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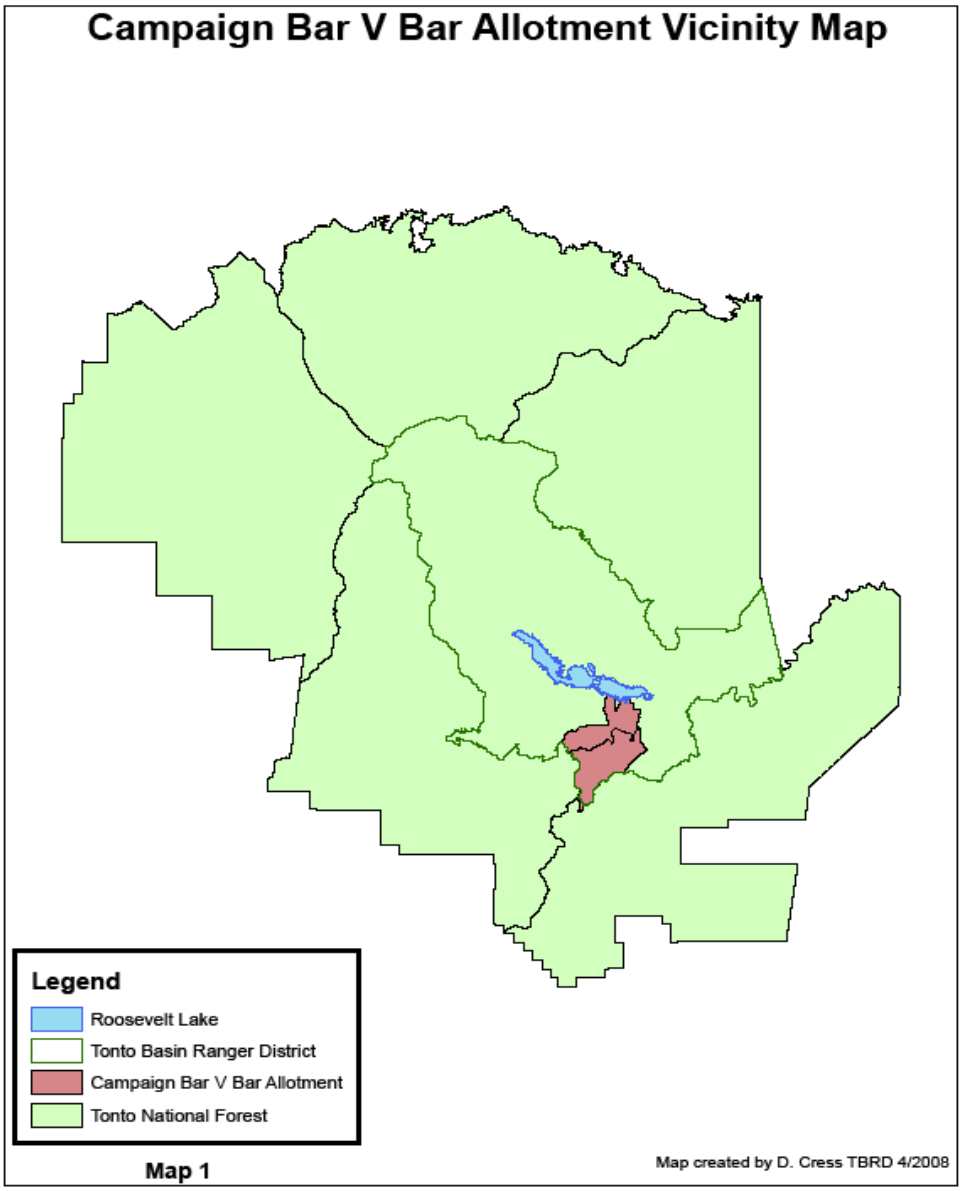
Environmental Assessment

Campaign and Bar V Bar Grazing Allotments

Tonto Basin Ranger District, Tonto National Forest
Gila County, Arizona

For Information Contact: Debbie C. Cress
HC02 Box 4800 State Highway 188
Roosevelt, Arizona 85545
(928) 467-3220



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SUMMARY

The Tonto National Forest proposes to reauthorize permitted livestock grazing on the Campaign/ Bar V Bar Allotment. The allotment (project area) is located in the Superstition Mountains in Gila County, Arizona on the Tonto Basin Ranger District.

The proposed action continues cattle grazing and associated rangeland management activities on the Campaign/ Bar V Bar Allotment. Livestock grazing would be managed using an adaptive management as described in this document, with monitoring and mitigation measures designed to improve resource conditions.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- *No Action/No Grazing*- all rangeland management activities would cease on the allotment and the term grazing permit would be cancelled. Structural range improvements such as fences would be removed over time.
- *Modified Proposed Action*- permitted grazing using adaptive management strategies would continue however the proposed action would be modified to minimize use of several pastures during the spring growing season. Pastures containing key riparian reaches would be grazed in the winter to provide protection to sensitive riparian vegetation.
- *Seasonal Use*- permitted livestock grazing and associated rangeland management activities would occur only during part of the year (October through April) in order to minimize grazing impacts to native vegetation. An adaptive management strategy is an integral part of this alternative as well.

The Tonto Basin District Ranger is the responsible official for this decision. As a result of this analysis process, a decision notice will be issued that includes a determination of the significance of the environmental effects and whether an environmental impact statement (EIS) will be prepared.

Implementation of a decision to continue to authorize livestock grazing would occur through an allotment management plan and annual operating instructions. Management actions such as adjustments to authorized numbers, season of use, timing and duration of use, and allowable utilization standards would be specified in these documents.

CHAPTER 1-INTRODUCTION

This Environmental Assessment (EA) was originally sent out for public comment in February 2009. Concurrence with a Biological Assessment (BA) was received from US Fish and Wildlife Service in late February 2009. The Decision Notice and Finding of No Significant Impact (FONSI) was issued March 5, 2009. Two appeals were received. A 36 CFR 215.7 appeal was reviewed by the Region 3 Regional Office and the decision was upheld. A 36 CFR 251 appeal was reviewed by the Tonto National Forest Supervisor and the decision was remanded back to the district to correct inconsistencies between the EA and Decision Notice. The district has reviewed those inconsistencies and is re-issuing this EA with clarification and additional information.

Edits were made to the following pages: page 2, adjustment to current stocking rate and update of fence status in Campaign Creek; Table One, clarification of mapped status for C1; page 8, photo of lower Campaign Creek added; page 10, photo of upper Spring Creek added; page 10, caption of photo amended; page 32, proposed improvements amended to reflect completion of fence; page 33, proposal to place lock on gate was moved from Proposed Action to Alternatives 3 and 4; page 36, map caption revised; pages 51-58, discussion of effects to southwestern willow flycatcher were amended; page 64, names added to list.

A new thirty day comment period will commence upon release of this revised EA. A revised BA will be sent to US Fish and Wildlife Service for concurrence. Following receipt of comments and concurrence, a new Decision Notice and FONSI will be issued.

The Forest Service has prepared this EA in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. Supporting documentation, including more detailed analyses of project area resources, is on file in the project planning record located at the Tonto Basin Ranger District of the Tonto National Forest in Roosevelt, Arizona. Maps for this document can be located at the end of the chapter they are referenced in.

Purpose and Need for Action

The purpose of this action is to authorize livestock grazing in a manner consistent with Forest Plan direction. The need is to implement a management strategy designed to achieve desired resource conditions on all parts of the grazing allotment.

Where consistent with other multiple use goals and objectives, there is Congressional intent to allow grazing on suitable lands through the Multiple Use Sustained Yield Act of 1960, the Wilderness Act of 1964, the Forest and Rangeland Renewable Resources Planning Act of 1974, the Federal Land Policy and Management Act of 1976, and the National Forest Management Act of 1976.

The Campaign/ Bar V Bar Allotments contain land identified as suitable for domestic livestock grazing in the Tonto National Forest Land Management Plan (LMP) and continued domestic livestock grazing is consistent with the goals, objectives, standards, and guidelines of the LMP for lands occurring within Management Areas 6B and 6J.

It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (FSM 2203.1; 36 CFR 222.22c).

It is Forest Service policy to continue contributions to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood (FSM 2201.1).

Background

The Campaign/ Bar V Bar Allotments encompass 34,158 acres in the foothills of the Superstition Mountains of Gila and Maricopa Counties, Arizona (Map 1). They are accessed on several forest roads both north and south of State Highway 188 and by several Forest system hiking trails leading into the Superstition Wilderness. Topography varies from gentle slopes broken by ephemeral drainages on the south side of the lake to steeper slopes in the foothills of the Superstition Mountains. The allotments contain 14,385 acres of the Superstition Wilderness.

The Campaign/ Bar V Bar Allotments have been managed together as one unit since the 1960's. The current permittee acquired the allotments in the early 1990's and has agreed to formally combine the two allotments into one, henceforth referred to as the Campaign Allotment. Prior management was limited and livestock distribution was poor due in part to a lack of interior fencing and inadequate water supply. Historical hedging of jojoba (*Simmondsia chinensis*), a primary browse species on the allotment, is still evident in several pastures along with soil loss and compaction. The current permittee has added interior fences and water developments to the allotment resulting in better distribution of livestock in recent years.

The current term grazing permit was issued in 1999 following a 1992 environmental assessment. Permitted use is as follows: 575 cows/bulls from January 1 through December 1 (year long) and 365 yearlings from January 1 through May 31. Of the 575 cows/bulls, 50 are listed on the permit in non-use status. Currently, a reduced number of cattle have been authorized to graze on the allotment (275 cows/bulls from November through May, 175 cows/bulls from June through October, and 150 yearlings from January through May). The permittee moves a portion of his herd each summer to other public grazing lands (PR Vol. 1 #8; 2 #8).

The allotment is cross-fenced with barbed wire to create 15 primary pastures and several smaller bull and holding pastures (Map 2). The main pastures are: Grapevine, Schoolhouse, Badlands, Spring Creek, Fowler, Brake, Jojoba/Bobcat, Tule, Campaign, Two Bar, Granite, Reevis, Cholla, Tidwell and West Ridge. The Jojoba/Bobcat pasture is proposed to be divided by a new pasture fence running from east to west, creating two separate units. In the Fowler pasture there is a natural boundary along Spring Creek which allows for use in the unit as two separate pastures when resource conditions permit.

