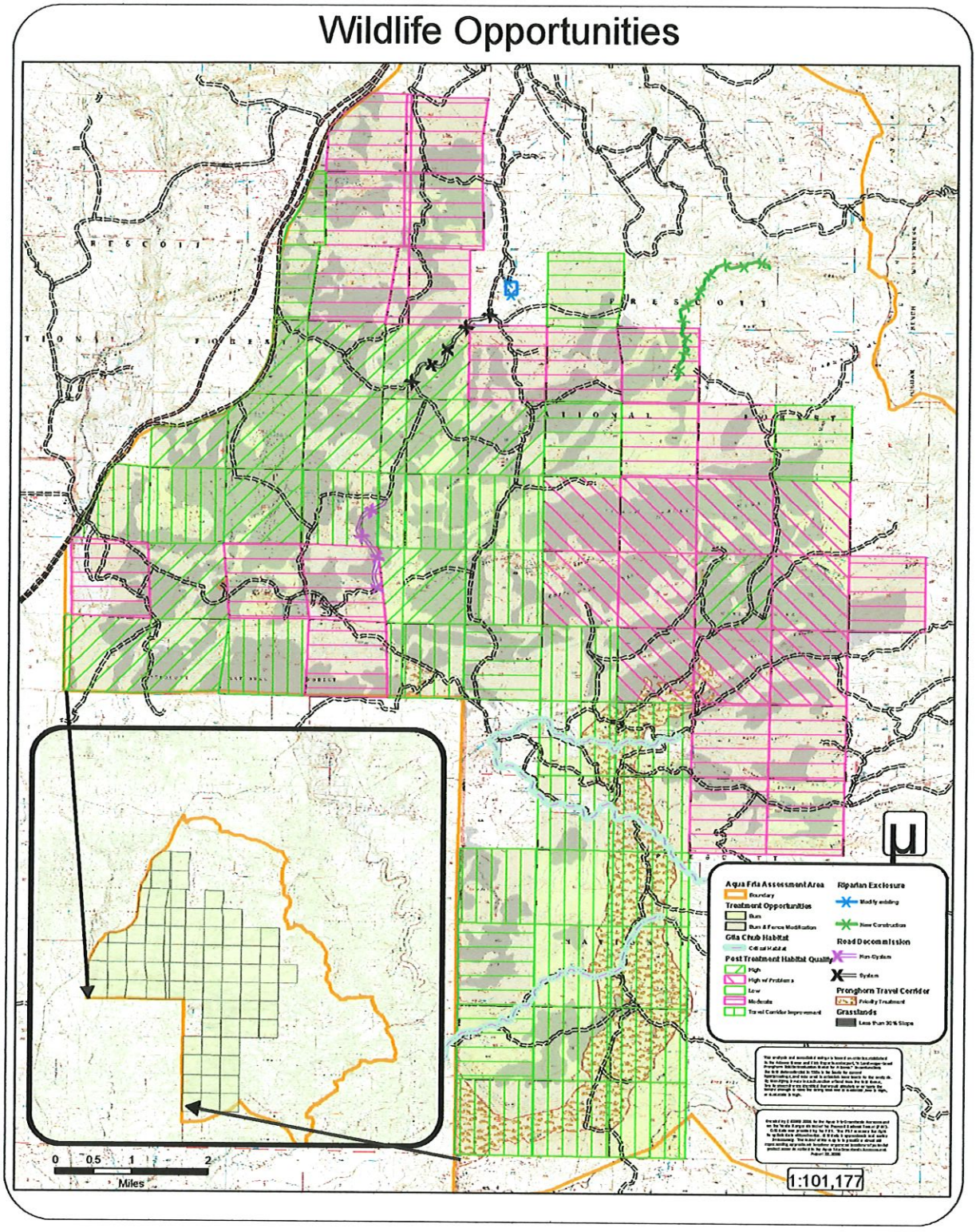
Map 4.


Wildlife Opportunities
Aqua Fria Assessment Area
Boundary
Treatment Opportunities
Burn
Burn & Fence Modification
Gila Chub Habitat
Critical Habitat
Post 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.

