina also migrated into the area, moving north from South America. Management indicator species, endangered and sensitive species, and birds associated with partnership groups are listed in Table 3.

Wildlife Habitat

The assessment area consists primarily of three habitat types: grasslands, shrub-steppe and riparian. All three habitat types face various challenges from human and natural sources.

The grassland of the assessment area transitions to a shrub-steppe community with encroachment from juniper and shrub species due to fire suppression. The transition from grassland is a trade-off for the species that use the area. As the grasslands shrink pronghorn, which prefer wide open areas, will experience more limited grazing opportunities while populations of predator species may increase as hiding cover

increases. Larger prey species such as deer and elk will benefit with more shade and cover from the encroaching vegetation. Additionally, the quality of the grassland as habitat for pronghorn is being reduced as large expanses are fragmented by the development of roads, trails, fences and homes.

Expanding into the grassland, the shrub-steppe, which includes chaparral and a juniper component, is increasing its percentage of cover within the assessment area. This increase in habitat type will benefit animals that use it for browse, hiding and thermal cover.

Riparian areas comprise one of the most limited habitat types in the assessment area. Limited to a few intermittent and perennial streams, riparian habitat comprises 1,253 acres within the assessment area. The Gila chub (*Gila intermedia)* is the only endangered species found within the assessment boundary and is limited to a few perennial streams (see Table 3 for species names). Impacts to Gila chub habitat appear minimal at this point as enclosures have been constructed to protect their habitat (Sillas). Grazing in the area appears to be impacting the riparian habitat and should be monitored to ensure the viability of riparian habitat. Successful habitat protection from grazing is ongoing for segments of Sycamore Creek. Natural impacts to the riparian habitat are occurring with encroachment of junipers and shrubs along with some alder die-back due to extended drought (Sillas).

Pronghorn

Habitat for pronghorn within the assessment area is centered primarily on the open grassland. Pronghorn "require open cover, either grassland or grassland interspersed with low shrubs that provide long-range visibility" (Wildlife Reference #2) with grass heights ranging from eight to 16 inches and with a ground cover in the 60 to 80% range. Pronghorn prefer a "plant species composition of 50 to 80% grasses, 10 to 20% forbs, and <5% shrubs" (Wildlife Reference #1). Low shrubs may be used by adult pronghorn for bedding, however for fawns, "...stands of grasses and forbs 9.8 inches (25cm) and more in height contributed to above-average fawn survival" (Wildlife Reference #2). The pronghorn diet consists primarily of forbs with browse and green grasses supplementing as necessary. Pronghorn will ideally move no more than about two miles for free water (Lee, R.M. et al, 1998). Slopes greater than 30% will normally be an impediment to pronghorn movement and use. Movement of pronghorn through unsuitable habitat as a linkage between suitable habitats will be swift and poses a greater risk for pronghorn from predation. Currently a corridor crosses the assessment area that connects Marlow Mesa and Perry Mesa. "This corridor follows along Forest Road 677 south to Long Gulch Canyon, then west along the north side of the canyon to the upland area on the western border and onto BLM lands..." (Long Gulch EA Biological Evaluation, 2001).