Cattle are moved through the primary pastures on the allotment using a deferred rotation grazing system. This means that pastures are not used during the same time each grazing year, providing for seasonal rest in each pasture over time. The permittee manages yearlings separate from cow/calf pairs and concurrently from January through April, generally using some of the pastures on the allotment for yearlings and the remainder for his cow/calf rotation. These pastures and rotation schedules vary depending on resource conditions and climatic factors.

Water for livestock is provided by developed springs, dirt stock tanks, Roosevelt Lake, and windmill/well combinations (Maps 3, 3A). Livestock also water directly from intermittent or perennial surface water in Tule Canyon, Two Bar Canyon, and from Campaign Creek in the Granite and Reevis pastures. Water developments are well-placed and allow for good livestock distribution across the allotment.

Currently, a fence is being constructed to control access to Campaign Creek in the Granite pasture. The fence will create a riparian unit, used only as a travel corridor for livestock as they are moved to and from pastures in this portion of the allotment (less than two weeks of anticipated use each grazing year). Unlike a riparian exclosure which prevents any livestock use, some use will be expected within established guidelines as

livestock are passing through the pasture. ***Construction of this fence was completed during the appeal period of the original Environmental Assessment and is being used as described.***

Existing Conditions

Soils/Vegetation

Vegetation on the allotment ranges from Sonoran Desert along the lake to pinyon/ juniper at the highest elevations. Dominant vegetation types are Sonoran Desert scrub, semi-desert grasslands, juniper grasslands, pinyon-juniper woodlands, and chaparral (Map 4). Riparian vegetation occurs in major creeks and smaller drainages, particularly near springs. Forty percent of the lower elevations are dominated by Sonoran Desert scrub. Most of the easily accessible desert rangeland has been impacted by domestic livestock grazing and OHV use, and soils and vegetation are in poor condition. Thirty-five percent of the allotment is dominated by a chaparral or chaparral woodland community type on steeper slopes. Impacts from livestock grazing tend to be lower on these sites due to a lack of access. Twenty percent of the allotment lies within a semi-desert grassland community type. Topography is variable, with easily accessible areas exhibiting more impacts from livestock grazing than sites with steeper slopes (Map 5). Grasslands in remote areas or on steep slopes have satisfactory soil conditions (PR Vol. 1 #45).

Soil condition is an evaluation of soil quality based on an interpretation of factors which effect vital soil functions. These functions are: the ability of the soil to hold and release water (hydrologic function), the ability of the soil to resist erosion and degradation (soil stability), and the ability of the soil to accept, hold, and release nutrients (nutrient cycling). If any of these functions are limited by the existing condition of the soils, then those soils are considered to be impaired. The rationale and procedure for monitoring soil quality is located in FSH 2509.18 supplement of the Forest Service Manual (PR Vol. 1 # 45). A sample data sheet for classifying soils can be found in Appendix D.

Soils on the Campaign Allotment were tested in the field using soil pits and ocular estimates and were assigned a soil condition category of satisfactory, impaired, or unsatisfactory. Initial soil condition ratings were also developed from interpretation of Terrestrial Ecosystem Survey (TES) data (PR Vol. 1 # 45). Soil loss and compaction were observed in lower, flatter Sonoran Desert portions of the allotment. Platy structure due to compaction has resulted in poor root penetration in some areas and may be limiting recruitment of new vegetation. Ridge tops and grassy openings in semi-desert grasslands and chaparral communities also have soil loss and lack of perennial ground cover. These ridges have evidence of prehistoric cultural occupation along with historic and current livestock concentrations, which cumulatively contribute to current soil conditions. 60% of the soils on the allotment are in satisfactory condition, 15% are in impaired condition, and 25% are unsatisfactory. Pastures with a high percentage of unsatisfactory Sonoran Desert soils include Campaign, Schoolhouse, Badlands, Grapevine, Spring Creek, Jojoba, Dry, Tidwell, and West Ridge, Brake, Fowler and Cholla Pastures.

Photo demonstrating compacted soils in the Campaign Pasture

Microbiotic (biological) soil crusts are a community of organisms living at the surface of soils commonly found in semiarid and arid environments. They have been observed in coarse textured soils in desert communities, pinyon-juniper woodlands, and semi-desert grasslands on the Forest. The historic extent of microbiotic crusts has not been quantified in any detail. A report by the Nature Conservancy (Hall, 2005) states: "At present, we have insufficient knowledge about Sonoran Desert biological crusts to be able to predict the species composition, abundance, or total percent cover that would be expected to occur at a particular site." Crusts play an important ecological role in the environment including increased soil stability and reduced erosion, atmospheric nitrogen-fixation, and nutrient contributions to plants (USGS Biological Science Center, 2006). Scientific papers report that biological crusts either do not compete with vascular plants or that vascular plant cover is enhanced. In deserts, well developed biological soil crusts can inhibit germination of many exotic species (U.S.D.I. Technical Reference 1730-2, 2001). Current cover of biological crusts on the flatter portions of the Campaign Allotment ranges from trace amounts to several percent. Specialist observations indicate that the cover of biological crusts is greater in exclosures and other areas protected from grazing (PR Vol. 1 #45).

Parker 3-step cluster summaries, last read in the 1970's, were re-read in the fall of 2008 to provide general observations about current conditions and trend on the allotment (Map 5A). The table below provides a summary of conditions observed.

Table 1- Summary of Parker 3-Step Data

Cluster #	Pasture	Vegetation trend	Soils trend
C1 (Campaign)	Jojoba/Bobcat	Only one transect relocated near FR 1503 (not mapped). Site is being used for camping. Forage vigor appeared low with stable trend	Soil stability was poor with a stable trend. Pedestalling and compaction from camping or historic use evident
C3 (Campaign)	Granite	Forage vigor fair with a stable trend. Site is dominated by curly mesquite and juniper encroachment	Soil stability was fair with stable trend. Overland flow and small rills present
C1 (Bar V Bar)	Schoolhouse	Forage vigor was poor with a downward trend. Loss of three-awn and fluffgrass, little recovery of historical hedging on jojoba	Soil stability was poor with a stable trend. Pedestalling and compaction evident
C5 (Bar V Bar)	Cholla	Site not re-read due to lack of stakes. Cholla die-off evident in area, forage vigor low with apparent downward trend due to loss of Rothrock grama and fluffgrass	Soils are decomposed granite and appear stable. Terrain is broken by many small washes/drainage patterns

Dominant vegetation includes palo verde (*Parkinsonia microphylum*), catclaw acacia (*Acacia greggii*), jojoba (*Simmondsia chinensis*), prickly pear (*Opuntia spp*.), wolfberry (*Lycium spp.*) and cholla (*Cylindropuntia spp.*) species. Herbaceous forbs and grasses are sparse in the understory of the lower elevations and Sonoran desert type. Trace amounts of three-awn (*Aristida spp.*), fluffgrass (*Tridens pulchellus*), and bush muhly (*Muhlenbergia porteri*) were noted in pastures south of Highway 188. Recently, top-kill on jojoba has been observed and is attributed to an unknown boring insect, which hollows out the upper stems of the plant and causes it to die back. So far, this phenomenon is limited to the Campaign pasture (PR Vol. 2 #8).

The nearby Tonto National Monument contains lands that are similar in vegetation composition and soil structure to portions of the allotment with gentle slopes and Sonoran Desert vegetation. The Monument was last grazed by livestock in 1975. A 2008 survey of the Monument west of the allotment used 0.1 acre ocular macroplots to record a high recruitment of seedling jojoba plants as well as good diversity of Sonoran Desert plants (PR Vol. 2 #8). On the allotment itself however few seedling or young plants were observed during 2007-08 monitoring and site visits with soil scientists. Diversity of vegetation is low on clay-dominated flats and higher on hillsides and canyon slopes within the Sonoran Desert community.

The permittee began monitoring through the *Reading the Range* program (Cooperative Extension) in the fall of 2007 (Map 5A). Data from those sessions demonstrated the presence of young jojoba plants on portions of the allotment, so recruitment of this key species is occurring in some areas. The data indicate recruitment of jojoba is lower on the allotment than in areas protected from grazing.

2006-2008 pasture inspections indicate that livestock distribution is generally satisfactory. Range improvements are in satisfactory condition and include several miles of fence, corrals, windmills, storage tanks, pipelines, metal and concrete troughs, and cattle guards. Water for livestock comes largely from developed water sources but livestock do water in Tule Canyon, upper Campaign Creek, Lake Roosevelt and Two Bar Canyon when surface water is available.

Table 2– Summary of Livestock Distribution for 2007-2008 Grazing Seasons (minor adjustments were made throughout the grazing season which did not significantly affect actual use).

Pasture Name	2007 Schedule	Actual AUM's	2008 Schedule	Actual AUM's	Distribution Observed
Grapevine	Apr. 1-May 11	315	May 1-May 31	201	Use is higher near the lake and eastern portion of pasture and less noticeable near the highway and on slopes of drainages.
Badlands	Jan. 13-Feb. 12	210	Apr. 1-Apr. 30	201	Cattle concentrate near the lake. Low use is typically observed in southern portions of the pasture.
Schoolhouse	Feb. 13-Mar. 31	322	Mar. 1-Mar. 31	201	Distribution was widespread both years.
West Ridge	May 12-June 1	139			2007 use was concentrated near a water development just south of Highway 188 and in the southern portion of the pasture.
Campaign	June 2-June 30	105	Apr. 1-Apr. 30 (yearlings)	93	Distribution was widespread in 2007. 2008 yearlings were concentrated near water developments but use remained low due to a dense presence of annual forbs
Spring Creek	July 1-Aug. 17	164			Distribution was widespread.