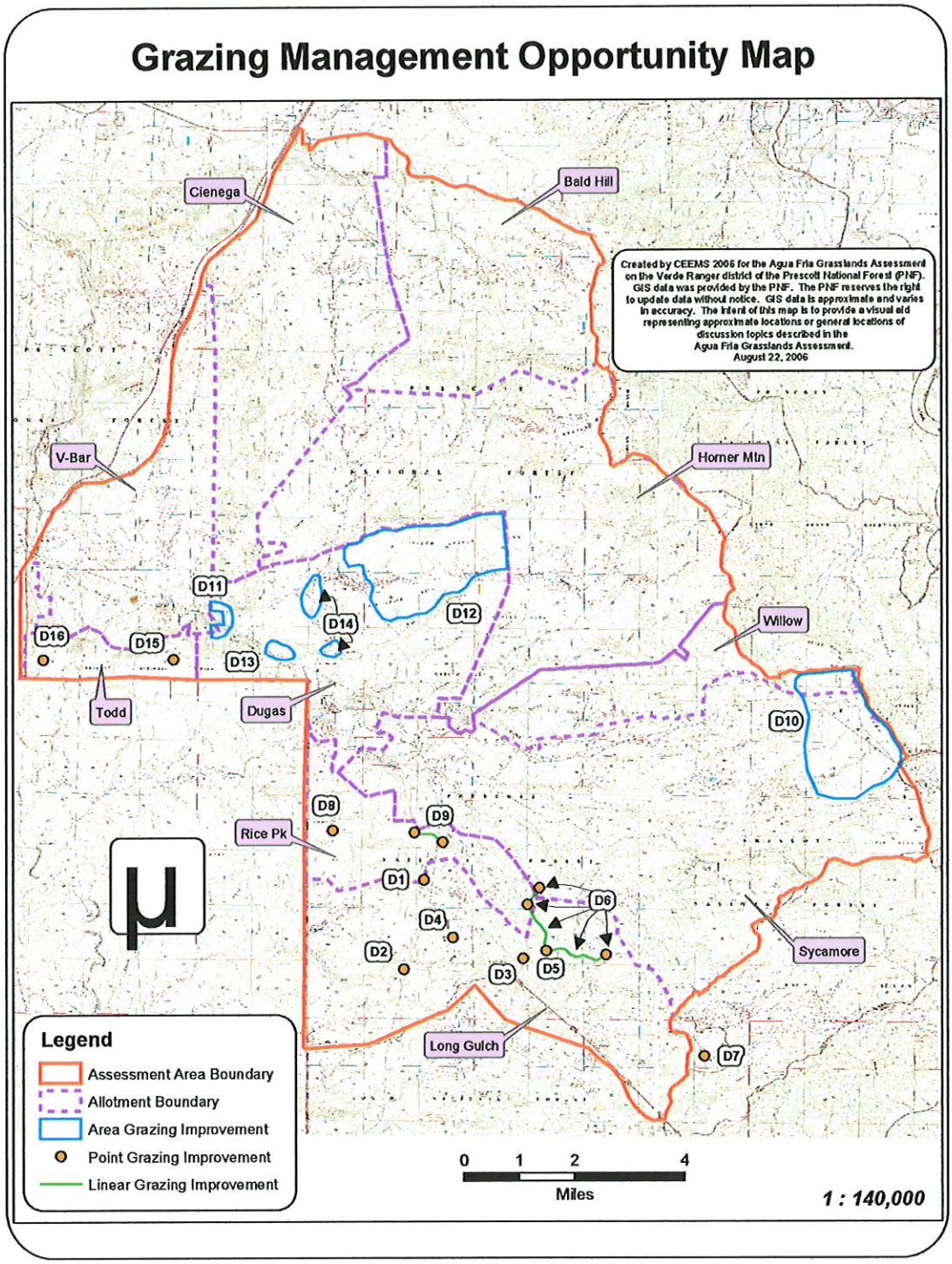
(D14) Mitigate resource damage from recreational users along Forest Road 68D in the Cottonwood pasture of the Dugas Allotment. Damage is occurring from off-highway vehicle travel in washes.

(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
D5
D3
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?