Table 3. Species List

Species	Status	Species Background
Gila Chub *Gila intermedia*	E	Gila chub commonly inhabit pools in smaller streams, cienegas, and artificial impoundments throughout its range. Within the assessment area, the Gila chub is known to occur in segments of Sycamore Creek, Little Sycamore Creek, Silver Creek and Indian Creek. Critical habitat is has been designated in Sycamore Creek, Little Sycamore Creek and Indian Creek (tributaries of the Aqua Fria River).
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	C, S, PIF	This species is associated with mature stands of cottonwood-willow riparian deciduous forest. It is also know to use dense thickets comprised of mixed hardwood species. Within the assessment area, Little Ash Creek, Dry Creek and Arnold Canyon are either suitable or occupied habitat.
Verdi Rim springsnail *Pygulopsis glandulosa*	S	Habitats for this species are always springs, streams, and rivers with perennial water. Known to occur in the headwaters of Sycamore Creek in the Pine Mt. area,.
Lowland leopard frog *Rana yavapeiensis*	S	This species is generally restricted to permanent waters below elevations of 3000 ft. It is found in small to medium streams and occurs in small springs, stock ponds, and occasionally in large rivers. Within the assessment area, Indian Creek, Sycamore Creek, Little Sycamore Creek, and Little Ash Creek are suitable or occupied habitat.
Toad, southwestern (Arizona) *Bufo microscaphus microscaphus*	S	Rocky stream courses in pine-oak woodlands. Within the assessment area, Indian Creek, Sycamore Creek, Little Sycamore Creek, and Little Ash Creek are suitable or occupied habitat.
Common black hawk *Buteogallus anthracinus*	S	Lowland forest, swamps and mangroves, in both moist and arid habitats but generally near water. Within the assessment area, Indian Creek, Sycamore Creek, Little Sycamore Creek, and Little Ash Creek are suitable or occupied habitat.

Table 3. Species List Continued.

Species	Status	Species Background
Lucy's warbler *Vermivora luciae*	MIS, PIF	MIS species for later seral riparian habitat. Seasonal cavity nester. Within the assessment area, Indian Creek, Sycamore Creek, Little Sycamore Creek, Little Ash Creek, and Dry Creek are suitable or occupied habitat. Population trend - stable.
Mule Deer *Odocoileus hemionus*	MIS	This species is the MIS for early seral stage pinyon-juniper and chaparral vegetation type. Common throughout assessment area,. Population trend - decreasing
Antelope *Antilocarpa americana*	MIS	This is the MIS for early and late seral stage grassland/desert shrub vegetation types. Common throughout assessment area,. Population trend - stable.
Spotted (Rufous-sided) towhee *Pipilo maculatus*	MIS	This is the MIS for late seral stage chaparral vegetation type. Common throughout assessment area,. Population trend - stable
Macroinvertebrates	MIS	This is the MIS for late seral riparian and aquatic habitats. MIS for water quality of perennial streams. Population trend - stable.

Source Data: Verde Rim Livestock Grazing Project Biological Evaluation-Prescott NF

Status Codes: E - Listed Endangered under the ESA, S - Sensitive species on the Regional Forester's Sensitive Species list, MIS - Management Indicator species, PIF - Partners in Flight priority species, C - Candiate Taxon, Ready for proposal.

Desired Condition

The assessment area is comprised of multiple vegetation types and varying terrain capable of providing a wide diversity of wildlife habitats. Nearly all existing wildlife habitat has been modified through human land uses or management actions including fire suppression, roads/access, recreation, grazing, land development and land management policy. The resulting effects on wildlife appear to be that wildlife populations are below their potential. Current management direction for the assessment area calls for improvement of habitat for riparian areas, threatened and endangered species and management indicator species. The desired condition is a healthy and sustainable ecosystem that can promote multiple vegetation types at varying seral stages providing diverse, productive wildlife habitats. Open grassland where woody shrub species cover is less than 20% and tree density is less than 15 trees per acre should be maintained. Shrub-steppe woodlands would dominate the canyons and drainage slopes in a mosaic pattern of seral stages from early grass/seedling to closed canopy conditions. Early seral stages may be strategically located to benefit other wildlife species and serve primarily as travel corridors for connecting pronghorn preferred habitat. The functionality of riparian areas should be maintained or improved through management activities directed at reducing or removing non-riparian vegetation occurring within the riparian areas.

Marlow Mesa, High Quality Antelope Habitat

Findings Required by Laws

Consistency with Forest Plan

The planning principles in the National Forest Management Act (NFMA) regulations (36 CFR 219.1[b]) were integrated into the Prescott National Forest Land and Resource Management Plan (LRMP).