Tidwell	Not used		Mar. 1-Mar. 31 (yearlings)	93	Used in conjunction with the Holding pasture; cattle concentrated on ridges and in Spring Creek.
Cholla	Not used		June 1-July 31	262	2008 use was widespread.
Horse	Used seasonally		Used seasonally		Distribution is widespread and use is typically light.
Dry	Not used		Not used		
Creek	Mar. 1-Mar. 31 (bulls)	21	Mar. 1-Mar. 31 (bulls)	21	Distribution is concentrated near creek but no surface water or riparian vegetation is present here
Holding (multiple)	Used seasonally for short periods		Used seasonally for short periods		Distribution is concentrated due to small pasture sizes.
Bull	Jan. 20-Feb. 28	26			Distribution was concentrated near creek but no surface water or riparian vegetation is present here
Jojoba	Aug. 18-Oct. 20	158	Not used		Distribution was widespread; cattle were extended in this pasture in 2007 due to light use
Neck	Nov. 4-Jan. 19, 2008 (bulls)	52	Nov. 1-Jan. 15, 2009 (scheduled)	52	Use was concentrated near creek in 2007 but no surface water or riparian vegetation is present here
HN	Not used		Not used		
Tule	Not used following Two-Bar Fire		Aug. 1-Oct. 31 (scheduled)	262	Distribution typically concentrated in eastern portion of pasture
Pasture Name	**2007 Schedule**	**Actual AUM's**	**2008 Schedule**	**Actual AUM's**	**Distribution Observed**
Two Bar	Not used following Two-Bar Fire		Nov. 1-Dec. 31	460	Pasture has been rested since fire; anticipated distribution is widespread in eastern portion of pasture but limited to the west due to steeper slopes.
Fowler	Jan. 1-Mar. 31 (yearlings)	311	Not used		Distribution was widespread. Impacts from cattle escaping Spring Creek in summer 2007 were noticeable in the southwestern portion of the pasture.
Fowler (Gans Hole area)	May 27-Sept. 10	374	Not used		Cattle trailed up and down Spring Creek but use was light. Some concentration of use in the extreme north end of the pasture (near private property) was noted. Cattle escaped from the pasture and utilized other parts of the Fowler pasture.
Brake	Sept. 29-Nov. 3	116	Jan. 1-Feb. 29 (yearlings)	186	Use is concentrated on ridge tops and less noticeable on slopes.
Granite	Nov. 4-Dec. 21	329	Not used		Distribution is widespread.
Reevis	Dec. 22-Feb. 19, 2008	420	Dec. 22, 2007-Feb. 19, 2008		Distribution is widespread in northern portion of pasture. Impacts to Campaign Creek are minimal.

Riparian Areas

Five and a half miles of stream channels are being evaluated in this EA. These selected streams were identified through the National Wetland Inventory (NWI) as being perennial or having 30% cover of cottonwood or mixed broadleaf forest (Table 3) with the potential to respond to changes in management. Key reaches and designated monitoring areas have been or will be identified for each of these streams and pastures listed in Table 4. Key reaches, similar to upland key areas, are stream channels, springs, or riparian areas that are representative, responsive to changes in management, accessible to livestock, and contain key species (Interagency Technical Team 1996). Key reaches are synonymous with designated monitoring areas (DMA's) defined by Burton, Cowley and Smith (2007) as the location where monitoring occurs (PR Vol. 2 #16).

Table 3- Estimated number of stream miles delineated by the National Wetland Inventory (NWI) within each pasture that are perennial or intermittent and cottonwood or mixed broadleaf forest.

Pasture	Stream Name	Perennial	Int. w/ Veg*
Grapevine	none		
Schoolhouse	none		
West Ridge	none		
Campaign	none		
Cholla	none		
Horse	none		
Dry	none		
Spring Creek	none		
Tidwell	none		
Holding Pasture	Spring Creek		0.25 RpSSMB
Jojoba	none		
Bobcat	none		
Pasture	**Stream Name**	**Perennial**	**Int. w/ Veg***
Creek	none		
Bull	none		
Tule	Tule Canyon	1.0 PF01A, FOCW	
Two Bar	Two Bar Canyon	0.25 RpSSMB	
Neck	Campaign Creek		0.25 RpFOCW
HN	none		
Fowler & Brake	Spring Creek	springs	
	Nonesuch Spring	springs	
Reevis	Campaign Creek	0.5 PF01A, FOCW	2.5 FOCW&MB
Granite	Campaign Creek	0.75 PF01A, FOCW	
TOTAL		**2.5 miles**	**3.00 miles**

Table 4- List of pastures and streams with key reaches

Pasture	Streams
Granite	Campaign Creek
Reevis	Campaign Creek
Holding	Spring Creek
Tule	Tule Canyon
Two Bar	Two Bar Canyon

Campaign Creek flows intermittently for about 17 miles through the Campaign Allotment in eight pastures and two private inholdings. Recovery of the Campaign Creek riparian area was one of seven objectives identified in the 1992 Allotment Management Plan. Most of the riparian vegetation along Campaign Creek occurs in the Reevis and Granite Pastures. A private inholding, the Reevis Mountain School, occurs between these two pastures.

There are two distinct perennial reaches of Campaign Creek in the Granite Pasture: the upper reach located from below the Reevis Mountain School to a box canyon formation and the lower reach located in the box canyon. Each of these reaches is approximately a mile long. Both have been included within a fenced riparian pasture.

Campaign Creek, below Reevis Mountain School in the Granite Pasture

Lower Campaign Creek

1992 monitoring records document livestock grazing impacts to riparian resources in upper Campaign Creek. Post-season monitoring after the 2007 grazing period documented little to no use of riparian vegetation along Campaign Creek between the trail junction and the private property. Impacts to lower Campaign Creek were also noted in 1992. Monitoring in 2007 and 2008 recorded light to moderate use in small areas along lower Campaign Creek with recruitment of woody species in several locations. Improving conditions are largely a result of more intensive management while the Granite Pasture is in use.

Tule Canyon originates on the east slope of Two Bar Ridge and flows 5.25 miles to its confluence with Campaign Creek. Most of the Tule Canyon watershed lies in the Tule Pasture. The largest extent of riparian vegetation occurs in the middle of both the pasture and stream channel. A series of springs (including Tule Spring) maintain perennial flow in a 0.75 mile reach. Riparian vegetation in the upper portion of this reach ends abruptly and is replaced by upland vegetation.

This reach was monitored in November 2001 after two months of use. Use on woody species exceeded 50% allowable use guidelines. Utilization of deergrass met the 50% use guidelines recommended by the Tonto National Forest Riparian Area Management Utilization Guidelines (PR Vol. 1 #1). Bank alteration was not measured, although physical impacts were apparent along the reach. Trailing along the narrow floodplain was observed. This same reach was visited in December 2007 following a seven week use period. Light use was observed but not measured.

Similar to Tule Canyon, the headwaters of **Two Bar Canyon** lie on the east slope of Two Bar Ridge. Most of the Two Bar watershed lies within the Two Bar Pasture. The stream channel is 4.2 miles long above its confluence with Campaign Creek. It is also spring fed, but is only perennial just below the spring. Trees include Fremont cottonwood (*Populus fremontii*) and Arizona sycamore (*Platanus wrightii*). Most of the trees are young, from seedling to pole size, with a few old, large trees. Giant reed grass (*Arundo donax)* dominates the spring area. Herbaceous species diversity and cover along the channel is very low.

Spring Creek is an intermittent stream that originates on the Pinto Creek Allotment above the Campaign Allotment east of Nonesuch Ridge. It drains north approximately seven miles to the confluence with Pinto Creek. About 4.5 miles of Spring Creek are included in the Campaign/Bar V Bar Allotment, with one-half mile located on the Spring Creek Ranch private inholding.

In summer 2007, the permittee was authorized to stock an additional 109 head of livestock for 100 days in the upper Spring Creek portion of the Fowler pasture due to a new water development and abundance of herbaceous and shrubby forage previously inaccessible to livestock. Riparian vegetation on this portion of Spring Creek is limited to two springs consisting of a few small willow and cottonwood trees along with Bermuda grass (*Cynodon dactylon*). Little use of these plants was observed during the grazing period. The lower spring was previously developed but has silted in. Surface water was not present in the creek during 2007 range inspections.

Upper Spring Creek

The only perennial stream channel segment with riparian vegetation is on the Spring Creek Ranch and in the downstream Holding Pasture. A spring located on the ranch is the source of water for lower Spring Creek. Dominant riparian vegetation is Fremont cottonwood, with lesser amounts of velvet ash (*Fraxinus velutina*) and Goodding willow (*Salix gooddingii*). All tree age classes are represented. Historic and current livestock browsing along with flood scouring was evident in 2008. Drought-related mortality of cottonwood was observed in 2008. Herbaceous species have a low canopy cover. Although this area has received heavy grazing pressure and flood damage, recovery potential is high. The permittee has developed water outside a fence around this portion of the creek to relieve grazing pressure during key growing seasons.

Lower Spring Creek depicting flood scouring, drought mortality

Wildlife/Fisheries

The various vegetation types and riparian areas on the Campaign allotment support many faunal communities. Game species present on the allotment include mule deer, white-tail deer, mountain lion, black bear, javelina, coyote, gray fox, bobcat, raccoon, Gambel's quail, mourning dove, and white-winged dove. Non-game species include a variety of birds, mammals, reptiles and amphibians.

Special Status Species are those given status by agencies responsible for managing plants, wildlife and their associated habitat because of declines in the species' population or habitat and birds given provisions under the Migratory Bird Treaty Act (see Appendix B). A few Special Status Species (e.g., federally endangered or threatened) occur on or adjacent to the allotment (PR Vol. 2 #11), and several sensitive species may occur on the allotment. Special status species being considered in this assessment include the lowland leopard frog, Southwestern willow flycatcher, Gila topminnow, Gila longfin dace, and desert bald eagle. Effects to these species will be analyzed through a Biological Assessment which will be submitted to the U.S. Fish and Wildlife Service and summarized in Chapter 3 of this document.

Fisheries and aquatic habitat surveys were conducted in 2007 using a modified Platts et al. 1982 methodology. Fish were only found in the Campaign Creek main stem and no fish were found in any tributary streams. Currently, the only fish species found in Campaign Creek is the native longfin dace (*Agosia chrysogaster*). No Gila topminnows (*Poeciliopsis occidentalis*) were found. Gila topminnow, a species listed as Endangered by the U. S. Fish and Wildlife Service, were stocked in 1983 (Voeltz and Bettaso 2003). The initial introduction contained 200 Gila topminnows from Boyce Thompson Arboretum. These fish were stocked near Upper Horrell Spring. Fisheries surveys found Gila topminnow during the years 1985, 1986, 1987, and 1989. No topminnows were found from 1991 to 1994. An additional stocking took place on July 18, 2001. Twenty topminnows were stocked near the same location. These topminnows were found from 2001 through 2003.

