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:

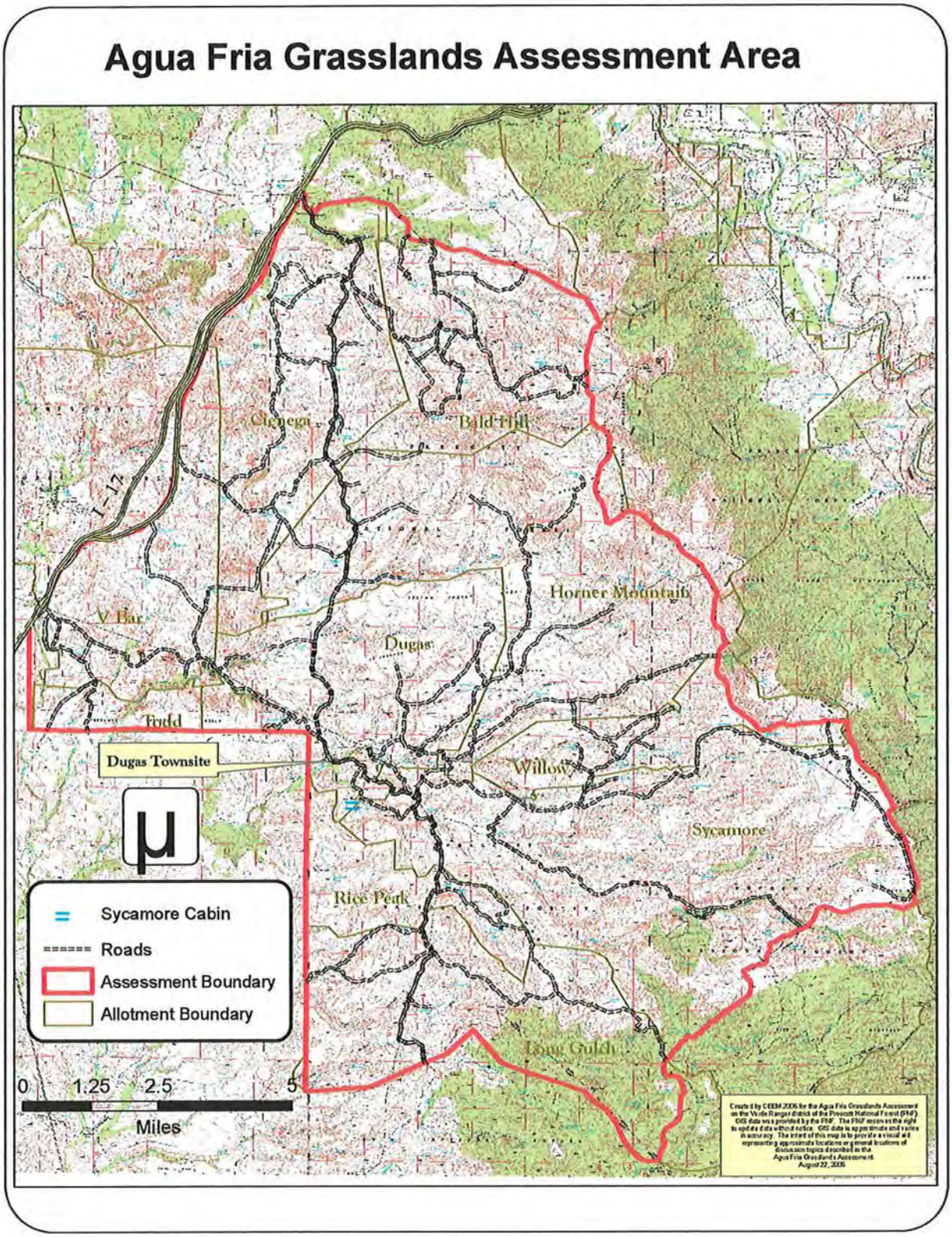
1. areas where a shrub/juniper component has encroached on grassland ecotypes
2. areas where high-quality pronghorn habitat is limited or could be expanded or improved
3. improvement of pronghorn transitional habitat (travel corridors) between ranges
4. impact of prescribed burning on active range allotments
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.

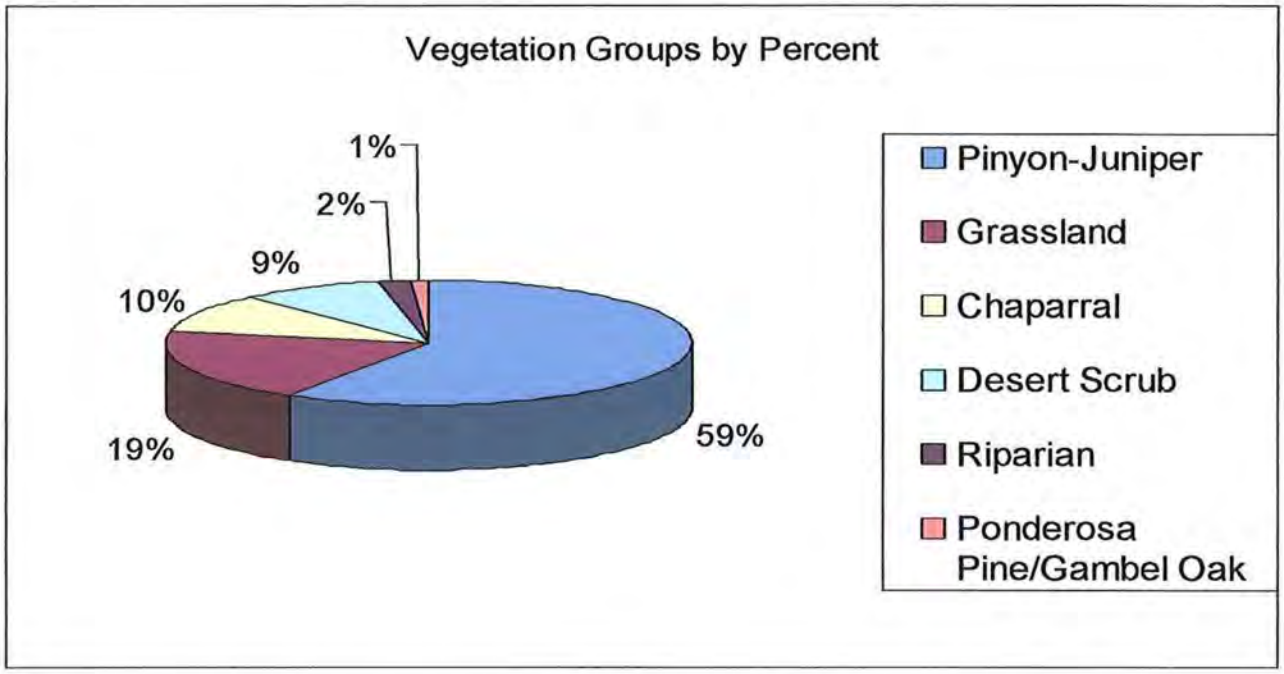


Figure 1. Visual of the vegetation groups by percent as listed in the above paragraph.

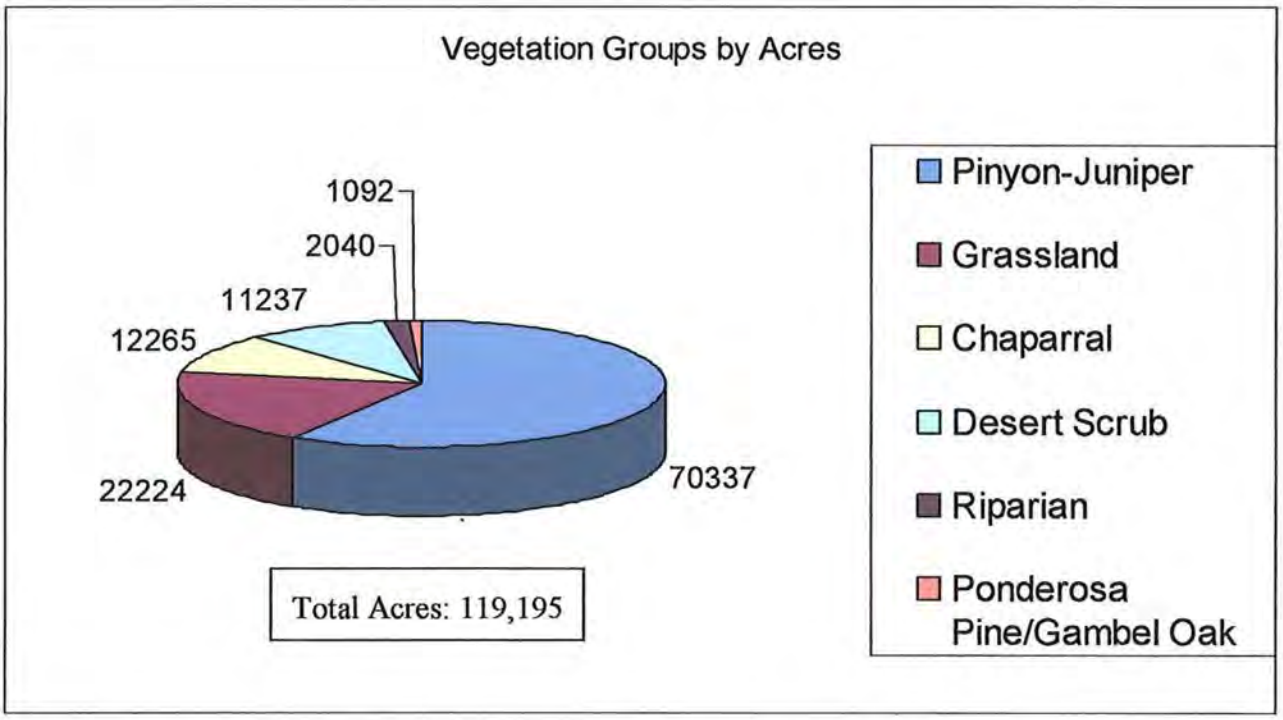
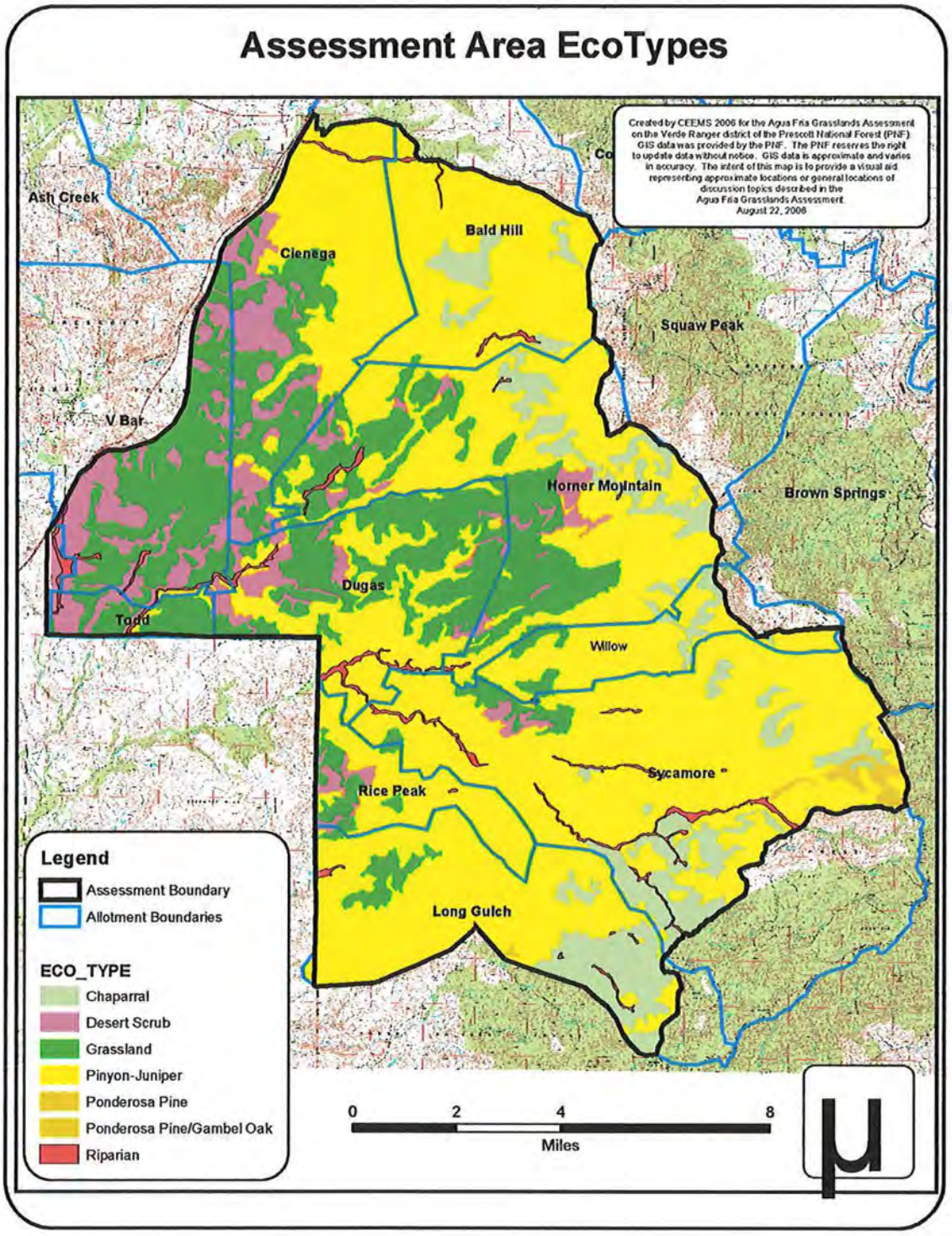


Figure 2. Visual of vegetation groups by acres, including the total acres.

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.

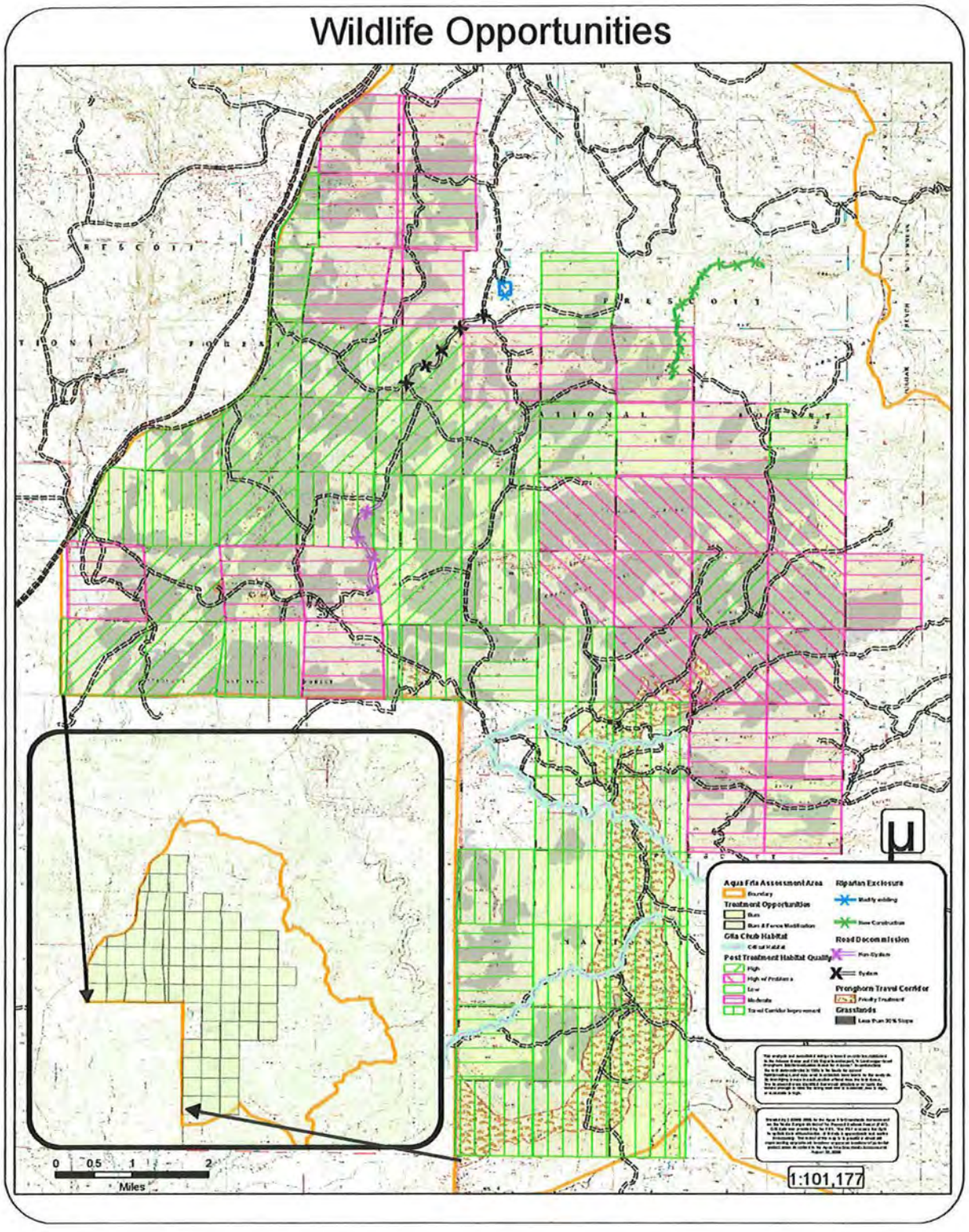
WL11 Decommission Forest Road (FR) 9601Y that bisects T12N, R3E, Sec.12 from the FR 68D intersection southwest to the junction with the 9709P. A user-created road should be decommissioned or effectively closed in T12N, R3E, Sec. 23 and 26. This road connects FR 9650P with FR 9650R, and runs north to 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.