General direction for wildlife and fish habitat in the Prescott LRMP is to manage for a diverse, well distributed pattern of habitats for wildlife populations and fish species in cooperation with states and other agencies. Wildlife habitat management activities are to be integrated into all resource practices through intensive coordination. Riparian-dependent resources are to be given preference over other resources. All riparian areas are to be improved and maintained in satisfactory condition, and habitat for threatened or endangered species is to be maintained and/or improved, with the intention of eventual recovery and delisting of species through recovery plan implementation. Both livestock and wildlife needs are to be considered when additional forage becomes available through investments in structural and nonstructural habitat improvements. In the future, vegetative diversity will progress toward older age classes, resulting in less consumptive use by wildlife. The overall wildlife use trend will be downward.

Past activities

Past management activities undertaken to meet specific resource objectives include fence modifications, water developments, vegetation treatments and prescribed fire. Fence modifications assessed from Geographic Information Systems (GIS) data provided by AGFD reveal a total of 130 miles of fence inventoried. Of that, no data or information has been recorded on structure, type of fencing or whether any work has been done on 40.5 miles of fence. Sixty-four and one-half miles of fence were converted to meet pronghorn specifications calling for a smooth wire to be placed along the bottom for ease of passage. Six miles of electric fence have been constructed. At least two fenced exclosures have been established for monitoring grazing effects on the Agua Fria Grasslands within the assessment area. Fencing has been constructed along Sycamore Creek to restrict grazing activities and protect occupied Gila chub habitat. Fence has also been constructed at Middle Water Spring and Upper Water Spring along Indian Creek for Gila chub habitat protection. However, this data does not represent all fence locations within the assessment area. Vegetation thinning treatments were conducted on approximately 939 acres scattered across the assessment area consisting of ten blocks or projects to improve range conditions and/or open pronghorn travel corridors. Prescribed fire activities have encompassed approximately 40,000 acres, with some of those acres receiving multiple treatments since the early 1980s through 2001. Water development and expansion have been major undertakings in the assessment area, with nearly 60 improvements being constructed. Improvements include wells, windmills, pipelines, troughs, storage tanks, earthen dams and development of springs to benefit of grazing and

wildlife. Many of the water developments are maintained throughout the year by permittees responsible for the allotments they reside on. However, some improvements have fallen into disrepair.

Resource Opportunities

Pronghorn Habitat Improvement

Habitat has historically been the foundation for successful management of wildlife populations. Pronghorn require succulent nutritious forbs, which are critical for optimal fawn production. Shrubs are also an important component of the pronghorn's diet. Grasses play a minor role in pronghorn nutrition. A possible major limiting factor to the viability of pronghorn in the assessment area is the monotypic cover of tobosa grass which occurs throughout the majority of suitable habitat for pronghorn (AGFD, 2006). Observations on the Verde Ranger District indicate that pronghorn frequently use tobosa burn sites for foraging and bedding grounds following regrowth. Spring burning has had positive effects on the tobosa community in the assessment area. Forb production either showed no response or responded favorably to spring burning. Several of the forbs are utilized by pronghorn as forage (Boren, K.L., 1985). In interior chaparral, forbs are not particularly abundant except during a brief period after burns (Brown, D.E., 1982). A nutritious diet could improve overall health and productivity, and could help pronghorn overcome some negative effects associated with parasites and disease. Thirty-three species of roundworms, 21 genera of bacteria, 14 viral diseases, eight species of protozoa, five species of tapeworms, four species of ticks, one fluke and a louse fly have been reported in or on pronghorn (Lance and Pojar, 1984, O'Gara and Yoakum, 2004). The impact of most of these agents on free-ranging populations is unknown.

Juniper and shrub encroachment has changed composition and structure of the grassland ecotype in many areas that could otherwise be classified as having higher habitat quality for pronghorn. A priority for creating high quality pronghorn habitat would be removal of excess shrubs and juniper through the use of fire or mechanical treatments. Juniper in the assessment area would occur at less than two per acre in high quality pronghorn habitat. High quality habitat would contain a woody species canopy cover between five and 20%.