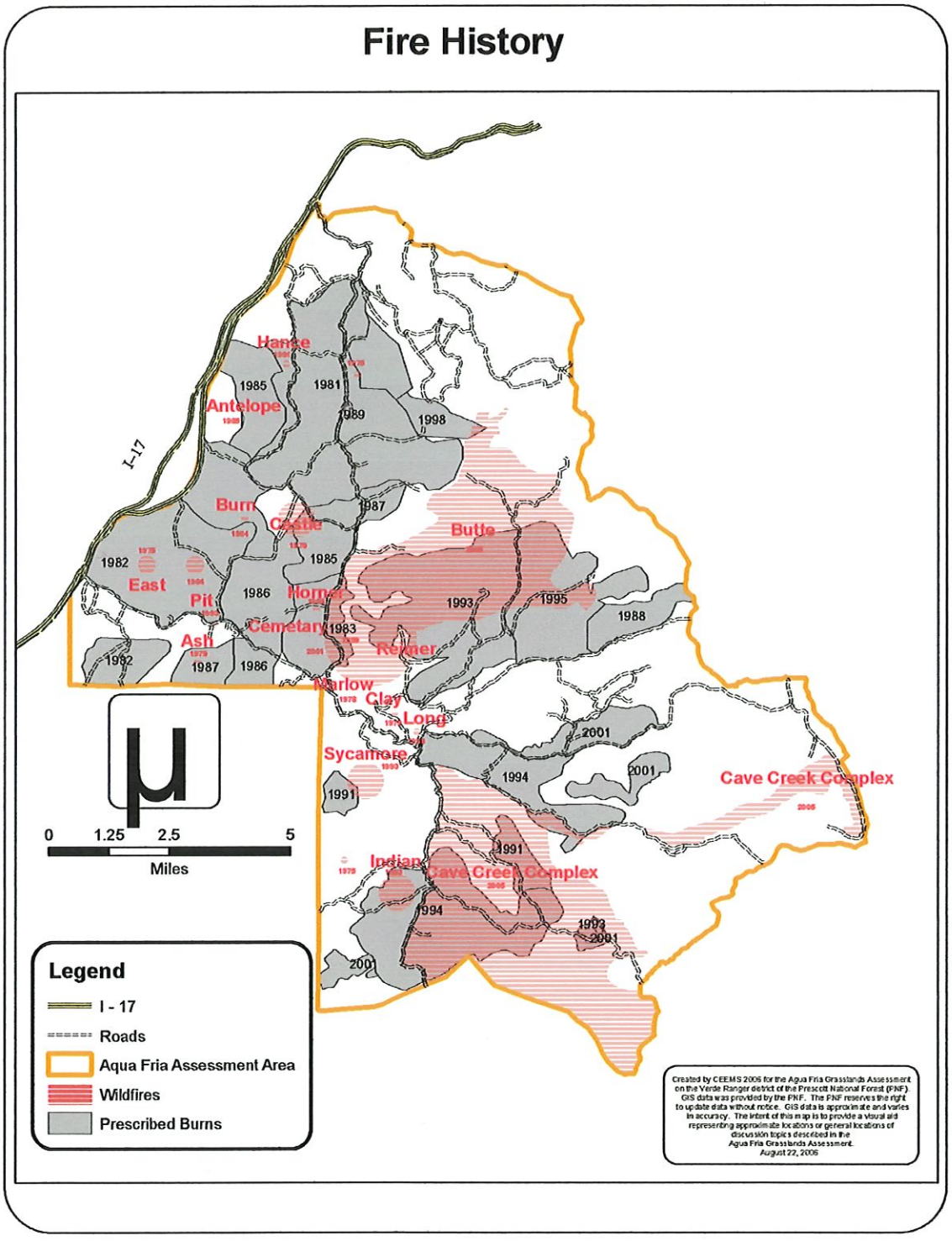
- What is the optimal fire return interval to reduce the spread of undesirable tree and shrub species?
- What are the effects of fire on non-native plant species?

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
I-17
Hance
1985
1981
Antelope
1989
1998
Burn
Castle
1987
Butte
1982
East
1985
Pit
1986
Horner
1993
1995
1988
Cemetary
1983
Ash
Reiner
1982
1987
1986
Marlow
Clay
Long
2001
Sycamore
1994
2001
1991
Cave Creek Complex
1991
Indian
Cave Creek Complex
1994
1993
2001
200
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.