The cause of topminnow extirpation in Campaign Creek is unknown (Voeltz and Bettaso 2003). A combination of low over-wintering survival in 1990 followed by spring flooding in 1991 may have caused their disappearance. The habitat remains suitable for topminnow. After the supplemental stocking in 2001 surveys 1 month and 6 months after the stocking failed to find any topminnow. However, topminnows were found 1 year (2002) after the stocking, and again 20 months (2003) after the stocking.

Current conditions observed on the allotments suggest that vegetative cover in Sonoran Desert clay-dominated flats do not meet desired ground cover conditions (Ambos 2008); therefore, this habitat type may not provide adequate forage, browse, and cover for some game species.

Management Indicator Species (MIS) were selected during the Forest planning process to adequately monitor implementation of project actions on wildlife habitat and species diversity. These indicator species reflect general habitat conditions or significant habitat components that are of value to these and other species with similar habitat needs. Habitats for a large number of the Forest MIS occur on the Bar V Bar/Campaign allotments. Because most MIS are not rare species and the allotments cover large areas of habitat, it is likely that at least some individuals of each MIS are present on the allotments (Appendix B).

Fuels

Vegetative communities found within the Campaign Allotment include Interior Chaparral, Semi-Desert Grassland, and Sonoran Desert. The natural fire regimes for each of these vegetative communities' range from frequent, high severity, stand replacing fires to long –interval, mixed severity (PR Vol. 2 #5).

Interior chaparral is classified as having a moderately long (35-100 yrs) fire return interval, characterized by intense burning that generally replaces the stand 90% of the time. Chaparral stands tend to become more

flammable with age, mainly due to the amount of dead woody material that accumulates in the individual plants as they mature.

In 2005, the Two Bar Fire (located in the Superstition Wilderness on Two Bar Mountain) burned approximately 2100 acres of chaparral on the Bar V Bar/Campaign allotment at moderate intensity. With no significant fire history in this area during the 50 years prior to the Two Bar Fire, the chaparral component on this allotment was mature. The Two Bar Fire essentially allowed these chaparral stands to maintain themselves in a Fire Regime Condition Class (FRCC) 1, where periodic stand replacement fires are the norm.

Very little research exists on the fire ecology of the upland Sonoran Desert. Many of the plant species associated with the upland Sonoran Desert ecosystem are intolerant of fire (Narog et al 1995). Mortality rates may approach 80-100% in mature stands of giant saguaro and foothills palo verde (Wilson et al 1996). The introduction and expansion of non-native plant species, especially grasses, has changed the characteristics of the fuel bed. In many locations on the Tonto, the combination of herbaceous and shrub layers, including many introduced species, form a nearly continuous and highly flammable fuel component in the Sonoran Desert. This is especially evident during abnormally wet precipitation cycles.

The Sonoran Desert vegetation type most closely identifies with fire regime group III; infrequent (35-100 yrs.) mixed severity fires. The mean fire interval is 75 years with high variation due to year to year variation in shrub mortality and grass and forb production related to drought and moisture cycles combined with variation in ignitions and associated fire weather. This vegetation type currently falls into the FRCC 3 category.

Semi-desert grasslands are typically found in foothills where the Sonoran Desert transitions to mountain landforms. This vegetation type falls into fire regime group II, characterized by frequent (0-35 yrs) stand replacement fires. The mean fire interval is about eight years with a high variation due to drought, which reduces fire frequency and moist periods that increase fire frequency. Grazing of the grassy fuels by livestock may also influence fire mosaic patterns in this vegetation type (Hann et al 2003). No fires have been known to occur during the last 50 years on this allotment and in this vegetation type. This is most likely due to the lack of herbaceous fuels (grass) needed to carry fire. This vegetation type is currently in FRCC 3 and will remain so until conditions are such that periodic fire plays a significant role.

Recreation

The Campaign Allotment contains one developed recreational site. Dispersed camping also occurs along the shoreline of Roosevelt Lake within the allotment boundary. The Grapevine campground is fenced to exclude livestock although livestock occasionally get in when fences are damaged. The Schoolhouse campground lies east of the allotment boundary and is largely unaffected by the allotment. Both campgrounds are accessed by paved roads that pass through open range on the allotment. Livestock have occasionally been hit and killed by vehicles traveling along these roads to and from the campgrounds. The roads are signed to alert the public to the presence of cattle, and posted speed limits are low.

There are three major trailheads on the allotment leading to a network of hiking trails in the Superstition Wilderness. Trailhead and trail use conflicts between recreation users and livestock or range improvement activities continue to be an issue on the allotment. Currently, range improvement activities such as brush removal near the Tule Canyon corral and trailhead have allowed for easier unauthorized access by motorized vehicles (ATV's) into the wilderness. Gates are often left open on the allotment by recreational users which can cause problems with livestock distribution. Occasionally, structural range improvements are vandalized through shooting or tampering with operational parts, creating financial burdens for the permittee along with livestock distribution issues. Range improvements can also create visual quality issues for recreational users in

or near wilderness areas. Illegal off-road ATV use in the Campaign Pasture has contributed to soil compaction in Sonoran Desert communities.

This area is currently being reviewed through a travel management planning process (TMR, PR Vol. 1 #1). The permittee will continue to have adequate access to fulfill permit and allotment management responsibilities. Lands within the Superstition Wilderness are subject to objectives and guidelines set forth by the Tonto National Forest LMP and the Superstition Wilderness Implementation Plan (PR Vol. 1 #13).

Heritage Resources

The Campaign Allotment contains hundreds of prehistoric archaeological sites representing the occupation and agricultural modification and use of this area by people related to the Hohokam and Salado archaeological traditions over a period of 8,000 to 10,000 years. It also contains many historic sites reflecting the use and occupation by Apache hunters, gatherers, and farmers, Anglo ranchers, stockmen, miners and prospectors, the Civilian Conservation Corps and the U.S. Forest Service (PR Vol. 1 #46).

Known heritage properties include a wide variety of features, ranging from historic cabin sites to simple artifact scatters. Most of the features, however, are prehistoric and consist of collapsed stone masonry structures ranging from single room field houses to large compound sites, various water control devices such as check dams, and terraces, and roasting pits for the processing of agave. There are also a large number of features associated with a long history of cattle ranching and a few reflecting sporadic attempts at small-scale mining and ore processing. Many other prehistoric and historic archaeological sites are represented by nothing more than a scatter of artifacts on the ground surface. No traditional cultural properties, native plant gathering areas, or tribal sacred sites are currently known to be located on the allotment.

From the 1870s to the early 1920s grazing on the allotment was heavy and unregulated. This resulted in an initial reduction of vegetative cover which would have affected heritage resources due to soil loss, erosion, and trampling. Since the establishment of the allotment and implementation of grazing management, impacts to known heritage resources inventoried has lessened and in many cases may have improved in condition as vegetative cover has returned.

Management Direction

The Tonto National Forest LMP (1985, as amended) identifies the following goals for the rangeland management program on the Forest (PR Vol. 1 #1). Page references in this section refer to the LMP.

Management Prescriptions (all management areas)

"Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover." (Page 40-1)

"Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species". (Page 42)

"Provide wildlife access and escape ramps on all livestock and wildlife water developments." (Page 42)

"Manage riparian areas to the level needed to provide protection and improvement." (Page 42-2)

Management Prescriptions- Management Area 6B (Superstition Wilderness)

Emphasis: "Manage for wilderness values, wildlife habitats and natural ecological processes while allowing livestock grazing and recreation opportunities that are compatible with maintaining these values and processes." (Page 172)

"Manage suitable rangeland at level B[1] to maintain permitted use within forage capacity. Rangeland in less than satisfactory condition will be treated with improved grazing management." (Page 173)

"Minimal range improvements necessary for level B management and protection of the forage and soil resources commensurate with wilderness values. Maintain utilization at acceptable levels within key forage producing and wilderness use areas." (Page 173)

"Minimal range improvements, i.e. boundary and essential interior division fences deemed necessary for level B management." (Page 173)

Management Prescriptions- Management Area 6J (remainder of allotment)

Emphasis: "Manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by FSM 2526, PR Vol. 1 #1) to benefit riparian dependent resources." (Page 193)

"Manage the desert scrub type to emphasize production of javelina, Gambel's quail, and mule deer." (Page 195)

"Manage higher ecosystem extensions in the desert scrub type to emphasize cottontail production." (Page 195)

"In the pinyon-juniper type, manage toward a goal of 25-50% cover of browse shrubs in key deer areas." (Page 195)

"Manage the pinyon-juniper type to emphasize the production of mule deer." (Page 195)

"Manage the chaparral type to emphasize the production of whitetail deer." (Page 195)

"Manage suitable rangelands at Level D[2]…Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements." (Page 195)

Other Management Direction

The Multiple Use Sustained Yield Act states that management of the National Forests must provide "sustained yields in perpetuity without impairment of the productivity of the land" (FSM 2550.1 Authority 1).

FSM 2550.3 policy states "Manage forest and rangelands in a manner that will improve soil productivity".

FSM 2521.03 objectives state "Manage terrestrial ecosystems and NFS watershed to protect soil productivity and hydrologic function. Implement soil and water conservation measures with management activities to maintain satisfactory or optimum watershed conditions."

Desired Conditions

Based on Forest Plan guidance, Forest Service Manual (FSM) direction, and site specific knowledge of this allotment, the following objectives constitute the desired condition for the analysis area.

Soils/ Vegetation

[1] Level B is defined in the LMP as "Management controls livestock numbers so that livestock use is within present grazing capacity. Improvements are minimal and constructed only to the extent needed to protect and maintain the range resource in the presence of grazing."

[2] Level D is defined in the LMP as "Management seeks to optimize production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing the multiple use of the range."

The desired condition is to have all soils in satisfactory condition as described in FSH 2509.18-99-1 (PR Vol. 1 #1). This is a long-term goal which may not be fully achieved for years or even decades. Research in desert ecosystems has suggested that recognizing improvement in soil and vegetation qualities may take more than 20 years (PR Vol. 1 #7).