Deep canyons, steep ridges and thick shrubs and juniper affect pronghorn movements and thereby the occupancy of habitats within the assessment area. Pronghorn would benefit from the removal of thick shrubs and juniper, to a minimum width of ¼ mile, in areas identified as travel corridors or potential travel corridors between ranges. Two primary corridors that could benefit from additional vegetation treatments have been identified within the assessment area (see Map 4, Wildlife Opportunities).

Most pronghorn are usually within two miles of water (Lee, R.M. et al., 1998). Drought can have a major impact on pronghorn numbers in arid areas (Brown, D.E. et al, 2006). Development of water sources can provide a more uniform distribution of pronghorn and increase carrying capacity throughout the assessment area. Such water developments

would allow wildlife populations to expand into areas that would normally be unavailable. Any water developments, including catchments, must be maintained if pronghorn are to benefit. Catchments that run dry or fail to provide water at critical times may cause more harm than good (Autenrieth, R.E. et a, 2006). Maintenance, other than that provided by grazing permittees, could be critical during periods of non-use by cattle. Opportunities exist for cooperative maintenance of developed water sites particularly on areas identified as high quality habitat for pronghorn.

Little information is available concerning water quality as it affects pronghorn. Dissolved solids and pH affect water quality which may, in turn, be detrimental to pronghorn. In the Red Desert, Sundstrom (1968) found little or no use by pronghorn of water sources that contained total dissolved solids in excess of 5,000 parts per million. Continuous use of such water may cause general loss of condition, weakness, scouring, reduced milk production, bone degeneration and death. Animals can temporarily drink highly saline waters that would be harmful if used continuously (Autenrieth, R.E. et al, 2006). Water quality, particularly at water development sites, could be monitored.

Water development would disperse grazing and promote better utilization of allotments. This would, in turn, allow more rest for other pastures and/or areas that may be better suited to pronghorn. Defoliation by grazing can help manage vegetation to a height preferred by pronghorn. Ten to 18 inches of vegetation is the preferred height, with that over 24 inches typically being avoided (Lee, R.M. et al. 1998). Grazing can actually increase above-ground annual net primary productivity in semi-arid grasslands (Loeser, M.R. et al, 2004).

Dispersal of salt and mineral blocks along with cattle in water development areas could benefit wildlife. Pronghorn often visit salt and mineral blocks, however, their mineral requirements and use remain unstudied (O'Gara and Yoakum, 2004). If, in the future, nutrient deficiencies are identified for pronghorn in the assessment area, the opportunity would arise to supplement the deficiencies with mineral blocks, liquid supplements and/or food plots.

Numerous fences occur in the assessment area. Since 1984 all fence construction, approximately 19 miles, has incorporated pronghorn specifications. Sixty-four and one-half miles of barbed wire fence remain in the assessment area, and 40.5 miles of fence have yet to be classified. Opportunities to identify and convert fence to meet pronghorn specifications still exist within the assessment area. Fences along the Forest boundary and the Aqua Fria National Monument, near the travel corridor (southwest of Dugas), and between the Dugas area and Perry Mesa should be priorities for modification.

Approximately 775 acres of privately owned land adjacent to the assessment area, referred to as "Sycamore Creek Preserve", is proposed for residential development. The subdivision will incorporate existing grazing rights to some extent. A three-pole fence will be constructed around the subdivision except where it connects to federal lands, and the bottom pole will be 18 inches above ground. A 300 foot easement across National Forest Lands is in the request process at this time. Once the subdivision are occupied, an