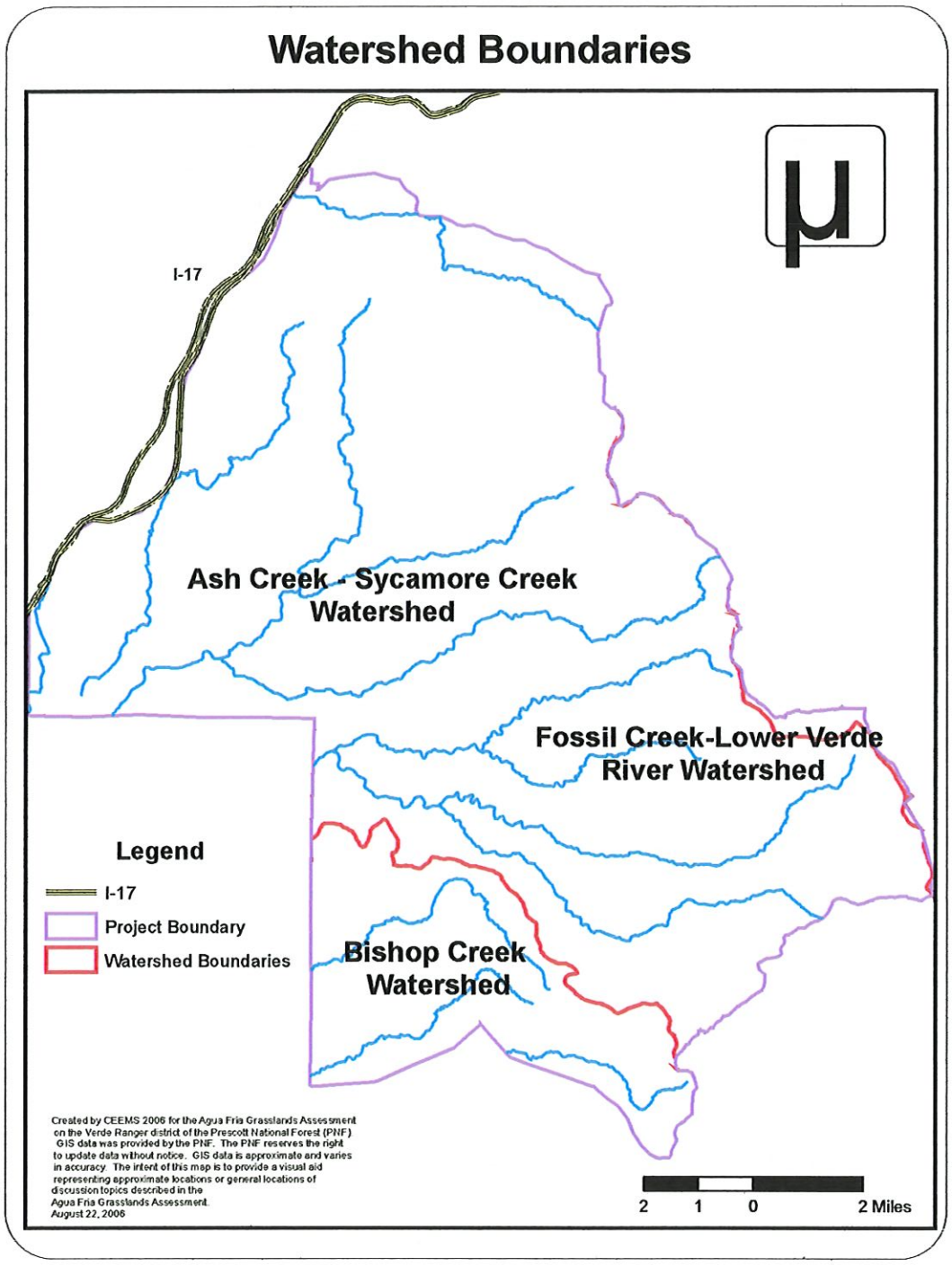
Overall, the amount of water flow in streams, seeps and springs in the area has decreased over the past 40 years, based on interviews with long time residence and ranchers. They also commented that the timing and intensity are increasing. A review of climatic data from the Maricopa County Alert System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