Map 4.


Wildlife Opportunities
Aqua Fria Assessment Area
Boundary
Treatment Opportunities
Burn
Burn & Fence Modification
Gila Chub Habitat
Critical Habitat
Pest Treatment Habitat Quality
High
High w/ Problems
Low
Moderate
Travel Corridor Improvement
Riparian Exclosure
Modify existing
New Construction
Road Decommission
Non-System
System
Pronghorn Travel Corridor
Priority Treatment
Grasslands
Less than 30% Slope
0 0.5 1 2
Miles
1:101,177

Range

Historic Condition

Pre-grazing

No written history was found for the range conditions in the Agua Fria assessment area prior to cattle grazing. It is commonly accepted that cattle grazing did not begin until the 1870s. From local ranchers' knowledge and trends observed on the landscape, it is believed that this grassland was very dry outside of spring areas and supported small groups of deer and pronghorn. Forage and water availability probably changed significantly from one year to the next depending on weather conditions and the amount of land burning naturally. These factors would have influenced the number of larger mammals that could be supported on the landscape over time (D. MacPhee).

Post 1870s

When cattle grazing began in the 1870s, prior to statehood, the assessment area was open range without fences or water improvements. Cattle were brought into this region in large numbers and moved from area to area depending on forage conditions and water. Based on tax records, up to 15,000 head of cattle grazed within the assessment area during the height of the cattle boom (D. MacPhee). During this time there was significant soil loss in the shallow "A" horizon, but the current feeling is that no lasting effect on vegetative composition or health occurred (C. Steedman from TES). Deer and pronghorn have continued to utilize this rangeland.

Since the early days of cattle grazing, many changes have occurred in the area which have significantly changed the grazing patterns and intensity. Significant water developments, in the form of earthen tanks, wells, and pipelines, plus a substantial amount of barbed wire and electric fencing, led cattle to graze where conditions were previously too dry. The introduction of fencing has enabled more intensive management, but has also reduced the ability of cattle to move naturally to water at a given time. Increased public interest in management activities on federal lands has caused the issue of cattle grazing to become highly scrutinized and politically charged.

One aspect of the pre-grazing condition that has become an important issue in the last 25 years is fire. Naturally-occurring fire historically worked to maintain the ecological function of the grasslands. Prior to the mid-twentieth century, it is believed the fire frequency in the area was every three to seven years. From the early twentieth century until the mid 1980s (locally), Forest Service policy was to extinguish all wildfires. The interruption of this fire cycle enabled more woody plants to become established, and caused tobosa grass to become "rank" and unpalatable and the amount of forb cover to decline. The woody plants leave less land available for grass and forbs to grow and increase cover for predators to hide. When tobosa becomes "rank," cattle will not readily feed on the past year's foliage. Annual forbs are crowded out by the woody plants and rank tobosa that covers bare ground. In the 1980s, a prescribed burning program was instituted in the area to mimic the historical natural fire patterns and rejuvenate plant communities (Tobosa Grassland Management – Agua Fria Grasslands EA, Decision Memo

signed 2/84). The tobosa and forb communities appear to benefit from both prescribed and natural fires that have been occurring (local ranchers). Due to the positive results observed from the Forest Service's prescribed burning activities, the Bureau of Land Management also adopted this approach on their adjacent lands with similar vegetation and grazing activities (Black Canyon Tobosa Grassland Prescribed Burn EA, Decision Memo signed 7/93).

Existing Condition

The assessment area is comprised of all or part of ten allotments with varying numbers of pastures. The allotments and pastures are divided by fences, which are increasingly "pronghorn friendly," that is, with a smooth, higher bottom wire for relatively easy passage. Since pronghorn evolved on the open grasslands, they are much more prone to travel under fences than over them, if fence construction permits. This contrasts with a five-or-six- barbed wire fence designed to retard or prevent wildlife movement onto highways. Dividing the area into smaller units allows for intensive management of cattle through rotation systems, which is markedly different compared to the 1870s when the area was open range. Other significant changes that have occurred since the 1870s include water developments and altered fire frequency. Water features were developed to increase the consistency of forage utilization by cattle and wildlife. Fires became less frequent as forage utilization and firefighting technology improved. Initial fences were built to create individual allotments from the open range. Later fences were added for the same reasons water features were developed.

Management today consists of the development of Annual Operating Instructions (AOI) yearly for each individual grazing allotment. The AOI specifies administration methods for allotments, to include utilization standards, improvements and pasture rotations. Most pasture rotation is based on the current utilization and climatic conditions. A complicating factor when compiling the AOI is long-term drought affecting conditions over multiple years. In recent years, the Forest Service worked with permittees to adjust stocking levels and partly mitigated over-utilization and resource damage. Allowable livestock numbers were dramatically decreased in 2002, but have slowly been recovering toward permitted levels. Annual Operating Instructions are based on the current allotment management plans which are periodically updated.

As previously stated, timing of pasture rotation is based on current utilization, but subsequent movement of cattle is a function of rotation type. A deferred-rotation system allows for the movement of cattle to locations where the forage could next be utilized more effectively. A rest-rotation system has a more defined rotation schedule that indicates the order in which pastures should be grazed. In both cases the intent is to graze each pasture at some point each year, with variation in the season of use.

Water developments and supplements are used to disperse livestock and enhance wildlife habitat. Cattle tend to concentrate their activities near water. Developing water availability in various locations within a pasture works to keep cattle in a pasture longer without over-utilization. Supplements help to offset nutritional deficiencies for both cattle and wildlife, and are also used as a tool to help disperse range utilization. These approaches are commonly used in current management strategies on all allotments.

Fire is an important part of the grassland ecosystem. Currently, management directive is to extinguish all wildfires. This policy has been institutionalized since the mid 1900's when the thought was that all fire was destructive. Lack of fire has caused tobosa grass to become decadent, forb cover to decrease, and woody plants such as juniper to dominate portions of the landscape. Over the past twenty years, prescribed fire has been introduced to rejuvenate herbaceous vegetation and decrease encroaching woody vegetation. Since 2001 prescribed fire has not occurred due to conditions resulting from drought. The indications are that prescribed burning will be re-instituted when favorable climatic conditions return. The assessment area has been proposed as a Wildland Fire Use area.

Barbed wire fencing, and electric fence to some extent, have major effects on grazing management capabilities. The use of barbed wire has evolved over time into a complex allotment and pasturing system that can be modified to accommodate wildlife passage needs. The current fencing system in each allotment is to be maintained by the permittee in accordance with the AOI and term grazing permit.

Proper Functioning Condition Surveys depict a variety of riparian conditions. Differences between riparian areas are largely due to season of use, topography, and/or exclosures. Riparian vegetation overall is below its potential, primarily due to cattle grazing. In riparian areas where cattle grazing has been excluded, rapid improvement in site condition and vegetation community development has occurred. Serious negative impacts to riparian conditions have occurred in places exclosures have failed (Verde Rim Livestock Grazing Project Record Number 117, Existing Condition Report).

In general, the grazing system and conditions within the assessment area appear to be sustainable. Many future improvements can be realized through "adaptive management," structural improvements, and vegetation treatments. The most recent drought seriously impacted range condition and resulted in decreased cattle numbers. Adjustments were made, allowing for ecosystems to begin recovery while maintaining long-term economic viability. Flexibility in current management will allow for improved opportunities in the future.

Summary of grazing permittee comments to team members

On 8/16/2006, the assessment team met with permittees, or their representatives, from grazing allotments within this assessment area. The meeting took place at Sycamore Cabin and consisted of large group interaction followed by breaking up into smaller groups and visiting each allotment. Each permittee/representative was asked identical questions agreed upon by the entire assessment team. Responses to the questions were analyzed and summarized into themes displayed below. The themes generally represent the responses, though there may be differing opinions between individuals.

Herd flexibility is a concern for all permittees. Reduced stocking or de-stocking to account for drought, wildfire, or prescribed burning is logistically feasible, but can be a financial burden. Rebuilding a herd can be difficult and take many years in some cases, especially for smaller operators. Some methods for rebuilding include retaining a larger portion of the "natural increase" from calving and purchasing on the open market, which itself responds to drought.

Another option for reducing the impacts from significant stocking changes is the use of "livestock use permits," issued by the Forest Service. In this case cattle not owned by permittees are brought in to utilize excess forage and provide income while herds are rebuilding.

All allotments are on a rest-rotation system except for the V-Bar, which is on deferred-rotation. The number of pastures per allotment varies, with the largest number being 30 on the V-Bar. Some permittees also have state and Bureau of Land Management permits in addition to variable amounts of private land. Most cattle movement is based on monitoring, not strictly on planned dates. This management style is consistent with Verde Ranger District Annual Operating Instructions.

Fire within the assessment area is generally supported. Concerns relating to fire tend to focus on the time needed to return cattle post-fire. The Verde Ranger District policy of immediate return after green-up is key to supporting a burning program. Permittees seem to prefer the use of prescribed fire over Wildland Fire Use or wildfire. Some concern was evident that fire should not be used everywhere as a blanket prescription.

Stubble-height requirements for wildlife conflict with range utilization and burning. Tobosa grass should be kept fresh through grazing or burning, which may leave inadequate cover for fawns. The consensus is that at any given time adequate cover exists for fawns in a large percentage of the area due to the existence of lightly stocked pastures or pasture rotation.

Control of woody plants such as juniper, catclaw acacia and mesquite is desirable and supported. Tools used to implement such control include fire and mechanical thinning.

Pre-settlement range conditions consisted of more grass, more surface water, less woody vegetation, more wildlife, and tobosa being common with decadence controlled by fire. Present range conditions consist of dominant grass cover, abundant water due to developments, and tobosa decadence being variable across the entire area and even within a single pasture. Desired range condition would be more like the pre-1880 vegetation condition with minor additions in water developments.

Wildlife populations and distributions are changing. Deer and pronghorn populations have decreased relative to past decades. Predation has increased. Elk are moving into the area where historically they were not present.

Some permittees mentioned a willingness to provide or distribute nutritional supplements for wildlife in vacant pastures, with the mineral formulation to be furnished by the Arizona Game and Fish Department, to help mitigate soil mineral deficiencies.

Permittees provide a valuable service to the local wildlife through maintaining reliable water sources and nutritional supplements. They have also worked with the Verde Ranger District to mitigate fencing issues by installation of a higher bottom wire without barbs that is "pronghorn friendly."

Off-road travel and the increase in public-pioneered, unauthorized off-highway vehicle trails are leading to erosion and negative impacts on wildlife. Violations occur due to lack of education or disregard for the rules. There is a feeling that law enforcement is inadequate or overlooking the issue. A related issue is legal off-road motorized travel for fuelwood harvest or big-game retrieval. Initial use that flattens grass or makes ruts often leads to additional use which reduces grass cover, visual quality and wildlife habitat value.

Arizona Department of Game and Fish comments

The following comments were taken from the NEPA Project Record 15 for Allotment Management Planning in the Dugas, Rice Peak, and Todd allotments (DR T). The letter quoted here was issued from the Mesa office on 6/7/2006.

"Population trends for pronghorn, mule deer and javelina show declines in the project area over the past two decades" (Attachment B).

"...current management is not meeting (ours and PNF) goals for pronghorn ...livestock grazing is a contributing factor...over the past two decades."

"...poor fawn recruitment, coupled with high adult mortality are primary reasons for declining pronghorn trends."

"...grazing is negatively affecting the availability of fawn hiding cover..."

"...an eight inch stubble height...in annual operating (instructions) (was) an interim step ... recommended ... minimum of 11 inches."

"The Department requests that the Forest collaborate on a ... monitoring plan ..."

Desired Condition

The desired condition would best be summarized by describing it as the vegetation composition prior to 1870 with the water developments of today with some minor additions. This desired vegetation composition would be comprised of less woody plant cover and more cover of "decreaser" grass species. Decreaser species are defined as declining under grazing pressure, which in this case would include black grama, sideoats grama and vine mesquite. Water developments, to include pipelines, catchments, and wells, have significantly improved grazing conditions since the 1870s, but opportunities remain to disperse and increase utilization using water.

Future management

The following is future management direction, from the letter filed in Forest Service file code 1950, issued by the Verde Ranger District on 5/2/2006 to interested publics regarding the DR T Livestock Grazing Project for the Dugas, Rice Peak and Todd Allotments.

Maintain current grazing management on the included allotments (DR T) through the issuance of 10-year term permits containing the parameters under which continued livestock grazing would be implemented.

Continue to improve/maintain soil conditions by striving to attain/maintain effective litter and vegetative basal area of 25 to 30%.

Continue to manage for a diverse population of flora that provides for watershed health, wildlife habitat, and forage for herbivores.

Continue to allow riparian vegetation to move toward or reach potential.

Continue to maintain the hydrologic system necessary to maintain state water quality standards.

Be responsive to regulations (36 CFR 222 Subpart A, 222.2 (c)) that direct the Forest Service to make forage available for livestock under direction contained in the Land Management Plan of the Prescott National Forest.

Be in timely compliance with Section 504 (a) of the 1995 Rescission Act (Public Law 104-19) for completion of National Environmental Policy Act (NEPA) analysis and decisions on all grazing allotments.

Findings Required by Laws

Consistency with Forest Plan

The following excerpts are from the amended version of the Prescott National Forest Land and Resource Management Plan (LRMP) adopted in 1986. The current version cited in this document was published in 2004. The excerpts below support the Desired Condition stated above and the Resource Opportunities itemized below.

Protection, where appropriate, and improvement of the quality of renewable resources (NFMA; LRMP page 1).

Both livestock and wildlife needs are considered when additional forage becomes available through investments in structural and nonstructural habitat improvements (LRMP page 4).

Provide forage to grazing and browsing animals to the extent benefits are relatively commensurate with costs without impairing land productivity, in accordance with management area objectives (LRMP page 12).

Cooperate with other agencies and private range landowners to reduce impacts of livestock grazing (LRMP page 12).

Construct and replace structural range improvements as needed to manage at prescribed levels on a 50 year cycle. If a more cost-effective alternative to replacement is available, it may be implemented. Priority for expenditure of funds for new structural range improvements will be determined by range analysis and the allotment management plan system (LRMP page 34).

Permittee investment will be encouraged by giving priority to projects that contain at least equal value contributions by grazing permittee (LRMP page 34).

Allow additional investment in nonstructural range improvements contingent upon receipt of funding above the level programmed (LRMP page 34).