estimated 200 to 300 vehicle passes per day (including existing use) is expected on County Road 171 (Forest Road 68) which connects the subdivision to Interstate Highway 17. Key areas lost during development should be mitigated by providing sites of equal value on adjacent areas, when such enhancement is deemed feasible with reference to the probability of displaced pronghorn using the alternate site. Development of water west of the proposed subdivision, on Bureau of Land Management (BLM) lands, could help mitigate negative effects to pronghorn (Fousek, J., 2006). Coordination with BLM to identify new water developments would be necessary. Water developments exist within the assessment area northwest of the proposed subdivision but could use improvement, such as a new well location to avoid pumping water uphill and to provide better distribution (see Map 5, Grazing Management Opportunities for locations). Vegetation management to improve pronghorn movement north of the subdivision and east of the steep areas in Horner Gulch could benefit pronghorn by providing a corridor (see Map 4, Wildlife Opportunities for location), however, in order to use the corridor, it would be necessary for pronghorn to cross County Road 171. Due to the amount of daily human disturbance on County Road 171, pronghorn habitat quality would be adversely affected. The amount of daily disturbance and the type of road surface are functions in the AGFD model that affect quality of habitat. The influence of road surface on the model, considering daily disturbance, is unclear, and it should be clarified.

To improve the quality of habitat available to pronghorn and improve existing fawning habitat, priority should be given to decommissioning and/or effectively closing two existing roads that consist of approximately 1.5 miles of unclassified road (not classified as a forest system road), and 1.6 miles of classified system road (see Map 4, Wildlife Opportunities for location). Opportunities exist to implement seasonal road closures around high quality pronghorn fawning habitat (identified as high or moderate quality habitat on Map 4 Wildlife Opportunities).

Fawn is in approximately eight inches of cover.

Riparian Habitat Improvement

Opportunities exist within the assessment area to maintain or improve riparian and aquatic habitat. Juniper has encroached into riparian habitats. Specific areas of encroachment were not identified for this assessment. Areas considered for treatment of encroachment should be identified when developing future projects within the assessment area. Priority should be given to Gila chub critical habitat (see Map 4 Wildlife Opportunities for locations). Hand thinning to reduce ladder fuels and/or non-riparian vegetation would be the preferred treatment method.

Proper Functioning Condition Surveys depict a variety of riparian conditions (Verde Rim Project Record #117). Monitoring should be conducted to identify areas in which exclusions could be added to assist in moving riparian areas toward their potential. The assessment identifies two potential areas where exclusions could be extended - the existing riparian and aquatic exclusion at Reimer Spring and the existing riparian and aquatic exclusion at Arnold Place downstream approximately one mile (see Map 4 Wildlife Opportunities).

Buffers outlined in the Prescott LRMP should be incorporated into project design to maintain or improve current riparian habitat quality.

Opportunities

WL1(D4) Repair existing windmill to provide available water for wildlife. This windmill is located in T11N, R4E, Sec. 28 within the Long Gulch Grazing Allotment (see Map 5 Grazing Management Opportunity for location).

WL2(D5) Further develop existing solar well on the 22 Mesa, within the Long Gulch Allotment, to capture excess water now running onto the ground. This development would consist of a cistern to hold water. When the cistern fills, excess water could be piped to the southeast and to the northwest. Water in the northeast location would be available for pronghorn accessing the 22 Mesa. Piping water to the southeast would provide additional water for wildlife (see Map 5 Grazing Management Opportunity for location).

WL3(D7) Install a fabric liner in the Buck Basin tank located within the Long Gulch Allotment. Water storage capabilities would be significantly improved by preventing loss through porous soil. Better utilization of the grazing allotment would occur and water would be available for wildlife (see Map 5 Grazing Management Opportunity for location).

WL4(D8) Install or upgrade existing well at Burmister tank on the west end of the Rice Peak Allotment. This would provide water for wildlife (see Map 5 Grazing Management Opportunity for location).

WL5(D9) Install a pipeline from Indian Creek Spring, in the Rice Peak Allotment, west to an underutilized portion of the pasture. A new water storage basin would also be needed to encourage grazing. This would provide additional water for wildlife (see Map 5 Grazing Management Opportunity for location).

WL6(D10) Remove juniper from the Tule Mesa area in the Sycamore Allotment. This would enhance both cattle and pronghorn habitat. Water development would benefit wildlife in this area (see Map 5 Grazing Management Opportunity for location).