Rates of recovery are dependent on the magnitude of past soil disturbances, inherent soil properties, current vegetative cover and composition, management, climate, and the type of ecosystem. It is possible that some sites in these arid environments have crossed a threshold and are limited in their capability to recover. It is important to recognize these limitations while providing opportunities to allow resources to move toward improved soil and vegetation conditions. If, over time, it can be demonstrated through monitoring that little to no change is occurring, it may become necessary to re-evaluate the suitability and/or capability of these lands to support livestock grazing into the future.

Short-term goals include meeting utilization standards for light to moderate use as described in Chapter 2 of this document. Improvement in desirable perennial plant species diversity and cover is expected to occur first at higher elevations on soils that are less impaired and move to lower elevations as soils begin to improve through increased plant litter and cover and reduced compaction impacts. For Sonoran Desert areas, improvement in plant density and diversity will begin on slopes and under or near mature plants, spreading outward to impaired soils as litter increases and soil conditions improve.

The desired conditions for soils are to:

- Maintain or improve the soils currently in satisfactory condition.
- Improve 15% of impaired soils so that they are achieving or moving towards satisfactory condition**.**
- Improve 25% of unsatisfactory soils so that they are achieving or moving toward at least impaired condition**.**
- Increase the amount of biological soil crusts in the Sonoran Desert community type

During a collaborative field visit that included rangeland specialists from University of Arizona, Arizona State University, Natural Resources Conservation Services (NRCS), Cooperative Extension, and the Forest Service, it was determined that the Sonoran Desert portion of this allotment is at the lower end of the potential range for perennial grasses. It is possible that they occurred on the site at one time, but even light to moderate grazing pressure or subtle climatic changes could have removed them and made it difficult for them to re-establish (PR Vol. 1 #37). Recruitment and growth of Sonoran Desert shrubs and trees (including jojoba and saguaro) is a process that can take many years and is affected not only by impacts from livestock and wildlife but also by climatic conditions.

The Sonoran Desert scorecard (PR Vol. 2 #8) categorizes plant species occurring in this vegetative type and assigns an ecological rating to their presence at a given site. Ecological Site Descriptions developed by NRCS and applicable to portions of the allotment also list potential vegetation based on soil types (PR Vol. 2 #12, 13, 14). These descriptions will be used to help monitor progress toward recovery of impaired sites on the allotment. The Ecological Site Description notes that it may not be possible to move from one existing state to another without some form of treatment, as tree and large shrub cover on the landscape may limit diversity of herbaceous understory species. W.A. Laycock (JRM, 1991 PR Vol. 1 #4) notes in his paper on range conditions that, if a vegetative type is in a stable state, it may not respond to changes in management or even removal of grazing.

The vegetative types listed in Table 6 and the vegetation map (Map 5) were developed from a combination of the Mid Scale existing vegetation project developed for Forest Plan revision, the Potential Natural Vegetation

Type (PNVT) map developed by the Arizona Zone TES crew, and aerial photo interpretation. Since the Mid Scale map has not been evaluated for accuracy at the present time, it is considered a tentative classification. The final map represents a grouping of similar potential vegetation types (PR Vol. 1 #45).

Table 6- Summary of Vegetation Types

Potential Vegetation	Acres	Percent
Sonoran Desert Scrub	15,117	43%
Semi-Desert Grasslands	6,280	18%
Juniper Savannas and Woodlands	473	1%
Chaparral and Chaparral Woodlands	12,106	35%
Streamside Vegetation	897	3%
Water	28	<1%
Private Land	58	<1%
Total	34,959	

Desired conditions for vegetation communities are to:

- Increase cover of native herbaceous species with an ultimate goal of achieving ecosystem potential.
- Increase plant basal area and litter.
- Increase the amount of desirable browse species in chaparral communities.
- In Sonoran Desert communities allow for increased reproduction of jojoba and diversity of desirable Sonoran Desert species.
- In grasslands, increase the foliar canopy coverage, basal cover of herbaceous plants, and vigor of grass species that decrease under grazing pressure.
- In chaparral, increase the foliar canopy cover and vigor of "A" shrub species. (FSH 2209.21 R-3)
- In Pinyon-juniper woodlands, increase all of the above attributes.

Riparian Areas

The 1985 Tonto National Forest Plan (pp 41-44) articulated the following desired conditions:

- Achieve 80% of potential riparian overstory crown coverage;
- Rehabilitate 80% of the potential shrub and overstory canopy cover in riparian areas;
- Manage cottonwood and sycamore stands so that by 2030, over half of these areas include all age classes;
- Re-establish riparian vegetation in severely degraded but potentially productive riparian areas; and
- Avoid channel changes or disturbance of stream channels and minimize impacts to riparian vegetation.

The Forest Plan also incorporated the following desired conditions (pp. 19-20) stated in the 1983 Regional Guide:

- Manage riparian areas to protect the productivity and diversity of riparian-dependent resources…;
- Improve all riparian areas to satisfactory or better condition by 2030, with 25% of riparian areas in satisfactory condition by 2000. Satisfactory conditions are specified below:

- Maintain 80% natural shade over water surfaces;
- Maintain 80% of natural bank protection;
- Maintain the composition of sand, silt and clay within 20% of natural levels; and
- Maintain three age classes of woody plants with 10% in seedling and saplings age classes.

The attainment of Tonto Forest Plan desired conditions for riparian vegetation are critical for achieving two important goals:

- Maintaining and improving wildlife and/or aquatic species habitat and
- Achieving stream channel proper functioning condition (Barrett et al, 1993). The most common conditions limiting proper functioning condition of stream channels are high width-depth ratios, and excessive erosion or deposition. The recovery of riparian vegetation is essential for attainment of stability or proper functioning condition for many stream types.

Desired condition of key reaches

Desired conditions for key reaches include both short-term and long-term timeframes. The most important short-term desired conditions are to:

- Maintain residual herbaceous vegetation along the greenline or streambank whenever precipitation is expected;
- Minimize the annual impacts to seedling and sapling riparian woody species; and
- Limit physical impacts to alterable streambanks and greenlines.

The most important long-term desired conditions are to:

- Optimize riparian tree and shrub establishment, especially following episodic, regional winter storms;
- Increase the density, vertical and horizontal canopy cover of woody riparian tree species;
- Increase the proportion of obligate and facultative riparian species;
- Maintain or increase canopy cover of herbaceous species to at least 50% (or 5% to 25% for reaches now at trace to 1%);
- Decrease the greenline to greenline width;
- Optimize the establishment of floodplains and streambanks; and
- Improve stream channel function and stability.

Achieving desired conditions for riparian areas and stream channels will depend on management activities as well as climatic events. Both drought and floods have the potential to affect riparian areas and stream channels. High flows (> 10 year recurrence interval) are likely to scour impaired or unstable channels. Even moderate flows (> 2 year recurrence interval) could cause unstable channels to widen or incise.

Wildlife/ Fisheries

In addition to previously described desired conditions and objectives that will benefit wildlife, the following goals also apply:

- Maintain potential for beneficial fire while inhibiting potential for destructive fire.
- Promote development of owl habitat.

- Allow for vegetative cover and forage to benefit threatened and endangered species, management indicator species, and emphasis harvest species.
- Maintain conservative forage use by grazing ungulates to assure recovery and continued existence of threatened and endangered species.
- Continue periodic inspections and maintenance of existing wildlife exclosures and restoration projects, and improve the level of protection and maintenance.

Fuels

The long-term goal for fire management on the Tonto National Forest is to reintroduce fire back into fire dependent ecosystems and allow it to resume its natural role. This will most likely be accomplished through the combined use of prescribed fire, mechanical treatments, and Wildland Fire Use. Over time, restoring fire to those ecosystems will shift areas currently classified as Fire Regime Condition Class (FRCC) 3 to FRCC 1 or 2 while serving to maintain those areas already classified as FRCC1. Livestock use of herbaceous vegetation may limit the ability of fire to behave naturally in some portions of the allotment.

Recreation

Once Travel Management is officially implemented, compliance mandates that allotment management plans and term grazing permits would describe access needs on the designated transportation system. Continued access by recreational users to trails, wilderness areas, campsites, and other recreation opportunities is essential. Continued cooperation between recreation users and livestock managers is essential. Project work conducted along hiking trails should consider visual quality and the wilderness experience.

Adherence to standards and guidelines for Management Area 6B (as described previously) will be expected. Any use of motorized equipment for management or facility improvement within the wilderness will be reviewed for "practical necessity and reasonableness" and the Minimum Tool analysis process will be used. The Superstition Wilderness Implementation Plan also states that grazing levels may be increased in non-wilderness sections of allotments in order to protect wilderness resources.

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and other alternatives in order to make the following decisions:

The Tonto Basin District Ranger is the official responsible for the decision regarding management of the Campaign/ Bar V Bar Allotment. As a result of this analysis process, the District Ranger will issue a decision notice that includes a determination of the significance of the environmental effects and whether an environmental impact statement (EIS) will be prepared. If the District Ranger determines that there are no significant issues warranting an EIS, the decision will be documented in the Decision Notice. Implementation of a decision to continue to authorize livestock grazing would occur through an allotment management plan and annual operating instructions. These would include any management actions, mitigation measures, and monitoring requirements necessary to the decision. These documents would also describe permitted numbers of animals, season of use, allowable utilization standards, and the terms of the grazing permit.

If there is a finding of significant impacts, an environmental impact statement will be prepared. The decision will also include a determination of consistency with the Tonto National Forest Land Management Plan (LMP), National Forest Management Act, National Environmental Policy Act, and other applicable laws, regulations, and executive orders.

Public Involvement

The proposal was listed in the Schedule of Proposed Actions on January 25, 2008. The proposal was provided to the public and other agencies for comment during scoping (January 25, 2008-February 22, 2008). The scoping letter was sent to 71 individuals, including permittees, federal, state, and local agency representatives, tribal representatives, environmental agency representatives, and other interested parties. The scoping letter generated responses from 9 individuals. Using those comments along with the input of Forest Service specialists, a list of issues was developed during a content analysis meeting and alternatives to the proposed action were drafted. Copies of the letters were provided to the permittee and a meeting was held with the permittee to discuss the results of the content analysis meeting.