The assessment area is located within Management Areas 2, 3 and 5 with the vegetation types consisting of juniper and desert grassland. The majority of the area is designated Management Area 5, but the range management levels are the same in all three management areas for each vegetation type. Overall, the assessment area is Management Area 5 (Desert Grasslands) with a vegetation type of desert grassland managed to level E. The juniper type is to be managed to level C, which is typified by "seeking full utilization of forage allocated to livestock". The desert grassland type is managed to level E, which is typified by "seeking to realize maximum livestock production and utilization of forage" and "providing for multiple-use of the range" (LRMP pages 55 to 65 and 125 to 127).

Resource Opportunities

Opportunities

Both structural and non-structural opportunities for improving rangeland/grazing conditions have been identified. These opportunities are listed and described below and the locations of many are included on the Grazing Management Opportunity Map 5. The assigned identifier (ex. D1) can be referenced between this list and the map.

(D1) Install a cattleguard where the Long Gulch and Rice Peak Allotment boundary fence crosses Forest Road 677. This cattleguard would reduce the occurrence of livestock entering the wrong allotment and eliminate damage resulting from the public leaving the current gate open and/or driving over it.

(D2) Install a cattleguard where the pasture boundary fence crosses Forest Road 677 south of Cow Canyon in the Long Gulch Allotment. This cattleguard would reduce the occurrence of livestock entering the wrong pasture and eliminate damage resulting from the public leaving the current gate open and/or driving over it.

(D3) Install a cattleguard where the pasture boundary fence crosses Forest Road 677A just east of Rice Peak in the Long Gulch Allotment. This cattleguard would reduce the occurrence of livestock entering the wrong pasture and eliminate damage resulting from the public leaving the current gate open and/or driving over it.

(D4) Repair the existing windmill in order to provide water enabling better dispersion of grazing effects. The windmill is located in T11N, R4E, Sec. 28 within the Long Gulch Allotment.

(D5) Further develop the existing solar well on 22 Mesa within the Long Gulch Allotment in order to capture and distribute excess water running onto the ground. This development would consist of a cistern to hold water for that location. When the cistern is full, excess water could be piped to other locations.

(D6) Develop a water distribution system to deliver excess water from the 22 Mesa solar well, identified in D5, to two areas within the Rice Peak Allotment and one area further east along Forest Road 677A in the Long Gulch Allotment. This development would consist of piping water to three new water storage basins. Benefits of this development include increased dispersion of cattle and possibly creation of more desirable habitat for pronghorn.

(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 losses through porous soil. Currently, cattle underutilize the area due to lack of water.

(D8) Install or upgrade well at Burmister Tank at the west end of the Rice Peak Allotment. This tank is currently dry, but is surrounded by high-quality feed.

(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 cattle to graze in the area.

(D10) Remove juniper from the Tule Mesa area within the Sycamore Allotment. This would enhance both cattle and pronghorn habitat. Another issue in this same area would be water source development, though exact locations have not yet been identified.

(D11) Consider time of grazing restrictions around Brown Spring within the Dugas Allotment. This area could benefit from grazing when currently the area is restricted. These restrictions may be causing under-utilization and over-rested tobosa.

(D12) Consider timing of grazing restrictions on Yellow Jacket Mesa within the Dugas Allotment. This area could benefit from grazing when currently the area is restricted. These restrictions may be causing underutilization and over-rested tobosa. The restriction is during the fawning season.

(D13) Mitigate site damage from recreational users along Forest Road 68 in the Brown Spring pasture of the Dugas Allotment. Resource damage is occurring from off-road travel and concentrated recreational use. Possible site development might include latrines and signage.

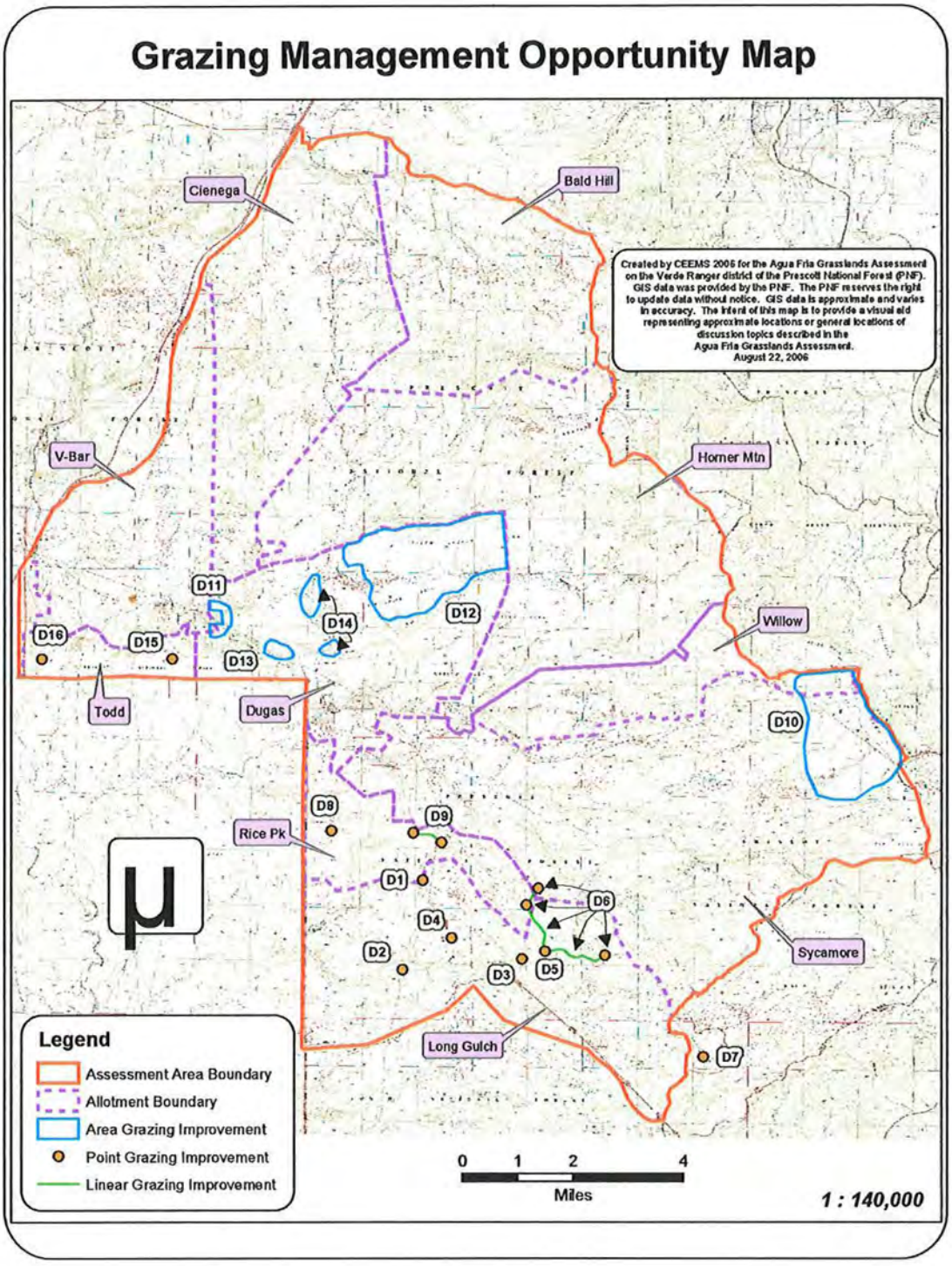
(D14) Mitigate resource damage from recreational users along Forest Road 68D in the Cottonwood pasture of the Dugas Allotment. Damage is occurring from off-highway vehicle travel in washes.

(D15) Install a water development in T12N, R5E, Sec. 34 of the Todd Allotment. This development would be positioned on top of the mesa in order to encourage better utilization by cattle and may provide benefits to pronghorn.

(D16) Install a water development in T12N, R5E, Sec. 32 of the Todd Allotment. This development would be positioned on the west side of Section 32 in order to encourage better utilization by cattle and may provide benefits to pronghorn.

There may be an opportunity to build consensus between the Arizona Game and Fish Department and US Forest Service regarding stubble height with respect to pronghorn fawning cover. Game and Fish requests an 11-inch stubble height minimum on all grassland acres. The Forest Service attempts to regulate utilization by requiring cattle movement when a percent-utilization-by-weight level is reached in key areas. This results in a variable stubble height that is dependant on the amount of production. It may be useful if the need for a substantial amount of un-grazed or lightly grazed acres, with stubble height exceeding 11 inches, could be balanced against those acres which are reduced substantially below 11 inches by natural fire, prescribed fire, or grazing intended to reduce the buildup of tobosa. Otherwise, the Game and Fish support for prescribed burning, and perhaps Wildland Fire Use, may be inconsistent with their request for an overall 11-inch stubble height.

Map 5.


Grazing Management Opportunity Map
Cienega
Bald Hill
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
V-Bar
Horner Mtn
D11
D12
D14
D16
D15
D13
Willow
Todd
Dugas
D10
D8
D9
Rice Pk
D1
D6
D4
D2
D3
D5
Sycamore
Long Gulch
D7
Legend
Assessment Area Boundary
Allotment Boundary
Area Grazing Improvement
Point Grazing Improvement
Linear Grazing Improvement
0 1 2 4
Miles
1 : 140,000

Fire and Fuels

Condition

Historic Condition

Fire has major effects on the functioning of grasslands. Over time, grasses have adapted to fire and become heavily dependant on it to maintain grassland ecotypes. Historically, high-frequency, low-intensity fires occurred on the Agua Fria Grasslands. These fires allowed the grasses to thrive and prevented development of the dense shrub component which is currently threatening the grasslands. Lightning was the probable ignition source for the fires. Some argue that indigenous peoples also started a significant number of fires for a variety of reasons including hunting, warfare and to attract game species to fresh browse. The majority of lightning ignitions took place during the monsoon season, typically June through September. Beginning in the period following World War II, aggressive wildfire suppression was initiated, thus disrupting the established natural fire frequency. In an effort to return fire to the ecosystem approximately 40,000 acres have been treated by prescribed burning between 1981 and 2001 (See Map 6). Since 2001, a dryer–than-average period has limited land managers' ability to continue the prescribed burning program due to reduced fuel.

Existing Condition

A coarse-scale survey was done nationwide to study the current conditions of vegetation and fuels to provide land managers with an overall measure of vegetation condition. The assessment divides the role of fire into five different regimes based on frequency (average number of years between fires) and severity (effect of the fire on the overstory). The assessment examines current vegetation conditions and rates the area on the degree of departure from historic conditions. The departure may be caused by livestock grazing, timber harvest, exclusion of fire, other management activities, insects, disease or the establishment of exotic species.

Table 4. Historical Natural Fire Regimes

Fire Regime	Frequency*	Severity**
I	0-35-year	Low
II	0-35-year	Stand-Replacement
III	35-100+ year	Mixed
IV	35-100+ year	Stand-Replacement
V	200+ year	Stand-Replacement

* Fire frequency is the average number of years between fires.
** Severity is the effect of the fire on the dominant overstory vegetation.

Landscapes are then broken into three classes based on how far the landscape has departed from the natural regime.

Table 5. Fire Regime Current Condition Class* Descriptions.

Condition class	Fire Regime
Condition Class 1	Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range.
Condition Class 2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystems components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.
Condition Class 3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.

* Fire Regime Current Condition Classes are a qualitative measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure and fuel loadings.

Approximately 88% of the assessment area is either grassland or pinyon-juniper and is considered to be in Fire Regime 1. Historically these grassland and juniper types would have had relatively frequent low-intensity burns. Many grassland types, including tobosa (*Pleuraphis mutica)*, have a natural fire return interval of between three and seven years. Within the assessment area, approximately 19,700 acres (20%) have burned within the last five years (see Map 6). These acres can be classified as Condition Class 1. There are significant areas with heavy components of brush and tree encroachment within the assessment area. Much of this could be considered Condition Class 3. The remaining area in the assessment area is presently in Condition Class 2 and could be returned to Condition Class 1 over time, with regular burn cycles.

Primary Fuel Components

The dominant grass species is tobosa, which is a fire-adapted species that, given adequate soil moisture, responds to fire with increased vigor. The dominant shrub species include catclaw acacia (*Acacia greggii*), wait-a-minute bush (*Mimosa biuncifera)* and honey mesquite (*Prosopis juliflora*). None of these shrub species burn or carry fire well except in the most extreme of burning conditions. The dominant tree species are alligator juniper

(*Juniperus deppeana*) and Utah juniper (*Juniperus osteosperma*). Juniper does not burn well unless live fuel moisture becomes extremely low. Native brush and tree species are increasing in numbers and distribution and are significantly outside their historic range of variability.

Wildland Fire Use

Wildland Fire Use is a concept that when put into practice would allow naturally caused fires to burn without immediate suppression in certain areas under certain conditions. Fire would only be allowed to burn in predefined areas that need fire to return to a more balanced historical condition. Proximity of the ignition point to roads and structures, weather, time of year and other factors combine to determine whether a naturally caused fire would be put into Wildland Fire Use status. The fire is then monitored by fire and resource managers to assure that the predetermined resource goals are being met.

Wildland Urban Interface

There are currently no areas officially identified as Wildland Urban Interface in the assessment area.

Wildfire

Two major wildfires occurred in 2005, the Butte Fire and the Cave Creek Complex (See Map 6). Together these fires burned approximately 19,700 acres within the assessment area. The general consensus among interested parties interviewed for this assessment was that the fires had positive effects on grass and forb growth, and reduced the numbers and spread of shrub and tree species. This anecdotal evidence is supported by published research including (Desert Plants p.97) (Stoddart et al. 1975).

Relevant Research

Burning tobosa in Texas reduced the importance value of forbs in the first-year growing season, but the production at two to four years exceeded that of unburned controls (Neuenschwander, et.al.,1978).

In the assessment area, burning every third winter resulted in forbs which were more dense than in unburned sites, while not affecting tobosa production. The resulting tobosa growth was more usable than the unburned tobosa as forage for grazing animals (Boren, 1985). This cycle would also likely result in a lower fire hazard.

Spring burns damaged forbs (primarily cool-season plants) and favored warm-season perennial grasses. These terms apply to the season in which different plants attain optimal growth, given adequate soil moisture (Boren, 1985).

Burning of the highly flammable red brome resulted in more forbs. There were 2.5 times more forbs than in the unburned controls in April and 1.7 times more in May, which are the two most productive months (Boren, 1985). They also coincide with fawning season.

Desired Condition

Ideally, the Agua Fria Grasslands should be in a condition where naturally caused large-acreage fires can be allowed to burn at low intensities with little risk to private property, grazing improvements and public safety. Fire should be allowed to burn with a return interval approximating the historic fires that shaped the assessment area. Several constraints including safety, livestock grazing and weather conditions will affect the ability to which managers can follow this return interval. Frequent low-intensity fires are ecologically desirable, and could help to reduce tree and shrub encroachment and promote forb production (Desert Plants p.97). Where naturally-occurring fires do not meet management goals, prescribed fire could target areas most in need of disturbance. Large burn areas utilizing existing fire breaks reduce fire management costs and more closely mimic historical conditions.

Resource Opportunities

Opportunities

As previously stated, fire's natural range of variability in tobosa grasslands is believed to be once every three to seven years. It would be ecologically beneficial to return to that natural range. Development of a coordinated comprehensive burn plan could prove to be a valuable tool in achieving this return interval on the Agua Fria Grasslands. The proposed plan should incorporate prescribed fire as well as Wildland Fire Use at a targeted interval of approximately every five years. A five-year interval equates to about 19,000 acres per year. This plan would prove most valuable if coordinated between all parties involved. Interested parties include the ranching community, recreationists, wildlife interests and other stakeholders that would be affected by actions proposed in the plan. Close cooperation between fire planners and grazing permitees could minimize negative fire effects on fencing, water improvements and short term forage reductions. On the positive side, cooperators could assist in targeting areas where fire could be most beneficial at reducing unwanted vegetation. With a lack of nearby urban areas and the availability of preexisting manmade and natural fire breaks, burning 20% per year is an attainable goal.