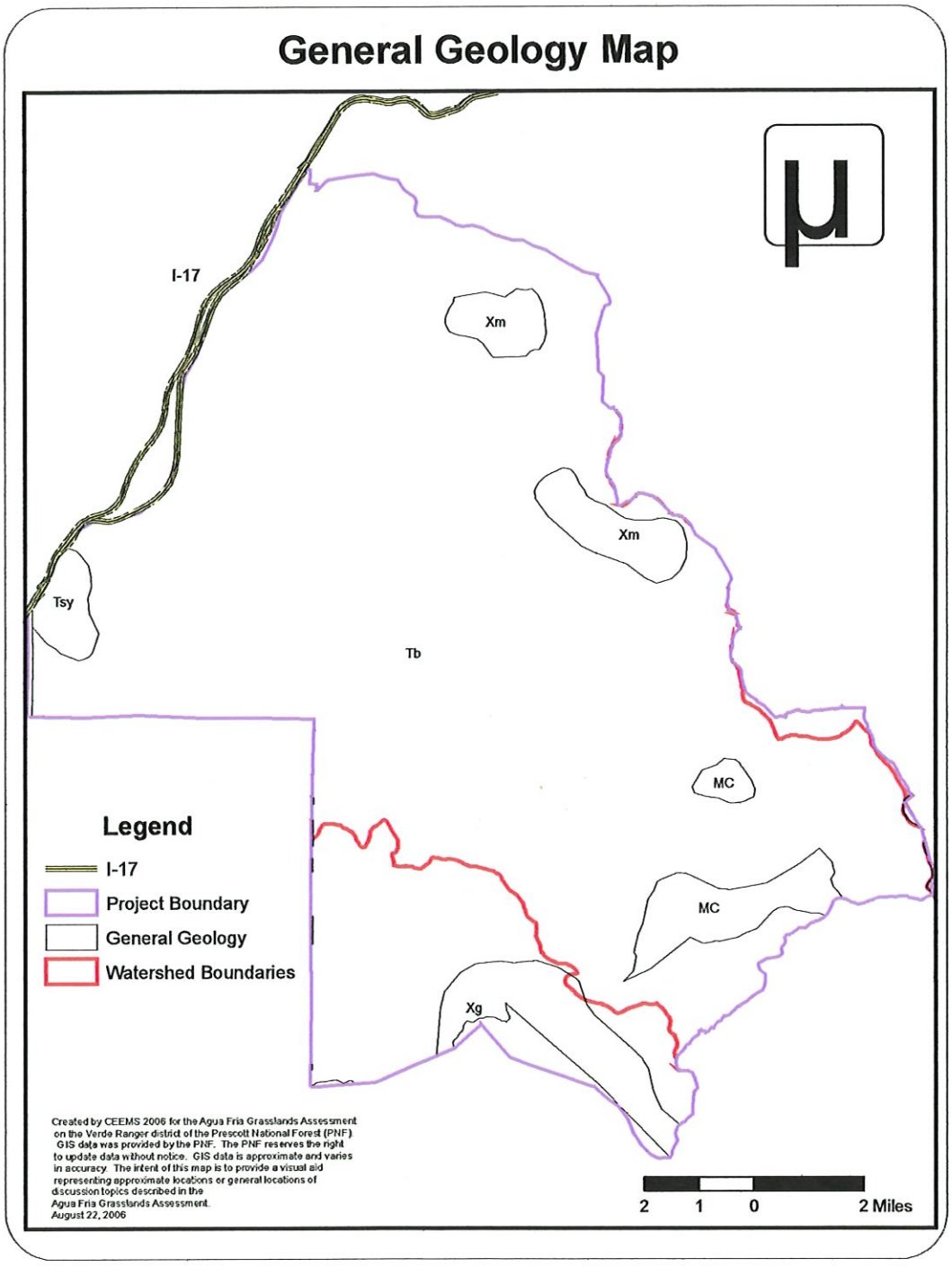
Based on Proper Functioning Condition (PFC) field sheets for some of the main creeks, field reviews, discussions with long term residents and the Allotment Management Plans for several of the grazing allotments, the overall watershed condition is fair to good in the assessment area. This takes into account 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.