WL7(D15) Install a water development in T12N, R5E, Sec. 34 in the Todd Allotment. This would develop water west of the Sycamore Creek Preserve subdivision providing benefits to pronghorn (see Map 5 Grazing Management Opportunity for location).

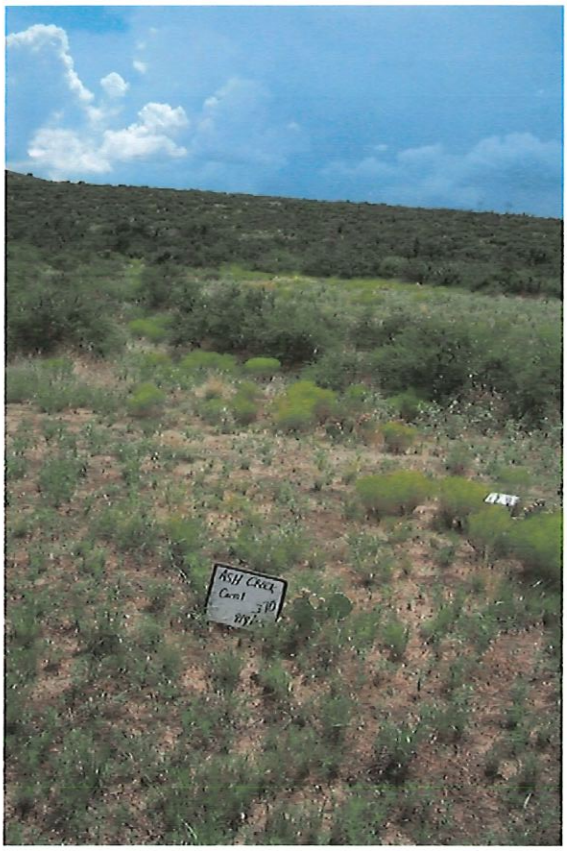
WL8(D16) Install a water development in T12N, R5E, Sec. 32 in the Todd Allotment. This water would be positioned on the west side of Section 32 providing benefits to pronghorn west of the Sycamore Creek Preserve subdivision (see Map 5 Grazing Management Opportunity for location).

WL9 Repair the existing trick tank on Tule Mesa at T11N, R5E, Sec3. An apron to collect rainwater and an associated storage tank are in place. The tank leaks and needs repair, the apron will need cleaning and the existing pipeline will need to be inspected. Establishing this water source will provide wildlife, especially deer and elk, opportunities to occupy habitat higher in elevation and in a more remote location (see Map 5 Grazing Management Opportunity for location).

WL10 Remove non-riparian vegetation from riparian areas. Priority areas would be Little Sycamore Creek, Sycamore Creek and Indian Creek to benefit Gila chub critical habitat (see map 4 Wildlife Opportunities). In addition, woody material created from thinning could be used to create habitat structures within the stream channels.

WL11 Decommission Forest Road (FR) 9601Y that bisects T12N, R3E, Sec.12 from the FR 68D intersection southwest to the junction with the 9709P. A user-created road should be decommissioned or effectively closed in T12N, R3E, Sec. 23 and 26. This road connects FR 9650P with FR 9650R, and runs north to south. Any additional non-system/user-created roads identified within the area should also be closed (see Map 4 Wildlife Opportunities).

WL12 Improve pronghorn habitat through burning. Sections have been identified where areas within that section should receive burn treatments to increase grass/forb diversity, decrease woody shrub or tree densities and regenerate fire dependent grass and shrub species (see Map 4 Wildlife Opportunities).



Opportunity for Rx Burn to control brush encroachment.

WL13 Improve pronghorn habitat through burning and fence modifications. Sections have been identified where priority treatment could occur. Within these sections, treatment areas are identified by utilizing the grassland ecotypes identified. Burn treatments along with fence modifications could increase grass/forb diversity, decrease woody shrub or tree densities, regenerate fire-dependent species and improve pronghorn movements through the grassland.