Targeting areas where vegetative habitat is the limiting factor for pronghorn numbers is an additional opportunity that could serve other multiple resource goals.

Several key questions need more research in order to maximize prescribed fire's beneficial effects on the land:

- How do the different species of forbs, shrubs and grasses respond to fires occurring during different times in the year?
- What is the optimal fire return interval to increase plant species diversity?

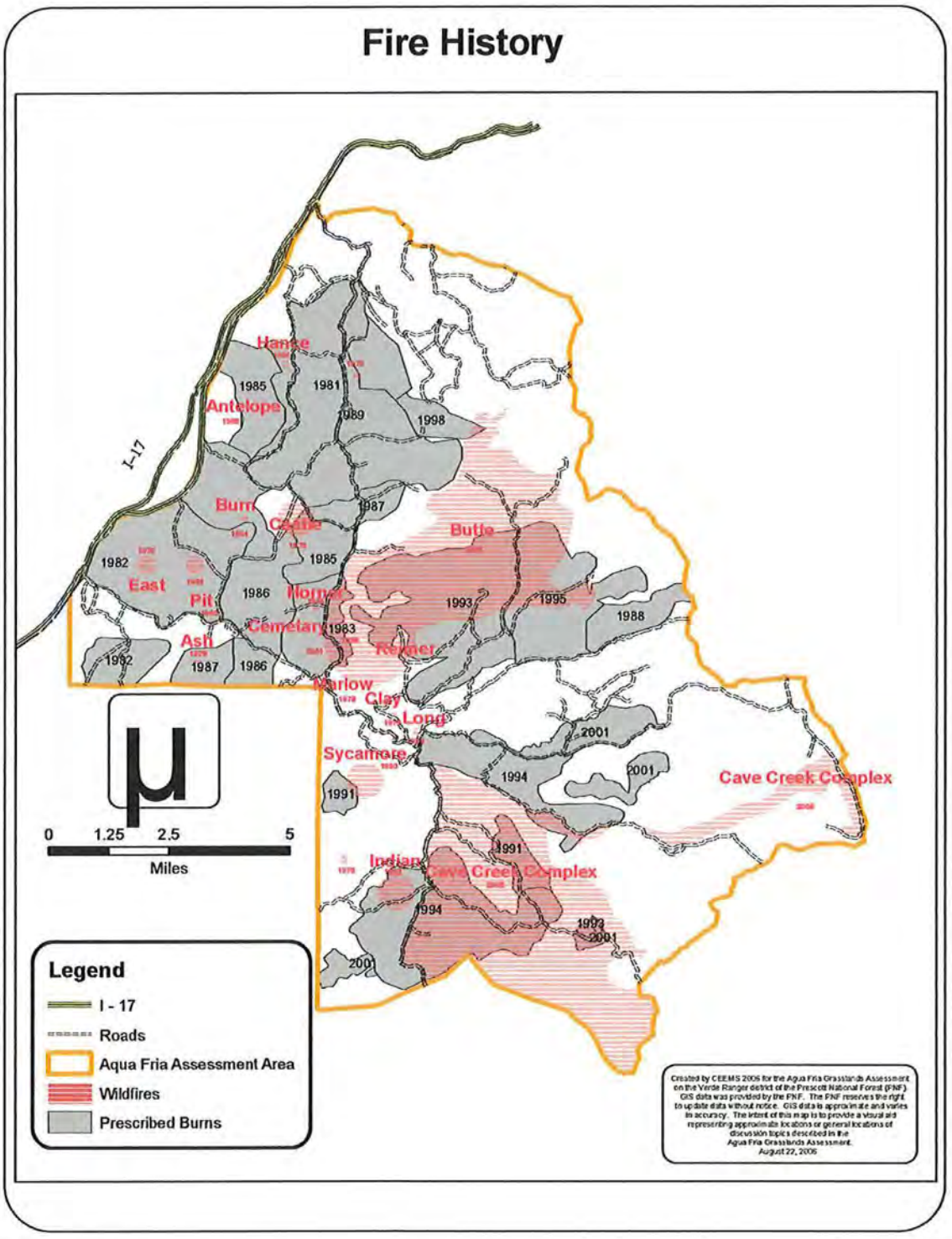
- What is the optimal fire return interval to reduce the spread of undesirable tree and shrub species?
- What are the effects of fire on non-native plant species?

A Fire Regime Condition Class assessment for the Verde Ranger District grasslands would help target areas that could be most easily moved to a lower condition class.

Monitoring

Consistently monitoring the Agua Fria Grasslands fire regime condition classes chould prove to be the most constructive tool. Monitoring, using this structure, will allow land managers to evaluate whether or not predetermined resource objectives are being met. The current fire regime condition class, however, should first be established as a baseline. With this information land managers will understand the current ecological conditions as they relate to fire. Furthermore, this data will also allow the opportunity for more informed decisions to be made in every aspect of wildland fire management within the Agua Fria Grasslands.

Map 6.


Fire History
Hance
1985
1981
Antelope
1989
1998
I-17
Burn
Castle
1987
Butte
1982
1985
East
Pit
1986
Horner
1993
1995
1988
Cemetary
1983
Ash
Reiner
1982
1987
1986
Marlow
Clay
Long
2001
Sycamore
1994
2001
Cave Creek Complex
1991
1991
Indian
Cave Creek Complex
1994
1993
2001
2001
μ
0 1.25 2.5 5
Miles
Legend
I - 17
Roads
Aqua Fria Assessment Area
Wildfires
Prescribed Burns
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August 22, 2006

Watersheds

Condition

Historic Condition

Over the past 40 years the three watersheds that encompass the assessment area (Ash Creek - Sycamore Creek Watershed, Bishop Creek Watershed and the Fossil Creek – Lower Verde River Watershed) have gone through many changes. The most significant has been the drought of the 1980s and the drought of the past eight years. Based on National Weather Service records and Maricopa County Alert System records for the Dugas station and other areas, the annual precipitation amounts have decreased by about one inch over the last 40 years. The recent drought began in 1998 and has continued to this day. Although the 2006 monsoon season provided more moisture than in the past six years, the effects of the drought over the past eight years can still be seen in parts of the Agua Fria Grasslands in the vegetation patterns and the amount of flowing water in the creeks, streams, rivers, seeps and springs.

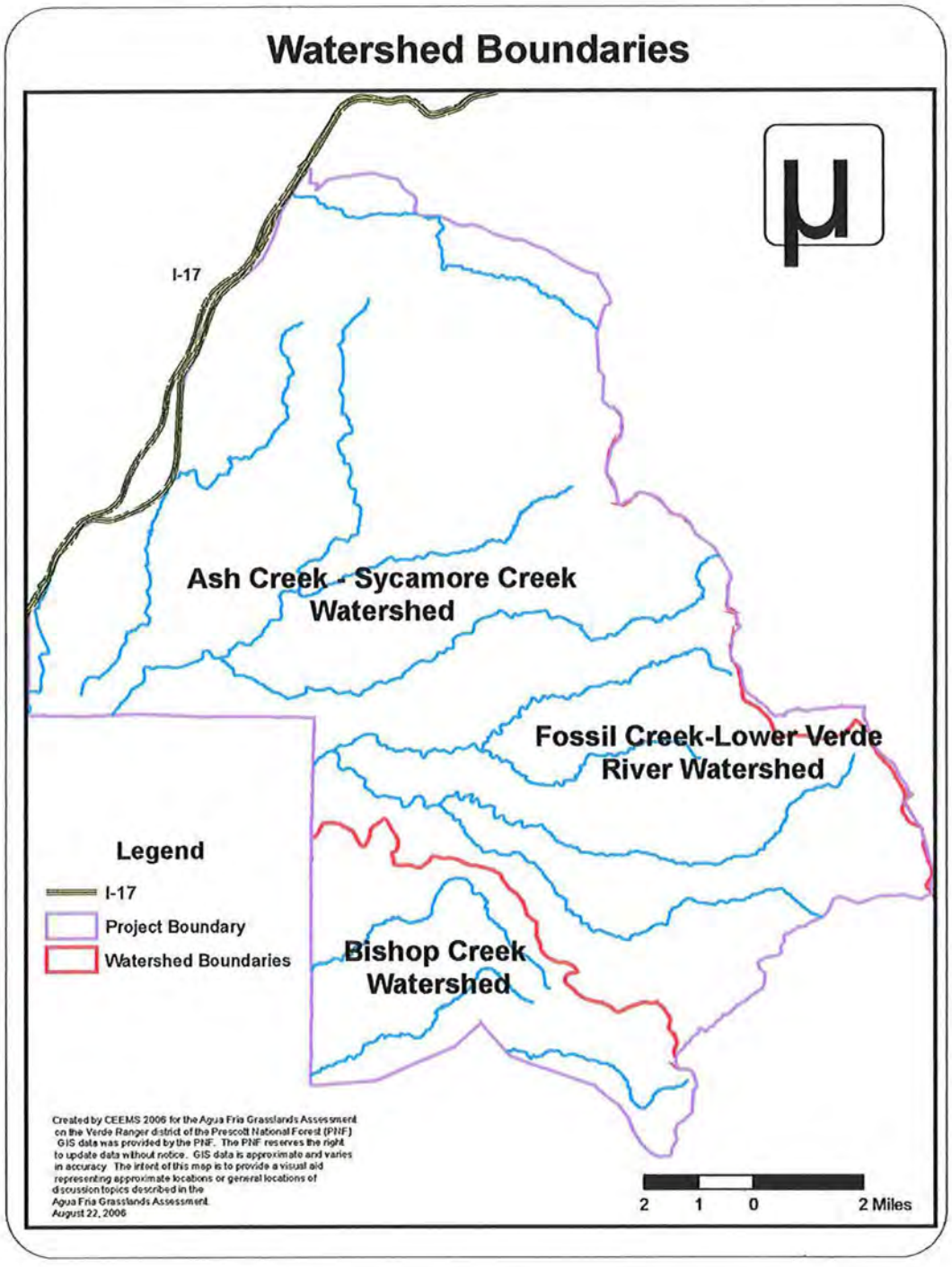
Overall, the amount of water flow in streams, seeps and springs in the area has decreased over the past 40 years, based on interviews with long time residence and ranchers. They also commented that the timing and intensity are increasing. A review of climatic data from the Maricopa County Alert System records for the area supports these statements.

As the livestock and grazing patterns in the assessment area have changed over the past 40 years (see Range section), so has the quality of the water. This is documented in the Sycamore Allotment Categorical Exclusion (CE) of 1995 for the installation of a fence creating the Hiball pasture, and from the Arizona Department of Environmental Quality.

Wildland Fire Use and wildfires in the Agua Fria Grasslands have changed over the past 40 years as well. There has been a decrease in the number of wildfires. The wild fires that have occurred have been of greater intensity than in the past. This has contributed to a change in the amount and type of vegetation (see Fire and Vegetation reports).

Windmill at Dugas August 2006

Map 7.


Watershed Boundaries
I-17
Ash Creek - Sycamore Creek Watershed
Fossil Creek-Lower Verde River Watershed
Bishop Creek Watershed
Legend
I-17
Project Boundary
Watershed Boundaries
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August 22, 2006
2 1 0 2 Miles

Existing Condition

The assessment area contains approximately 95,166 acres. The area is covered by three 5th code watersheds (Ash Creek - Sycamore Creek Watershed, Bishop Creek Watershed and the Fossil Creek – Lower Verde River Watershed). See Map 7and Table 6 for details. There are 36 Terrestrial Ecological Survey (TES) map units (see Map 10 and Table 9 for details) and four major geology types covering the area (see Map 8 and Table 7 for details).

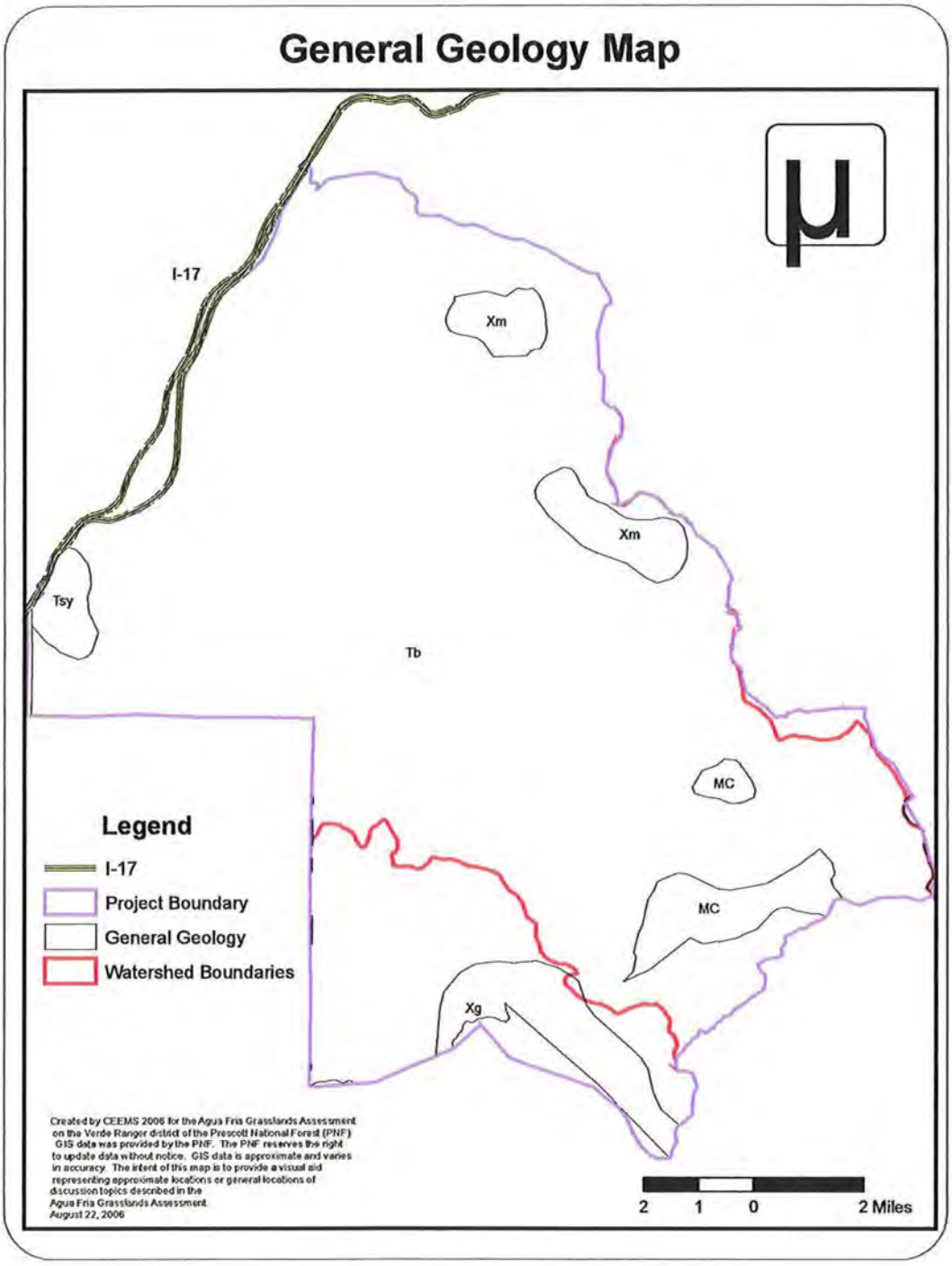
Based on Proper Functioning Condition (PFC) field sheets for some of the main creeks, field reviews, discussions with long term residents and the Allotment Management Plans for several of the grazing allotments, the overall watershed condition is fair to good in the assessment area. This takes into account the soil, water quality, water quantity and general stream condition including sediment load and other potential pollutants.

Based on the TES survey information, the climate falls into one of two types, Low Sun Mild (LSM) and Low Sun Cool (LSC). The Low Sun Mild is associated with a little over half of the TES map units and is characterized by a mean annual precipitation of 12 to 15 inches, and a mean annual temperature of 61 to 65 degrees Fahrenheit. The majority of the rain occurs during the months of October to March. The winters are typically mild with two to four inches of snowfall and no accumulation of snow. The summers are typically hot during the day with cooling in the evening. There are typically 230 to 240 days that are frost-free. At this time there are no site specific temperatures available for the assessment area.