Additionally, a collaborative workshop was held to discuss Sonoran Desert vegetation and soils. This information was used in the development of attainable desired conditions for the allotment. Representatives from Natural Resources Conservation Services (NRCS), University of Arizona, Cooperative Extension, Arizona State University, the Forest Service, and the permittee were in attendance. A workshop was held to exchange information, followed by a field trip to the allotment to view the area being discussed. A summary of minutes from this meeting can be found in the Project Record (PR Vol. 1 #36, 37).

Issues

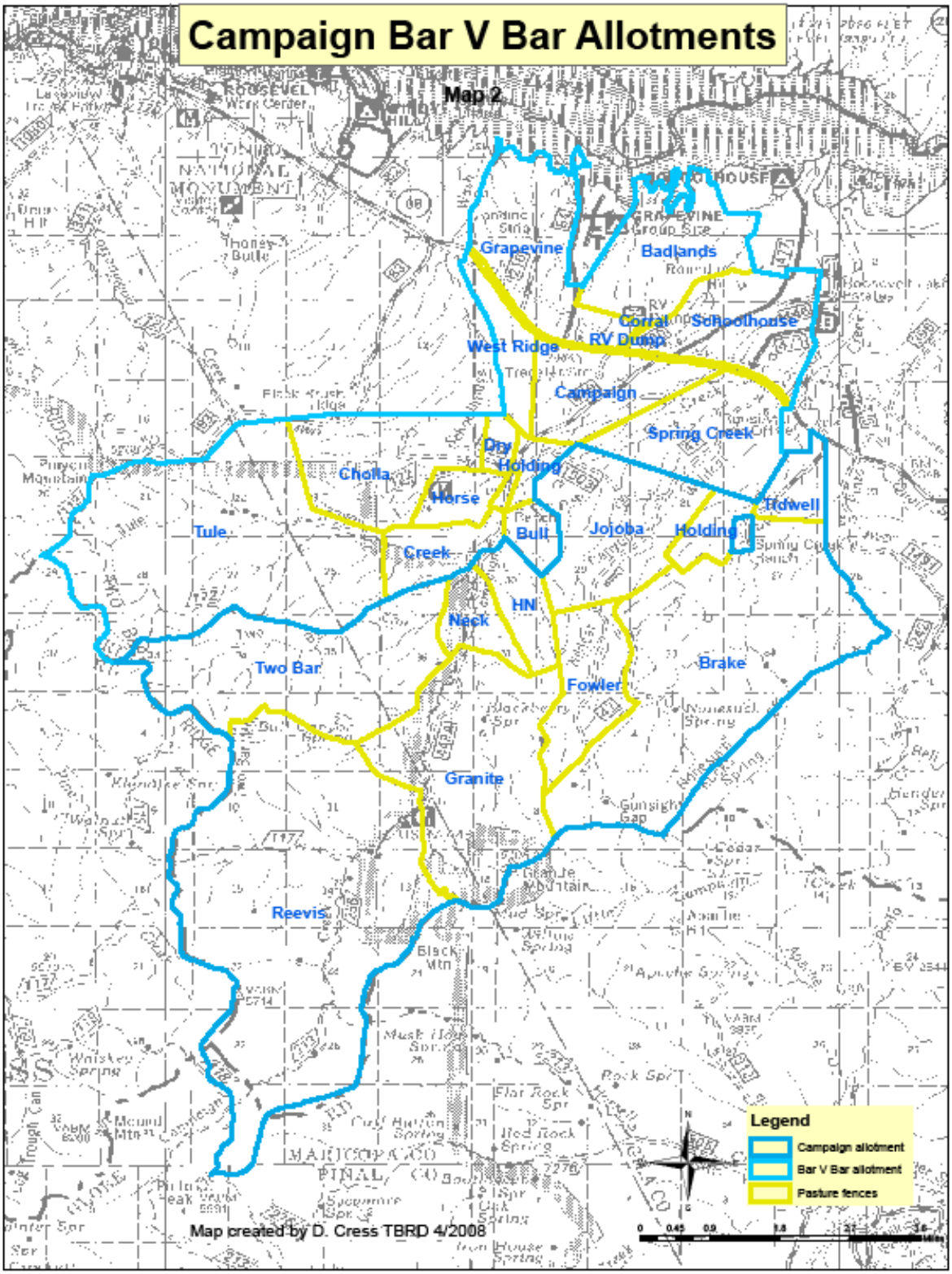
The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record (PR Vol. 1 #28).

As for significant issues, the Interdisciplinary Team identified important topics raised during scoping which could be addressed through this Environmental Assessment. These issues include:

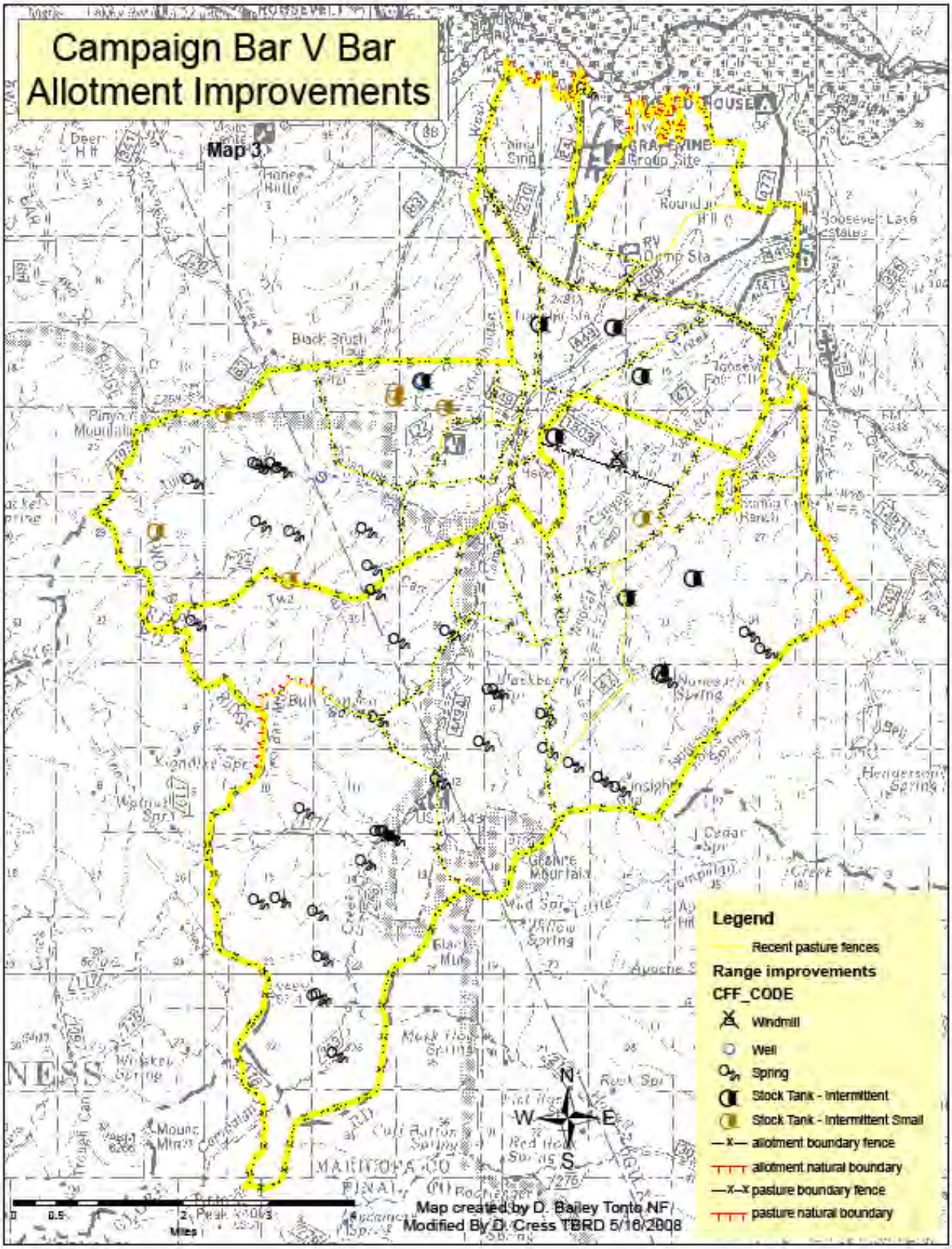
- Southwestern willow flycatcher 2-mile grazing setback during the breeding season. The permittee and an attorney working on behalf of several permittees feel that the setback is not warranted. This issue will be addressed in the Biological Assessment for this analysis, but the team also felt that the issue needed to be resolved at a forest or regional level and not necessarily through this analysis process. There is also a concern that fluctuating lake levels may allow livestock access to newly emerging flycatcher nesting habitat. Grazing pressure may adversely affect habitat quality.
- Altering the term grazing permit to allow yearlings on the allotment at any time of the year versus seasonal (winter) use only. A concern was raised from the public about negative impacts to vegetation, particularly riparian vegetation, during hot summer months by allowing yearlings at this time of year in addition to mature animals. This will be addressed through a seasonal grazing alternative as well as an alternative to the proposed action that keeps yearling use confined to winter months.
- Permitted numbers remain the same under the proposed action. A concern was raised by a member of the public asking why numbers wouldn't be reduced on the allotment. This issue will be addressed through adaptive management.

- Livestock use in riparian areas. There is a public concern that livestock grazing in riparian areas is detrimental and must be addressed in this analysis. There will be a description of mitigation measures in each alternative as well as a seasonal grazing alternative and description of a fence project to protect Campaign Creek described in Chapter 2.
- Recreational user conflicts with livestock. Recreation staff for the district are concerned that intrusions into the wilderness by motorized vehicles through range improvement sites are increasing. There is also concern about gates being left open and improvements being vandalized. All alternatives will discuss these issues and offer mitigation.