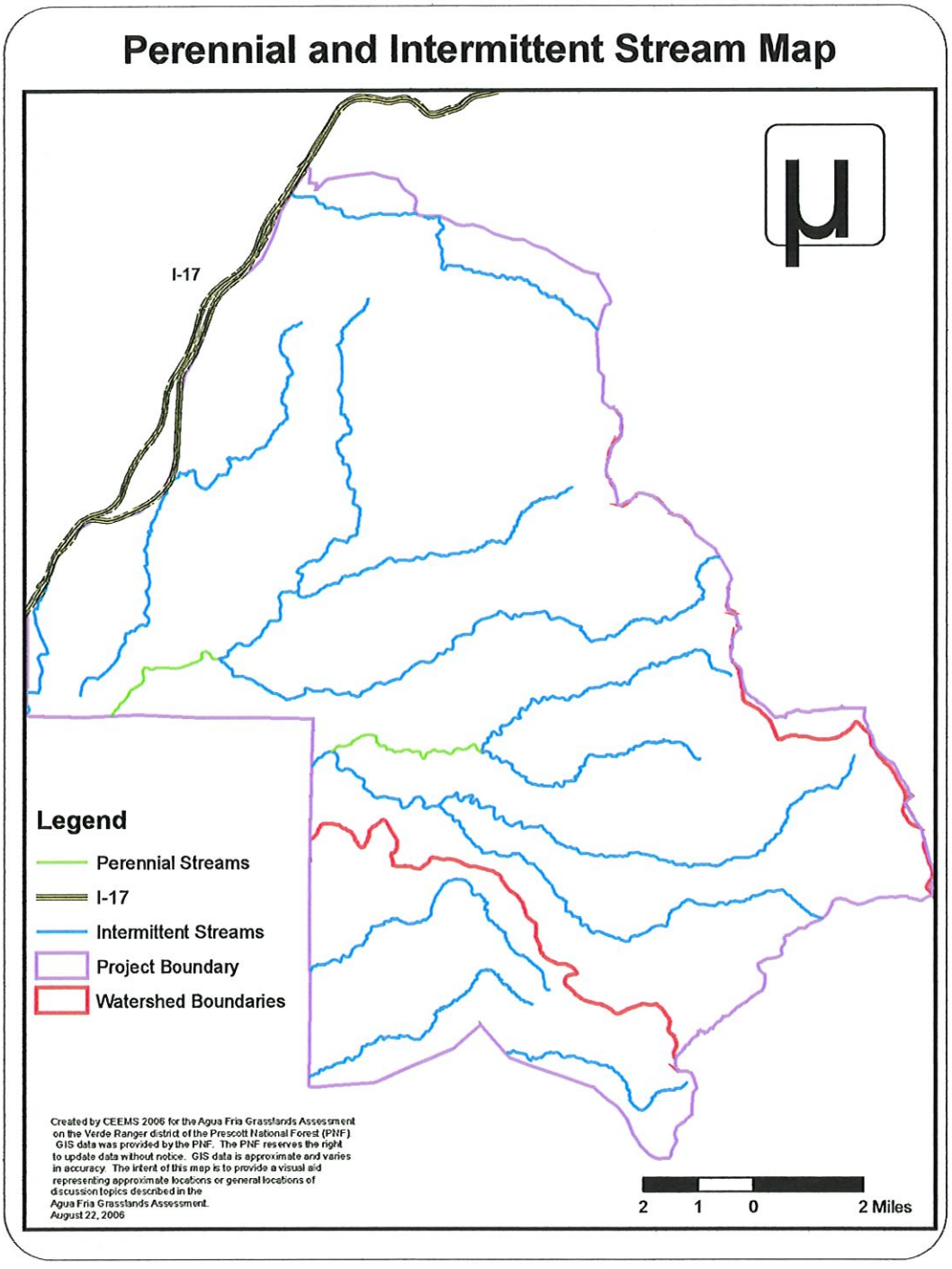
Table 7. Summary of Acres by Geologic Type

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
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August 22, 2006
2 1 0 2 Miles

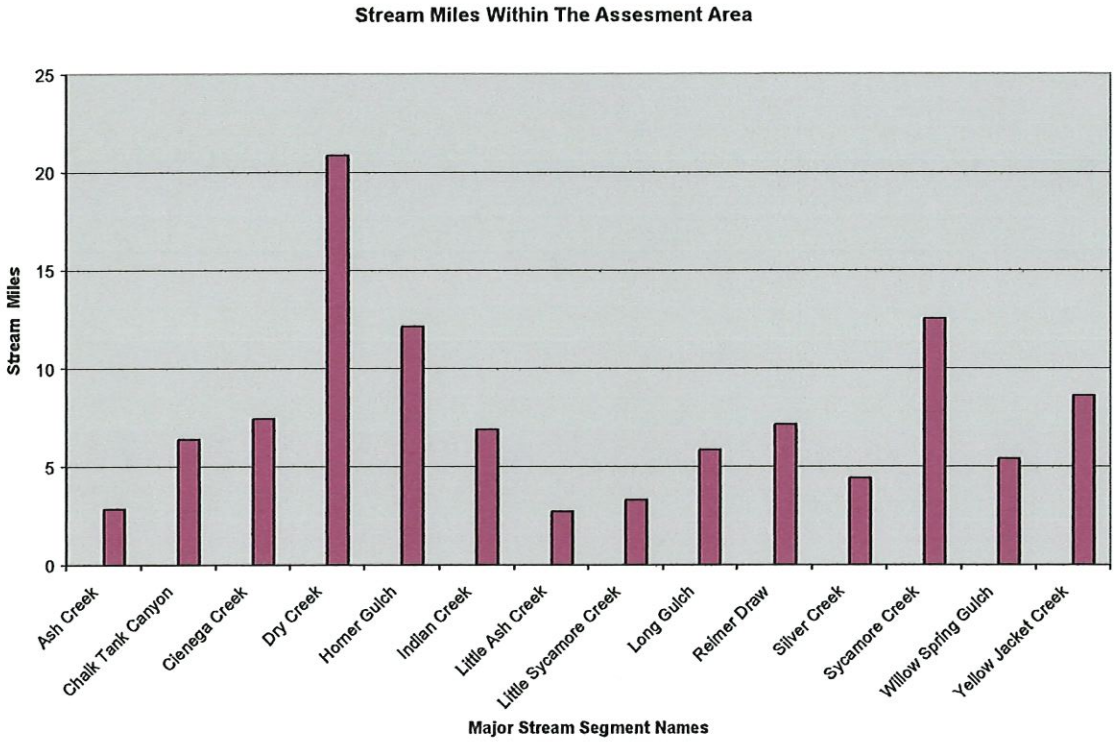
Table 8. Summary of Major Streams by Stream Type

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.