The Low Sun Cool is associated with a little less than half of the TES map units and is characterized by a mean annual precipitation of 18 to 20 inches, and a mean annual temperature of 41 to 43 degrees Fahrenheit. The majority of the rain occurs during the months of October to March. The winters are typically cold with about 47 inches of snowfall and a mean accumulation of 14 inches of snow. Patches of snow may exist into the early spring. The summers are typically warm during the day and cool in the evening. There are typically 100 days that are frost-free.

There are four main bedrock types covering the assessment area, basalt, limestone, metamorphic (sandstone) and granite. The dominant geology is basalt. This type of geologic parent material typically lends itself to the development of clayey soils such as those in TES map unit 370. Soils developed from basalt can be subject to weight being problems and damage, mainly from compaction, puddling and displacement when they become wet. These soils can also be very susceptible to rill and sheet erosion if ground cover is lost.

Map 8.


General Geology Map
I-17
Xm
Xm
Tsy
Tb
MC
MC
Xg
Legend
I-17
Project Boundary
General Geology
Watershed Boundaries
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August 22, 2006
2 1 0 2 Miles

Table 6. Summary of Acres by Watershed

Watershed Name	Watershed Acres in Assessment Area	Percent of Assessment Area Covered by the Watershed
Ash Creek - Sycamore Creek	81141.086651	85.00 %
Bishop Creek	13364.145837	14.00 %
Fossil Creek – Lower Verde River	605.748158	<1.00 %

The acres for the watershed delineations came from clipping the assessment area boundary with the Forest's 5th level Hydrologic Unit Codes (HUC) code layer. In the attribute table the delineations are associated with the tables listing of the 10th level HUC. The Forest hydrologist identified the 10th HUC code listing as the 5th level HUC that should be used for this assessment. The acres were calculated using ARCGIS XTOOLS. All numbers were rounded to the nearest whole number.

Table 7. Summary of Acres by Geologic Type

Geology	Geology Acres in Assessment Area	Percent of Assessment Area Covered by the Geology
Basalt (Tb)	84312.00	90.00 %
Limestone (Tsy, MC)	3764.00	4.00 %
Metamorphic (Xm)	2764.00	3.00 %
Granite (Xg)	3172.00	3.00 %

The acres for the geologic types are based on a lumping of TES map unit delineation. These very coarse scale delineations should not be used for site specific analysis per recommendations from the forest soil scientist. Acres were calculated using ARCGIS XTOOLS. All numbers were rounded to the nearest whole number

The assessment area contains approximately six miles of perennial streams and approximately 100 miles of intermittent streams (see Map 9, Table 8 and Figure 3 for details). A total of 1,947 acres of wetlands/riparian acres were identified in the assessment area based on the TES map unit data (see Map 10 and Figure 4 for details). The stream network is dominated by a dendritic drainage pattern. This drainage pattern develops mainly in areas where the underlying geology is fairly homogeneous with respect to the geologic materials resistance to weathering. The general density ranges from medium to high (1:20 to 1:85). At this time there is no site specific sediment load information for any of the streams.

Map 9.

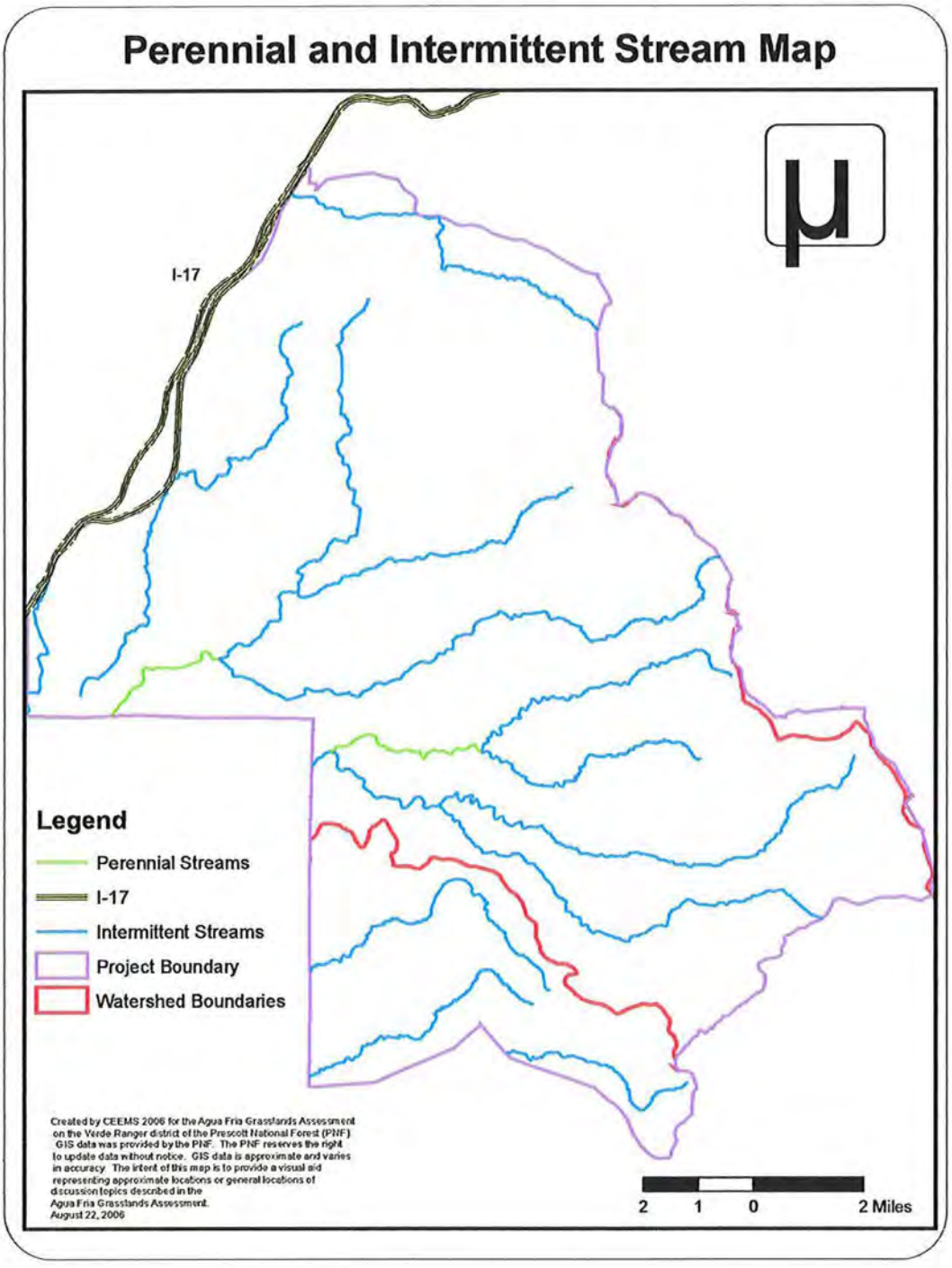

Perennial and Intermittent Stream Map
I-17
Legend
Perennial Streams
I-17
Intermittent Streams
Project Boundary
Watershed Boundaries
Created by CEEMS 2006 for the Agua Fria Grasslands Assessment on the Verde Ranger district of the Prescott National Forest (PNF) GIS data was provided by the PNF. The PNF 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
2 1 0 2 Miles

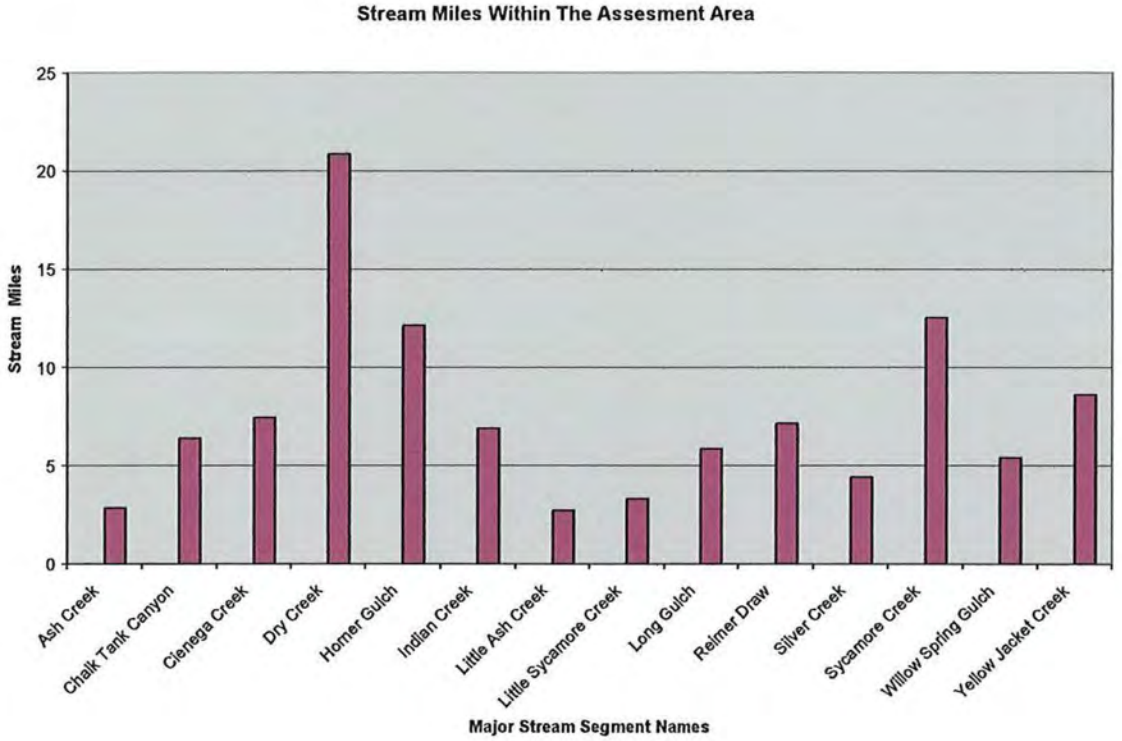
Table 8. Summary of Major Streams by Stream Type

Major Creek and River Names	Type	Miles of Stream Within the Assessment Area
Ash Creek	Intermittent	3
Chalk Tank Canyon	Intermittent	6
Cienega Creek	Intermittent	7
Dry Creek	Intermittent	21
Horner Gulch	Intermittent	12
Indian Creek	Intermittent	7
Little Ash Creek	Perennial	3
Little Sycamore Creek	Perennial	3
Long Gulch	Intermittent	6
Reimer Draw	Intermittent	7
Silver Creek	Intermittent	4
Sycamore Creek	Intermittent	13
Willow Spring Gulch	Intermittent	5
Yellow Jacket Creek	Intermittent	9

The miles were calculated using the GIS XTools software. All numbers were rounded to the nearest whole number.

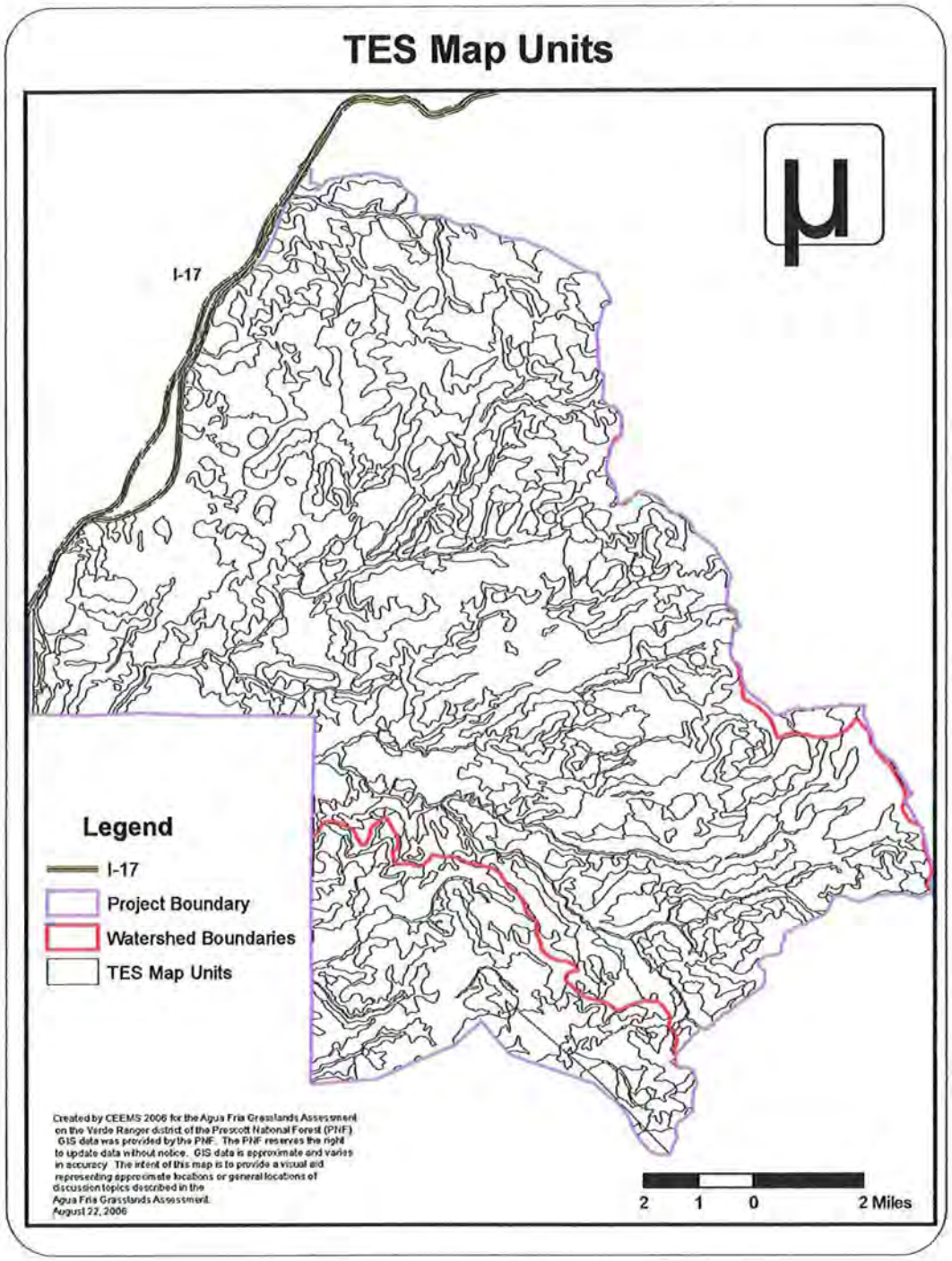
Dugas stream crossing, August 2006

Figure 3. Stream miles



Downstream from Dugas crossing, August 2006.

Map 10.