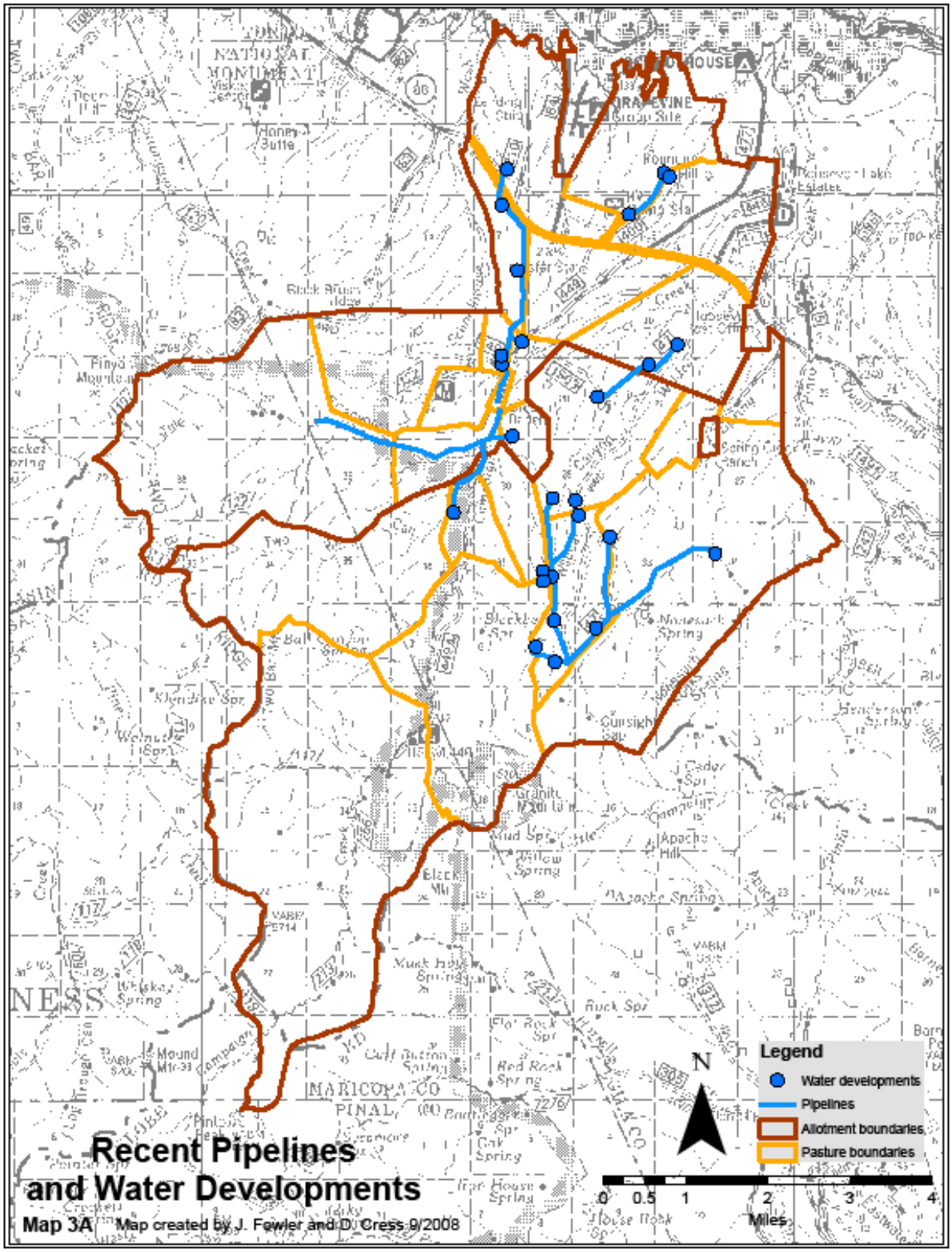
A comparison of each alternative and how they address these issues can be found at the end of Chapter 2.