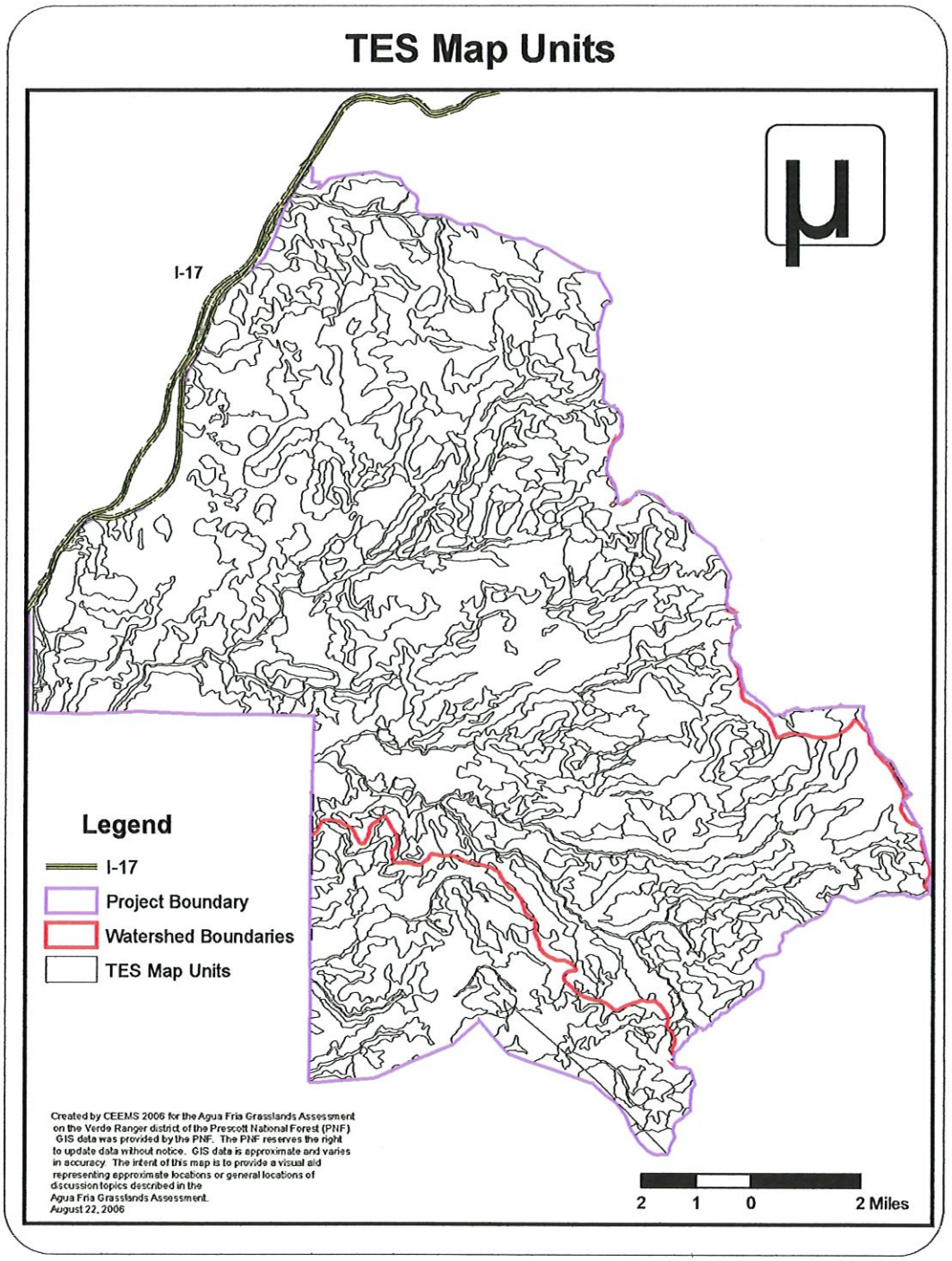
Dugas stream crossing, August 2006

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

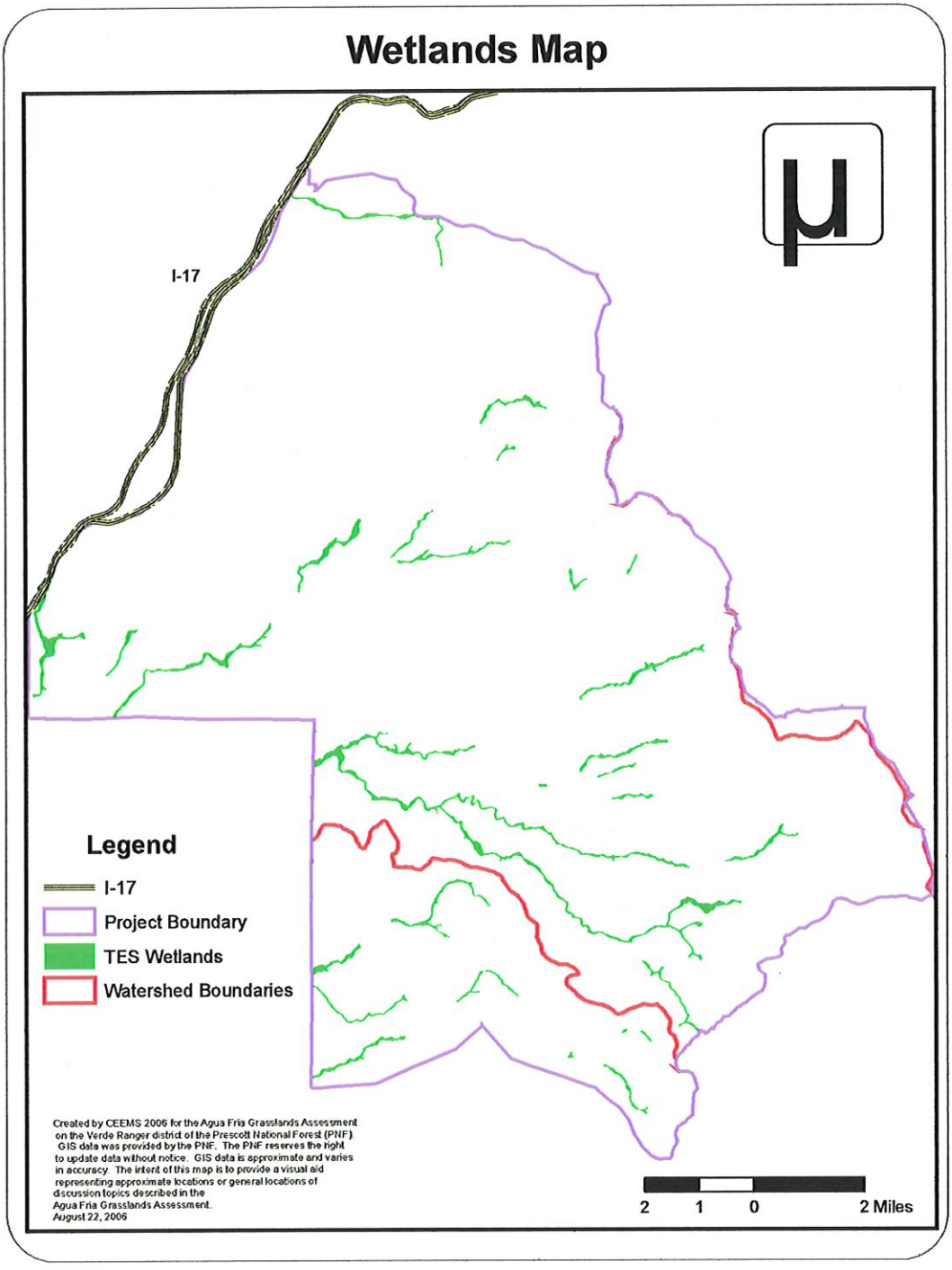
There are 36 TES map units (see Table 9 for details) covering the assessment area. The dominant vegetation in the area are grasses (tobosa), some trees (juniper) and some shrubs (see Vegetation section for specifics). There are six TES units that identify wetland and riparian areas (see Map 11 Figure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