TES Map Units
I-17
Legend
I-17
Project Boundary
Watershed Boundaries
TES Map Units
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August 22, 2006
2 1 0 2 Miles

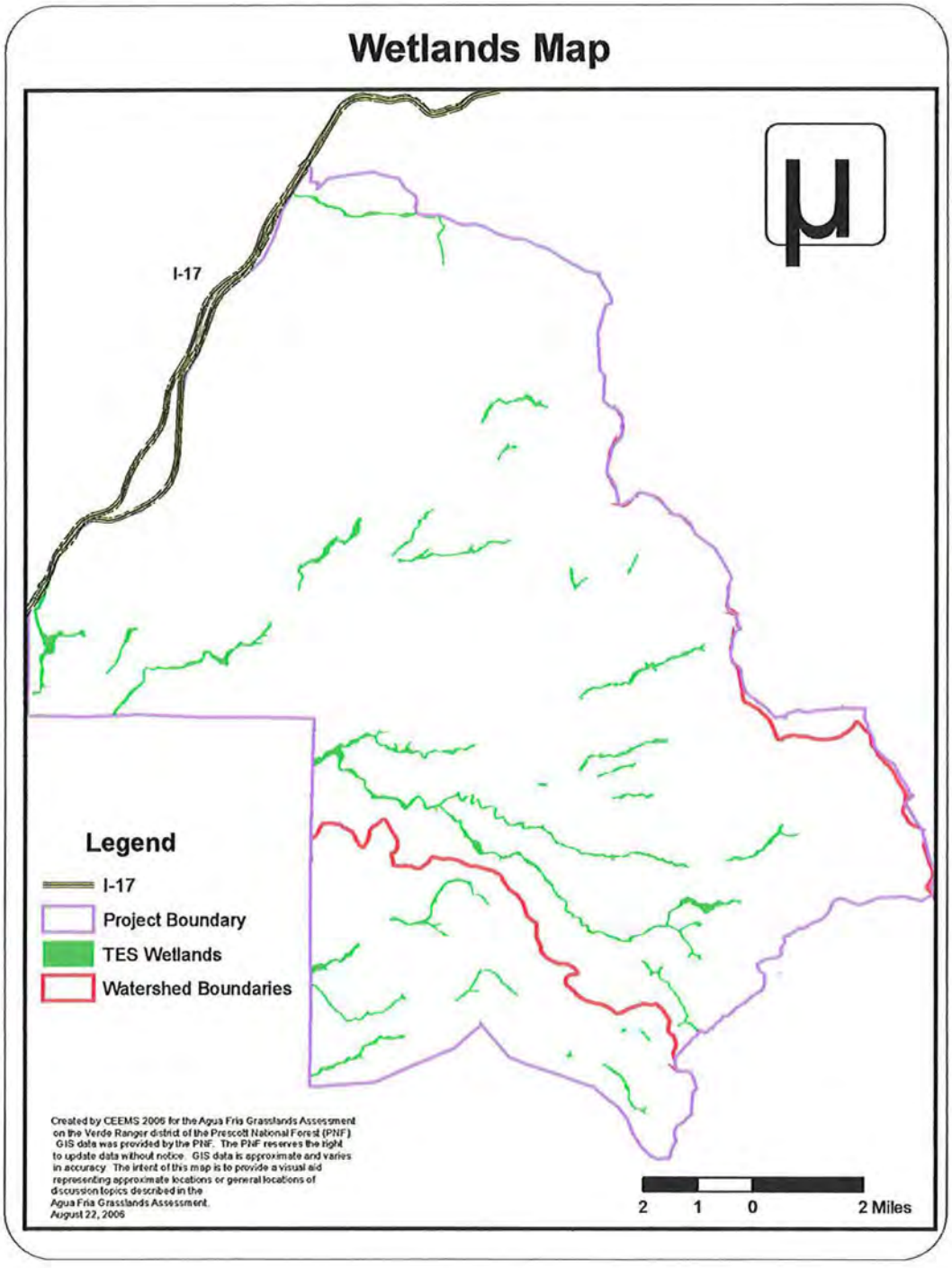
There are 36 TES map units (see Table 9 for details) covering the assessment area. The dominant vegetation in the area are grasses (tobosa), some trees (juniper) and some shrubs (see Vegetation section for specifics). There are six TES units that identify wetland and riparian areas (see Map 11 Figure 4).

Table 9. TES Map Units

TES Map Unit Number	Acres in Assessment Area	Percent of Assessment Area Covered by TES Map Unit
0030	86	< 1%
0034	140	< 1 %
0041	963	1%
0042	233	< 1 %
0043	628	< 1%
0050	64	< 1 %
0055	66	< 1 %
0370	2,926	3 %
0371	67	< 1 %
0372	22,224	23 %
0373	8,245	9 %
0425	847	< 1 %
0427	7853	8 %
0428	488	< 1 %
0430	14,603	15 %
0431	4,246	5 %
0432	1,7031	18 %
0436	4,149	4 %
0446	203	< 1 %
0448	948	1 %
0457	286	< 1 %
0461	1,995	2 %
0462	5,062	5 %
0463	526	< 1 %
0464	2,961	3 %
0466	279	< 1 %
0475	1,189	1 %
0476	66	< 1 %
0479	1,055	1 %
0485	6,905	7 %
0490	4,067	4 %
0491	2,196	2 %
0540	516	< 1 %
0551	4,781	5 %
0560	418	< 1%
0570	92	< 1 %

The acres for these units were obtained using ARCGIS XTOOLS. All numbers were rounded to the nearest whole number.

Map 11.


Wetlands Map
I-17
Legend
I-17
Project Boundary
TES Wetlands
Watershed Boundaries
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August 22, 2006
2 1 0 2 Miles

Desired Condition

The desired condition for the three watersheds in the assessment area focuses around watershed condition class. The desire is to maintain and where possible move from a Condition Class of 2 to a 1. The condition class takes into account factors such as sediment, erosion and water quality. In Condition Class 1 all aspects of the watershed are functioning within normal ranges. The amount of sediment and pollution do not exceed any state or federal standard. In Condition Class 3, there is much impairment with respect to water quality and levels of sediment. The systems are not functioning with the normal range. Condition Class 2 has some systems that are not functioning well but are acceptable.

Jersy barrier stream stabalization, August 2006.

Findings Required by Laws

The main laws driving the watershed and its condition are the Clean Water Act and the Arizona Department of Environmental Quality title 18. Both are concerned with water quality and quantity.

Consistency with Forest Plan

The Forest Land and Resource Management Plan covers various aspects of watershed management ranging from specific standards and guidelines, to specific actions that need to be completed by a specific date. Pages 13, 30, 35, 38, 55, 58 and 64 provide the most specific direction.

Past Activities

Past activities that have directly affected the overall watershed have been the relocation of various roads out of the stream and riparian areas, the installation of Jersey barriers in the streams for stream bank protection and energy dissipation, prescribed burning and the grazing allotment management system the District is using. Past recreation activities such as Off-Highway-Vehicle (OHV) use and dispersed camping has had minimal impact. As the use of these activities has increased over time, the impacts to soil and water have also increased.

Present Activities

Other than the grazing management program and recreation activities outlined above, there are no other active or ongoing activities in the assessment area affecting the overall watershed. Although trash dumping is not considered an activity, it has become an increasing problem on the Forest.

Resource Opportunities

Aspect of Resource To Be Affected

The main aspects of the watershed to be affected by various opportunities include, but are not limited to water quantity, water quality and detrimental soil conditions. See Table 11 for details.

Opportunities

The main opportunities for the watersheds include, but are not limited to decreasing sedimentation, water quantity and distribution, water quality, soil compaction, soil puddling, soil displacement, severely burned soils and erosion. See Table 11and maps 12-17 for specifics.

Desired Outcome

The overall desired outcome is to maintain the fair to good condition of the watersheds and work towards moving them to a Class 1 condition.

Table 11. Watershed Opportunities Summary Table

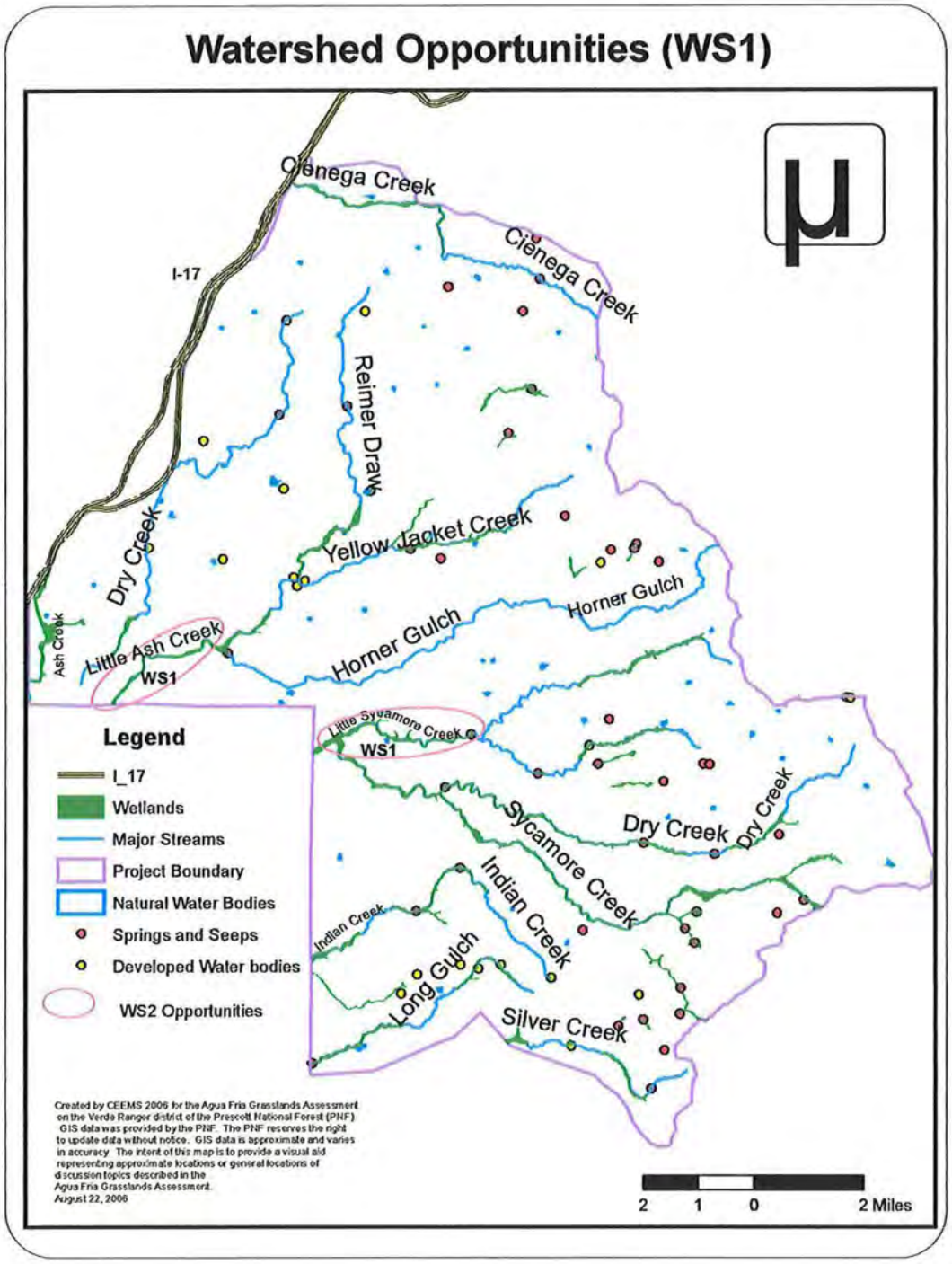
Resource	Aspect of the Resource Needing Change	Map Opportunity Number	Opportunity for Change	Potential Tools for Change
Watershed	There is a lack of area specific flow data.	WS1	Collect in-stream flow data over the next 5 years to document potential change on Little Sycamore and Little Ash Creeks.	Partner with NRCS, ranchers, forest service research or colleges/universities.
	Sediment load.	WS2	Move all travelways out of stream bottoms and riparian areas.	Partner with recreation, engineering and range to identify priority areas.
		WS3	Harden stream crossings.	-----
		WS4	Prohibit off road cross country motorized travel on TES map units with soils susceptible to compaction, erosion and low re-vegetation potential.	Implementation/enforcement of the Travel Management Rule.
	Water flow in creeks, streams, rivers, seeps and springs.	WS5	Increase prescribed burning and wildland fire use in and around seep and spring areas and in the head water areas of the Little Sycamore and Little Ash Creeks.	------
		WS6	Decrease juniper encroachment in drainage ways and in meadow areas.	Partner with forestry.

Potential Tools it Implement/Move Towards Opportunity

The main tools identified to help in the implementation of the identified opportunities include, but are not limited to, vegetation treatments, water distribution tanks and lines, fire and relocation of travelways. See Table 11for specifics.

Opportunities for signing and hardening of stream crossings.

Map 12.


Watershed Opportunities (WS1)
Cienega Creek
Cienega Creek
I-17
Reimer Draw
Dry Creek
Yellow Jacket Creek
Horner Gulch
Horner Gulch
Ash Creek
Little Ash Creek
WS1
Little Sycamore Creek
WS1
Sycamore Creek
Dry Creek
Dry Creek
Indian Creek
Indian Creek
Long Gulch
Silver Creek
Legend
I_17
Wetlands
Major Streams
Project Boundary
Natural Water Bodies
Springs and Seeps
Developed Water bodies
WS2 Opportunities
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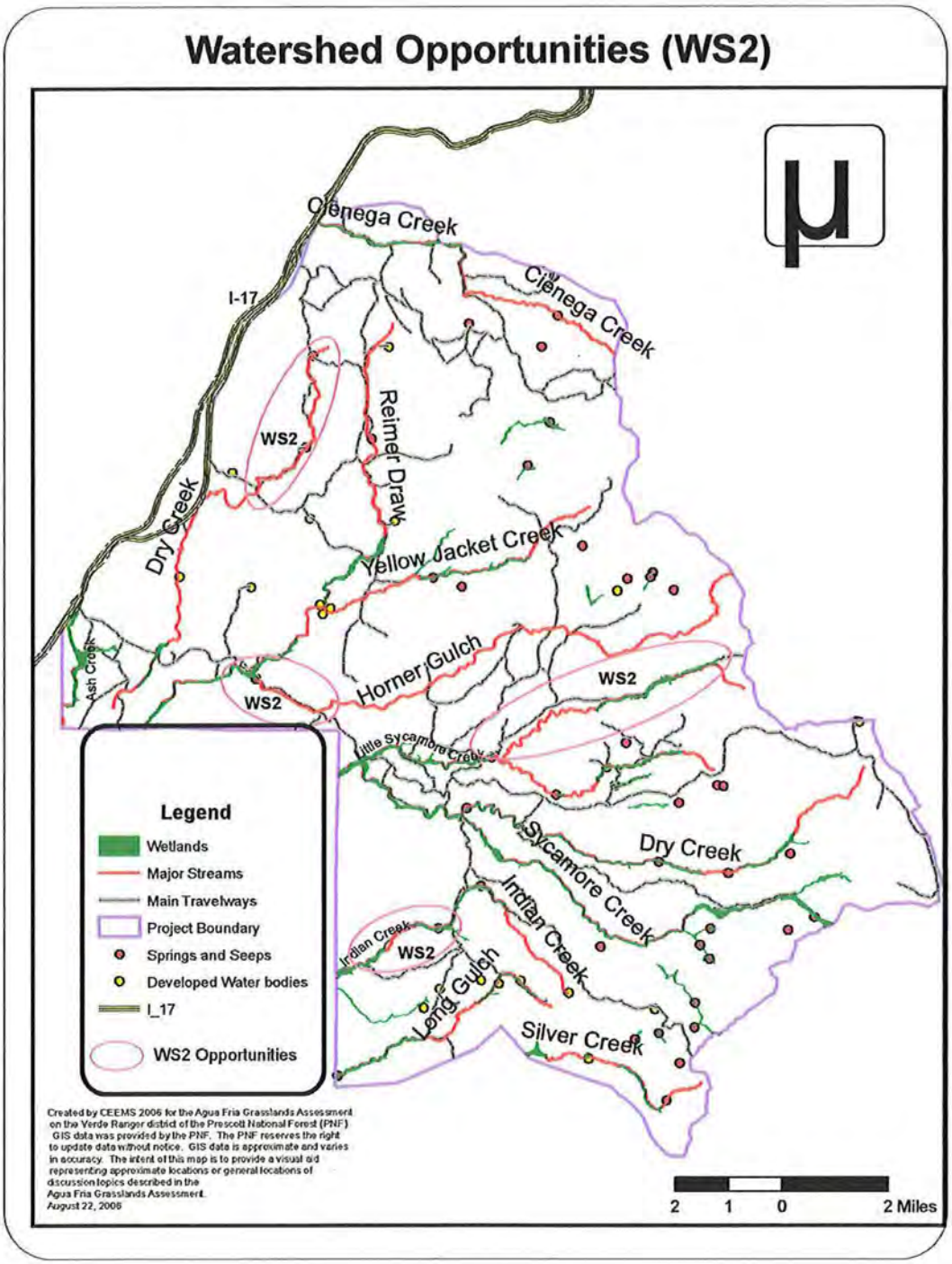
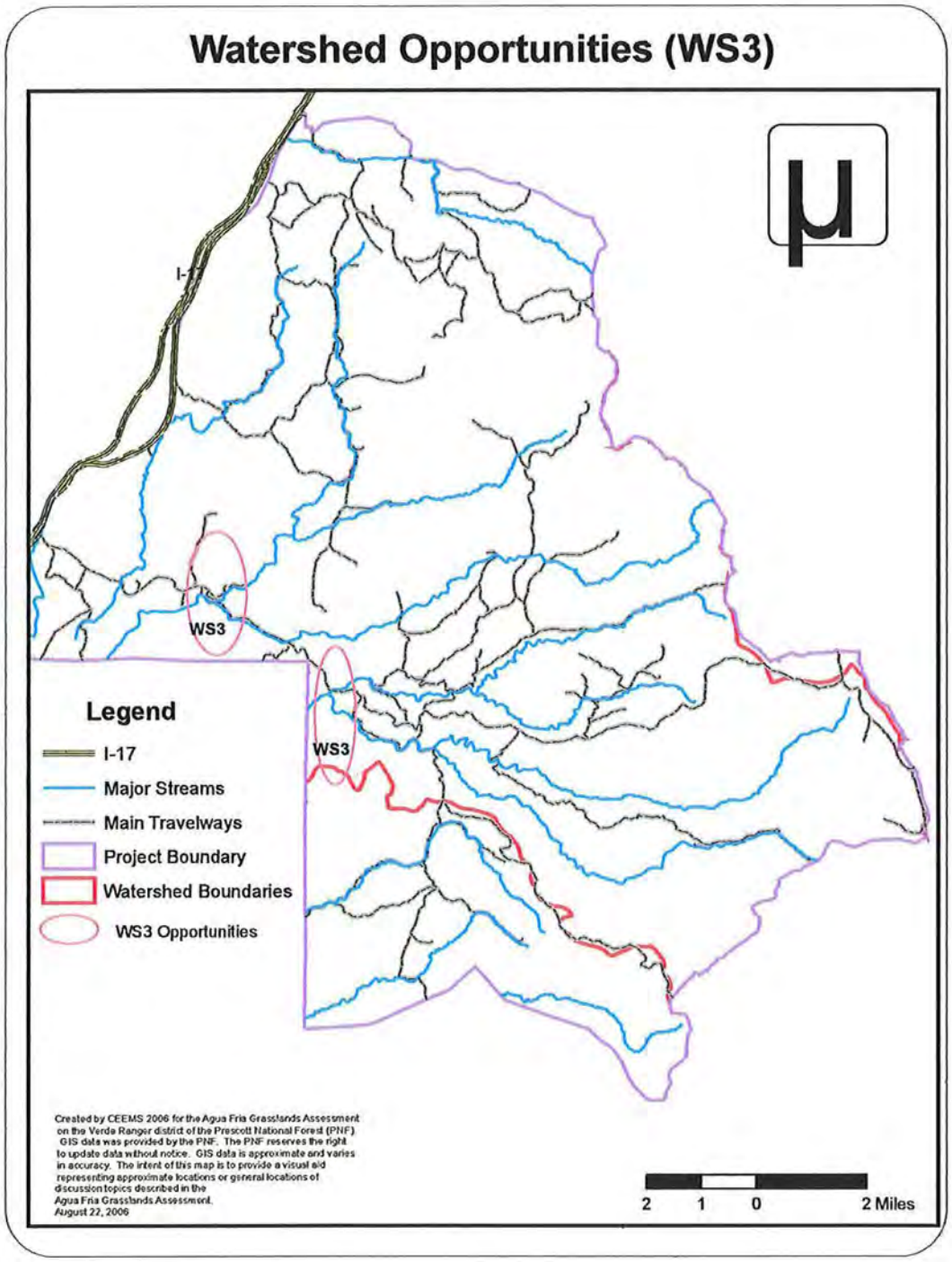
August 22, 2006
2 1 0 2 Miles

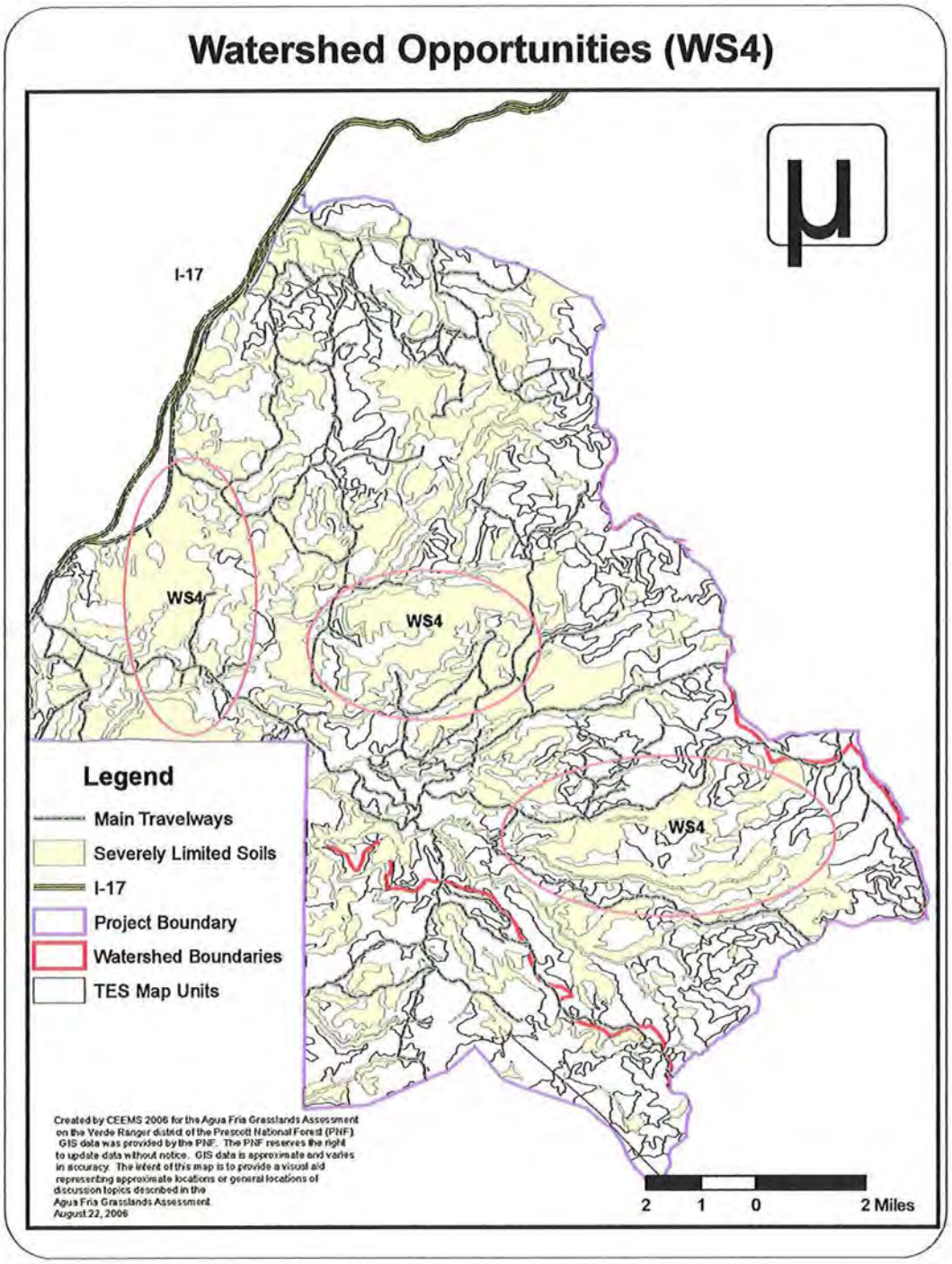
Map 13.


Watershed Opportunities (WS2)
Cienega Creek
I-17
Cienega Creek
WS2
Reimer Draw
Dry Creek
Yellow Jacket Creek
Ash Creek
WS2
Horner Gulch
WS2
Little Sycamore Creek
Sycamore Creek
Dry Creek
Indian Creek
Indian Creek
WS2
Long Gulch
Silver Creek
Legend
Wetlands
Major Streams
Main Travelways
Project Boundary
Springs and Seeps
Developed Water bodies
I_17
WS2 Opportunities
Created by CEEMS 2006 for the Agua Fria Grasslands Assessment on the Verde Ranger distrct 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
2 1 0 2 Miles

Map 14.


Watershed Opportunities (WS3)
I-17
WS3
WS3
Legend
I-17
Major Streams
Main Travelways
Project Boundary
Watershed Boundaries
WS3 Opportunities
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
2 1 0 2 Miles

Map 15.


Watershed Opportunities (WS4)
I-17
WS4
WS4
WS4
Legend
Main Travelways
Severely Limited Soils
I-17
Project Boundary
Watershed Boundaries
TES Map Units
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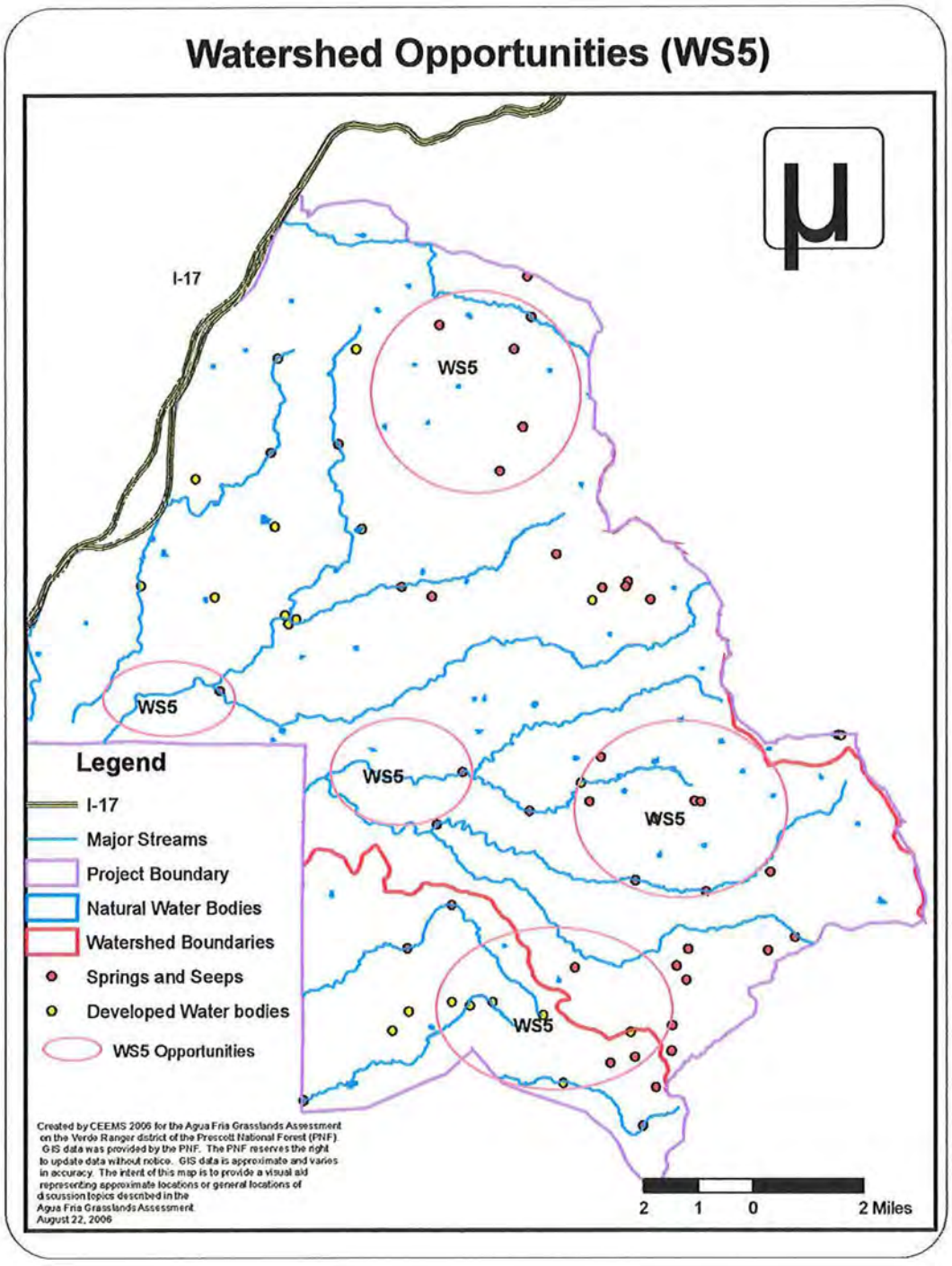
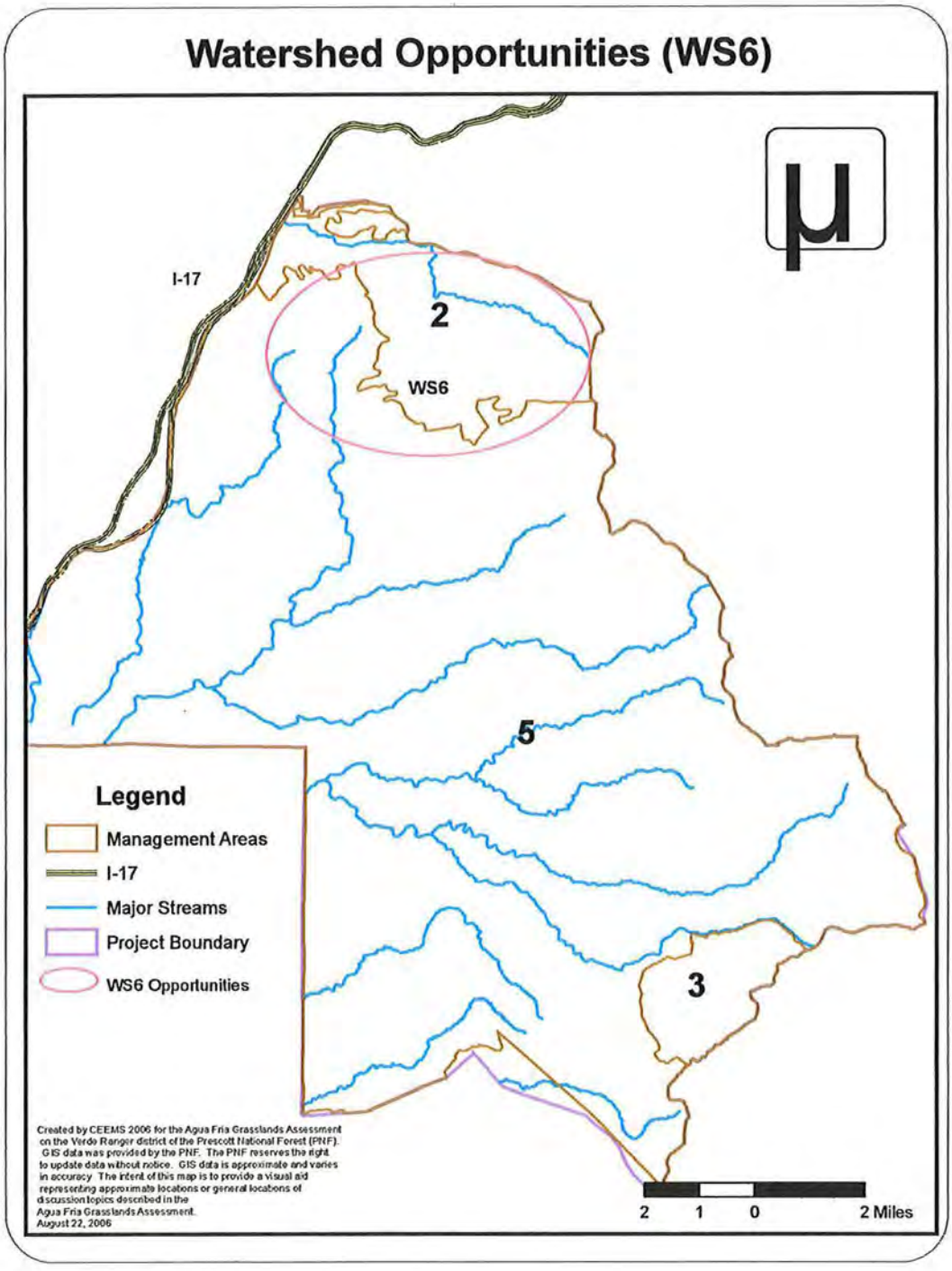
August 22, 2006
2 1 0 2 Miles

Map 16.


Watershed Opportunities (WS5)
I-17
WS5
WS5
WS5
WS5
WS5
Legend
I-17
Major Streams
Project Boundary
Natural Water Bodies
Watershed Boundaries
Springs and Seeps
Developed Water bodies
WS5 Opportunities
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
2 1 0 2 Miles

Map 17.


Watershed Opportunities (WS6)
I-17
2
WS6
5
3
Legend
Management Areas
I-17
Major Streams
Project Boundary
WS6 Opportunities
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
2 1 0 2 Miles

Off Highway Vehicle Use

A 180-mile OHV transportation system offers outstanding opportunities for OHV recreation. All motorized travel is restricted to authorized travel routes. Cross-country travel is not permitted. Authorized travel route designations include forest development roads, dual-use roads, and OHV trails within the grasslands. Dual-use roads and OHV trails are open to hikers, horseback riders, and mountain bike riders. The difference between the two is that full size vehicles are prohibited on OHV trails. A travel management plan was completed in the 1980s. A network of unauthorized trails and roads has developed and continues to proliferate. Varying levels of conflict with area grazing operations are reported from a majority of permittees (see Appendix B). The area has a special closure order prohibiting travel on all roads and trails when they are wet, however, reports suggest that the prohibition is largely disregarded. Spring and fall are the recommended seasons of use by the Forest. Spark arrestors and mufflers are also required on vehicles. The Great Western Trail passes north and south through the assessment area. This designation attracts four-wheel-drive enthusiasts and will eventually connect Canada with Mexico (Prescott NF OHV Opportunity Guide).

Trails

There are approximately 18.7 miles of Forest Service system trails within the area. The 6.4 miles of non-motorized, multi-use trails are all short segments accessing and continuing into the Cedar Bench or Pine Mountain Wilderness areas. Reports suggest the trail conditions vary from poor and hard-to-find to satisfactory.

The 12.3 miles of motorized, multi-use trails typically connect forest system roads. A 2006 condition inventory underway of motorized trails is being conducted (Steedman).

Desired Condition

Based on 2006 recreation niche planning, the Verde Ranger District has been given the priority of managing with emphasis on day-use recreation (Hines). Refinement of authorized, motorized travel routes will commence in the fall of 2006 under Travel Management Rule procedures.

Recreational uses in the assessment area have the potential to grow considerably. It will be important to minimize conflicts between various recreation uses and also between recreationist and area residents or grazing permittees. Biological and physical resources should be given weight in planning efforts when in conflict with recreation opportunities. A particular area was highlighted by District staff as a location for future site development to mitigate resource impacts (a dispersed and group-use camping area along Little Ash Creek off of County Road 171).

Consistency with Forest Plan

For Management Areas 2 and 5 identified in the assessment area, the following direction exists in the Prescott National Forest Land and Resource Management Plan of 1986:

"Dispersed recreation will be managed to maintain environmental quality and reduce user conflicts. Improve all riparian areas and maintain in satisfactory condition. This management area is an emphasis area for interpretation. Interpretation efforts will be focused on high-use roads, trails, sites, and areas."

Management Area 3 direction does not address recreation.

Future Activities

On private land between Dugas and the Agua Fria National Monument, a single family residential subdivision named "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 in size 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.

Table 12. Recreation Opportunities.

Opportunity	Desired Outcome	Tools to Implement
Collect a baseline 'rapid site' inventory of dispersed campsites.	Provide a reference point to compare trends of potential increase in site impact and density with increased recreation use. Data is important in support of future management decisions	One week of staff or volunteer time to inventory. Appropriate condition assessment form and GPS unit.
Moderately develop the Little Ash Creek dispersed group use site until appropriations can fund the construction of toilet vaults.	Locate concentrated use areas an appropriate distance from the stream to keep watershed quality at high standards.	Modest information board highlighting area considerations, Leave No Trace practices pertinent to area (regarding human waste disposal). Procurement of steel grills to identify and designate camp sites.
Identify OHV staging areas with durable information and education interpretive panels. Little Ash Creek group use site would be a good location due to proximity with the Great Western Trail, existing use, and ease of access.	Reduce and prevent conflicts and resource damage.	Grant dollars or other funding for Information & Education panels focusing on 'Light on the Land' ethics and the Great Western Trail.

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APPENDIX A

Appendix A
Fire and Fuels Notes
Derived from Permittiee Interviews on August 16, 2006

- Don Moore/Bald Hill Allotment
  - Fire is the most effective way to manage juniper
  - Needs to be burned to eradicate/maintain juniper
  - Wants prescribed burning to occur

- Scott Smith/Rice Peak Allotment
  - Wants more prescribed burning
  - Fire is good, but can be damaging if not done right
  - Fire improves the range
  - Exclusion of fire has got the range in the current condition that it's in
  - Less juniper means more prescribed burning

- Willie Kelton/Long Gulch Allotment
  - Likes fire

- Joel Kent/Horner Mountain Allotment
  - Prescribed burning is more effective than wildfire
  - Prescribed burning needs to be coordinated between Forest Service and the permittees
  - Fire is not overly important
  - Juniper needs to be thinned and burned

- Shawn Moore/Sycamore Allotment
  - Fire should occur every 1 to 2 years
  - Prescribed burning is good for the land and it reduces juniper and prickly pear
  - Prescribed burning should be carefully planned
  - Wildland Fire Use is good depending on when & where
  - The lack of fire is the reason why the landscape is at its' current condition

- Gary Halford/Cienega
  - Fire is a management tool
  - Wants to burn the junipers that were cut by the Agra Ax

- Tom Teskey/Todd Allotment
  - Very much in favor of Wildland Fire Use during natural lightning season
  - Fire is a good management tool
  - Fire suppression is the cause of the deterioration of the current conditions

- Alan and Diana Keeler/V-Bar Allotment
  - Should avoid fire
  - Recognizes the use for fire but manages through intense grazing, and are living with the woody component issues
- Chuck and Trudy Birkemeyer/Dugas Allotment
  - Had a bad experience w/ the FS burning
    - Burned with low soil moistures
    - That caused that the grasses not to return for a long time
  - Mixed feelings on prescribed burning
  - Have had good success with fire (Butte Fire)
  - Restock as appropriate, when there is 4" to 6" of green grass
  - Could tolerate up to 1/3 of pastures to be burned
  - Replace fence and pipe that was burned by fire

- Fred Teskey/Willow Allotment
  - In favor of Wildland Fire Use and would like to see it used
  - Any portion of his allotment could tolerate fire

- Scott Spleres/Verde District Fuels Specialist*
  - 3-7 year fire interval
  - 2nd most lightning strike state only behind Florida
  - Hazard Fuels and Ecological Restoration and separate categories/topics
  - The Prescott is not in a drought, its in a long term dry spell
  - Timing of fire is very important
    - During the monsoon
    - June to September
    - Monsoon starts when the predominating winds shift from the Southwest/West to the Southeast/East
  - Wildland Fire Use would be the most effective way to get back within the natural range of variability
    - The ecosystem is not ready due to the Wildland Urban Interface
    - There is a need for preparation of the Wildland Urban Interface to accommodate the use of Wildland Fire Use

*Scott Spleres is a Prescott National Forest employee who was interviewed on August 17, 2006.

APPENDIX B

Appendix B
Human Dimension Notes
Derived from Permittee Interviews on August 16, 2006

- Don Moore/Bald Hill Allotment
  - OHV users have torn up the country
  - Vandalism & theft have occurred
  - Hunters leave gates open

- Scott Smith/Rice Peak Allotment
  - Gates have been left open
  - Littering has occurred

- Willie Kelton/Long Gulch Allotment
  - OHV users and hunters leave gates open
  - Gates and fences have been damaged

- Joel Kent/Horner Mountain Allotment
  - Little recreation use
  - Some vandalism
    - Water trough and water storage tank shot
  - Gates left open occasionally
  - Forest Service needs to maintain roads better

- Shawn Moore/Sycamore Allotment
  - Hunters leave trash
  - OHV users tear up roads
  - Hikers have no impact on lands

- Gary Halford/Cienega Allotment
  - Trash left outside dump and along I-17

- Tom Teskey/Todd Allotment
  - Vandalism
    - Shooting of water tanks
    - Cutting Fences
  - Gates left open
  - OHV tracks on grasslands/off trails
    - Need more Forest Service law enforcement
  - Hunters are pretty good

- Alan and Diana Kessler/V-Bar Allotment
  - Camping & OHV directly cause loss a vegetation cover
  - Cattle is adversely effected by OHV users
  - Their pasture choices are made in part to avoid recreationists

- Chuck and Trudy Birkemeyer/Dugas Allotment
  - Better patrol of OHV & camping unauthorized use
  - Better control of road ways/improve road maintenance
  - Wildcat roads are a problem
  - Need for increase of signage concerning OHV use
    - Get dollars from developers to help pay for patrolling & education materials about misuse of the lands
  - OHV & campers disregard of the no driving on the roads when they are wet

APPENDIX C

Appendix C

Community Member Interviews

1. All 6 community members live in Camp Verde.

2. Tell me about your or your community's connections or uses of the Agua Fria Grassland on the Prescott NF?

Response	**Interview #**
No current activity or connections to area	1, 3, 5,6
Horseback riding outside identified area or in the past	3, 1, 4
Drive thru the area to access wilderness and river	2
Horseback riding and hiking	4

3. What time of year do you use the area and how often?

Response	**Interview #**
No response	1, 3, 5, 6
Spring time. Once every few years	2
Mostly year-round, high elevation in the summer, lower elevations in the winter	4

4. What changes have you noticed over time?

Response	**Interview #**
No response	1, 5,6
Don't see Pronghorn populations as often	2, 3
Less grass density, especially in the last 5 year	3
More prickly pear or brush, increase in OHV use and damage resulting, more garbage and trash	4

5. What do you feel the Agua Fria Grasslands should look like?

Response	**Interview #**
No response	1, 5
An area managed for pronghorn	2
Should look natural, don't make changes	3
Loves seeing wildlife, cattle help keep the fire danger low	4
Need more established trails and enforce trial rules	4
Leave it alone	6

6. What changes would you like to see the forest service make with the Agua Fria Grasslands?

Response	Interview #
No response	1, 5
Focus on travel management, close and obliterate roads & roads in sensitive areas	2, 3
Promote defensible space around to Dugas landowners	3
Develop an auxiliary patrol group to inform public about staying on trails and trash pick up, establish more multi-use trails, create more staging areas for horse and quad riders, burn after cutting, more signage	4

7. How would prescribed fire & Wildland Fire Use affect your or the community's connections of activities in the Agua Fria Grasslands?

Response	Interview #
May attract attention as a place to go look and see what happened on the land	2
Assist when wildfires occur by providing fire crews a place to stay (school gym)	1
The land should burn, a natural part of the forest, would not affect the connection	3, 4
No response	5
Burning may be implemented, but should be for holistic reasons rather than single species' habitat manipulation prescribed	6

8. How would mechanical treatments affect connections/activities in the area?

Response	Interview #
No response	1, 5
Remove skeletons and slash to keep visual quality high	2
Does not want to see clear-cut type treatments. Selective cutting is best, chainsaws noise does not affect wildlife	3
Area needs to be thinned, doesn't matter how	4
Do not destroy juniper-type vegetation communities for preference of pronghorn habitat	6

9. Describe partnership or volunteer opportunities that may be possible with your community and the Prescott NF?

Response	Interview #
Stewards of Public Lands could help clean up areas	1
New development residents could be valuable source for partnerships, Camp Verde residents are too far away	2, 3
Develop volunteer patrol to assist with information and education, partner for trails development	4
Would like to see some trail access points from the development to the forest, some defensible space	5
Would collaborate with interpretive site location and content	6

10. Is there anything more you'd like to share I did not ask regarding your community and the Agua Fria Grasslands?

Response	Interview #
No response	1
Mt ranch area is allowing some access thru locked gate on road to Childs so people can make loop OHV ride from the south. Route returns on Dugas road from the Tonto	2
He warns of what the new development's effect will be. There will be large increase in OHV, horses, and hunting. New trails will be created	3
The winter rain makes a big difference, I have seen water running in creeks and from springs that I have never seen run before	4
We to break ground on the development in 2008. We did have a meeting with the FS on access concerns and what would be needed for that. Have been working with the permittee to continue to allow grazing in the area after the development goes in. We want to honor the grazing/ranching way of life and to have a rural setting. We will use wording in the deeds to help do this. Have also been working with the BLM on restricting access and letting members of the community be members of the monument	5
Avoid toxic chemicals 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;	6

Key

Interview #	Name	Community Connection
1	Bill Lee	Camp Verde Town Manager
2	Dexter Allen	Long time resident and USFS Verde River Ranger
3	Howard Parrish	Camp Verde City Council Member/50 year resident
4	Ron Smith	Camp Verde City Council Member
5	Jeremy Bach	AZ North Vice-President/Developer
6	Chris Coder	Yavapai Apache Archeologist

APPENDIX D

Appendix D
Hunting Regulations That Apply To The Agua Fria Grasslands
Game Management Unit 21

Animal	**Season Dates**	**Number of Permits**
Pronghorn Antelope	Sep. 8 – Sep. 17, 2006	5 (Bucks) 10 (Bucks/Archery)
Mule Deer	Nov. 10 – Nov. 19, 2006	400 (Antlered)
Whitetale Deer	Oct. 27 – Nov 5, 2006	350 (Antlered)
Whitetale Deer	Dec. 15 – Dec. 31, 2006	50 (Antelered)
Any Deer	Sep. 1- Sep. 21, 2006	Nonpermit Tag (Antlered/Archery)
Any Deer	Dec. 15, 2006 – Jan. 31, 2007	Nonpermit Tag (Antlered/Archery)
Mountain Lion	Jul. 1, 2006 – Jun, 30, 2007	1 Per Hunter (Harvest Objective Of 8)
Bear	Oct. 6 – Dec 31, 2006	2
Blue Grouse	Sep. 15 – Nov. 26	3 Per Day
Chukar Partridge	Sep. 15, 2006 – Feb 12, 2007	5 Per Day
Cottontail Rabbit	Jul 1, 2006 – Jun. 30, 2007	Not Defined
Pheasant	Oct. 13, 2006 – Feb. 12, 2007	2 Per Day (Archery) 2 Per Day (Falcony-Only)
Gambel's, Scaled And California Quail	Oct. 13, 2006 – Feb. 12, 2007	15 Per Day
Mearns' Quail	Nov. 24, 2006 – Feb 12, 2007	8 Per Day
Tree Squirrel (Except The Mount Graham Red Squirrel)	Oct. 13 – Nov. 26, 2006	5 Per Day
Tree Squirrel (Except The Mount Graham Red Squirrel)	Sep. 1 – Oct. 5, 2006	5 Per Day (Archery)

Trapping Regulations That Apply To The Agua Fria Grasslands
Game Management Unit 21

Animal	Season Date	Number Of Permits
Coyote	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Bobcat	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Fox	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Ringtail	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Badger	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Beaver	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Raccoon	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Skunks	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Weasels	Nov. 1, 2006 – Feb. 28, 2007	Unlimited
Muskrat	Nov. 1, 2006 – Feb. 28, 2007	Unlimited

*All information was gathered from: Arizona Game And Fish Department 2006 – 2007 Arizona Hunting And Trapping Regulations Booklet

APPENDIX E

Appendix E
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Joel Kent, grazing permittee
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Craig Steedman, Prescott National Forest
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