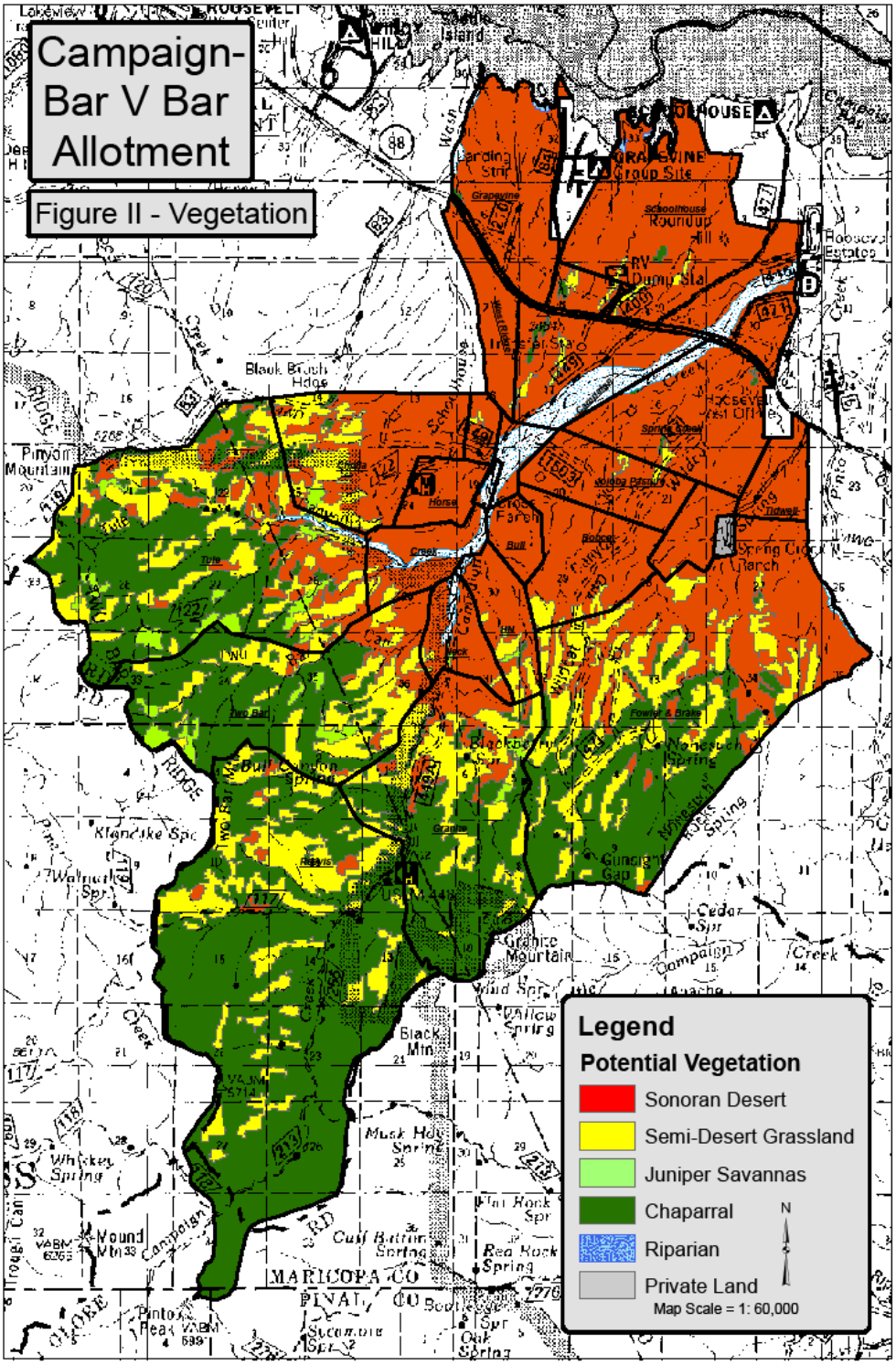
Map 2- Allotment and Pasture Boundaries



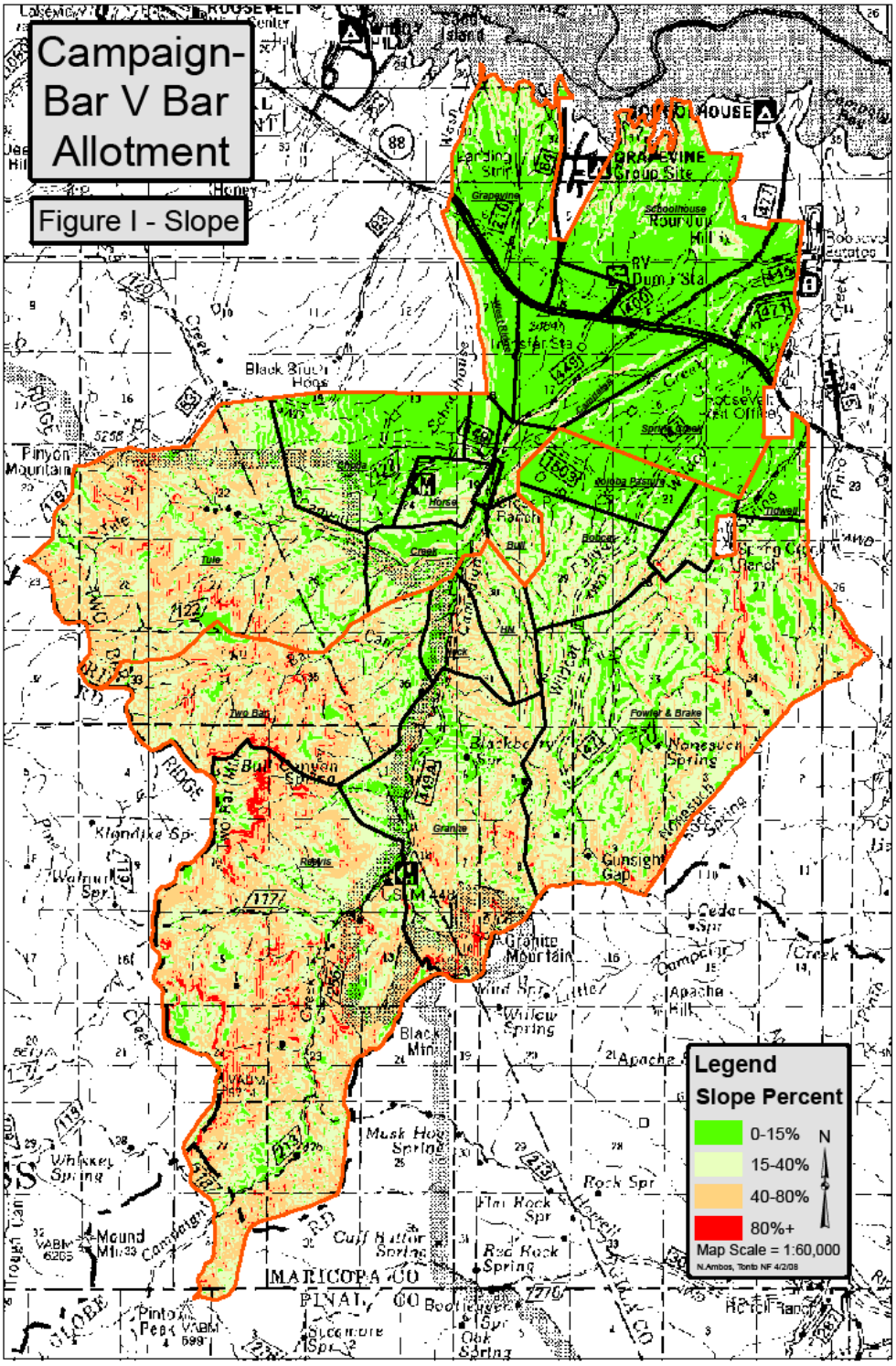
Map 3- Rangeland Improvements



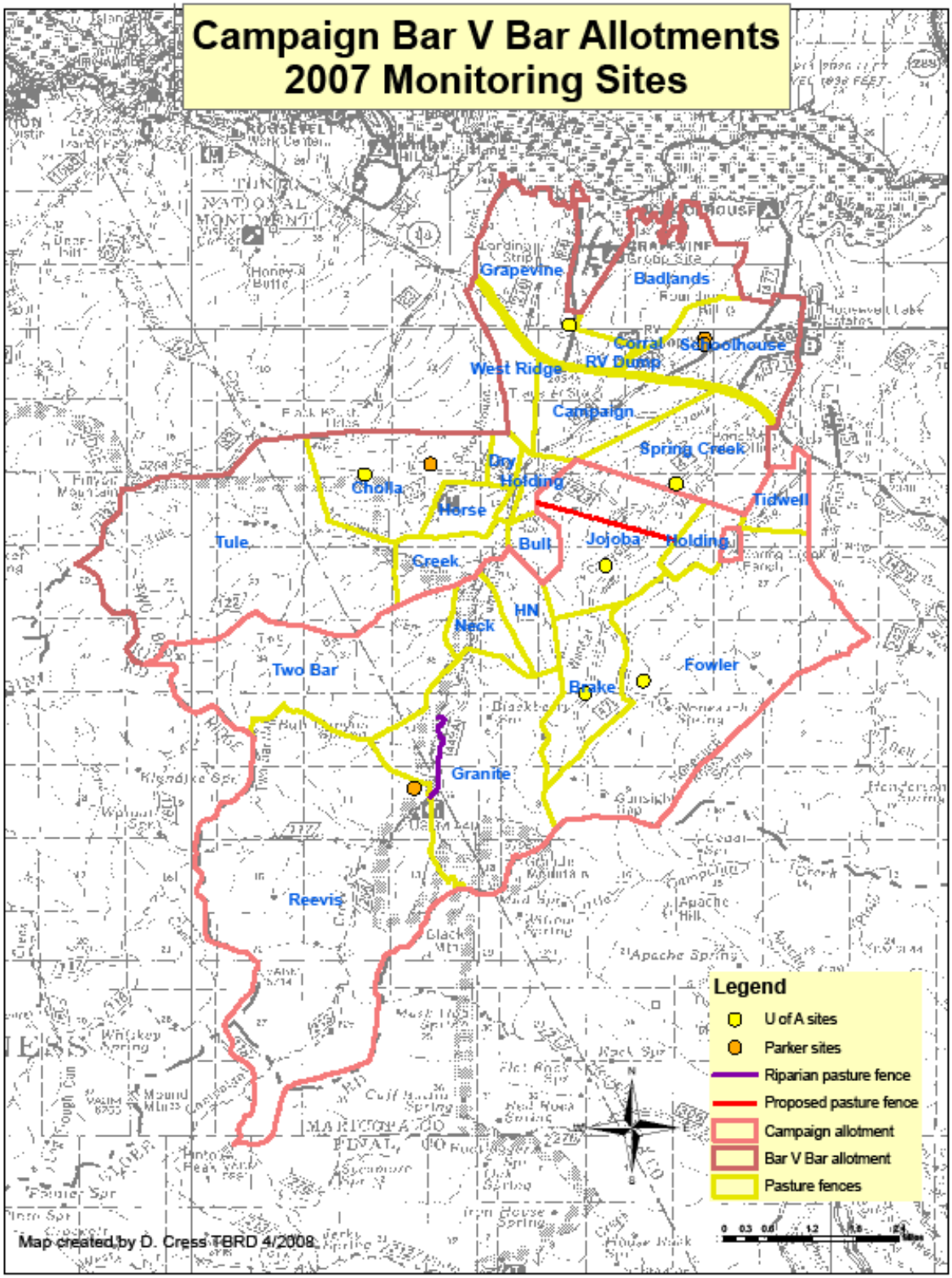
Map 3A: Pipelines and Water Developments Added By Current Permittee



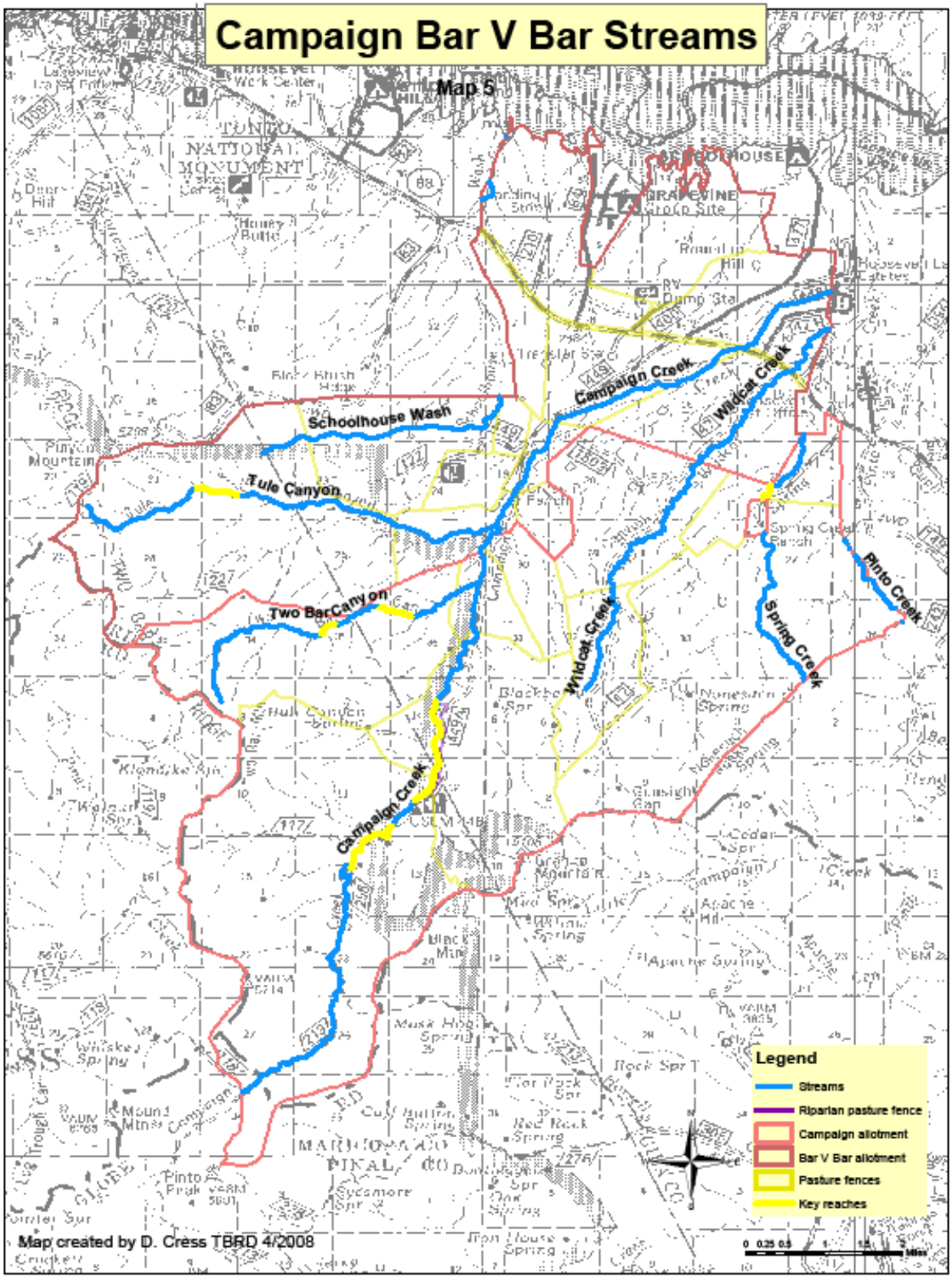
Map 4- Potential Vegetation Types



Map 5- Slope Percentages



Map 5A- Plot Locations for U of A and Parker 3-Step Vegetation Monitoring



Map 6- Named Streams and Drainages

CHAPTER 2-ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Campaign Allotment analysis project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form to provide a clear basis for choice among options by the decision maker and the public. A description of monitoring methods applying to the proposed action and all grazing alternatives prefaces the alternatives.

A description of the objectives of implementation and effectiveness monitoring and how the information will be used can be found at the end of the chapter.

Proposed Action

The Tonto Basin Ranger District proposes to continue to authorize cattle grazing on the Campaign Allotment in compliance with Forest Service policy and Forest LMP objectives. Grazing authorization would be accomplished through the issuance of a new term grazing permit in accordance with 36 CFR 222.3. A new allotment management plan (AMP) would be prepared for the allotment and would be included as Part 3 of any new term grazing permit issued. The AMP would describe management objectives, livestock management practices including allowable use levels, mitigation measures necessary to comply with LMP standards and guidelines and biological terms and conditions, and monitoring requirements necessary to determine if management objectives are being achieved. The District Ranger, in coordination with the permittee, would incorporate an adaptive management strategy under which the duration, timing and frequency, along with the number of livestock authorized annually, may receive continual modification in response to annual monitoring, changing resource conditions, and achievement of management objectives.

Adaptive Management

The proposed action and all grazing alternatives described in Chapter 2 would implement the use of adaptive management as described in FSH 2209.13, Ch. 90 (PR Vol. 1 # 1). Adaptive management uses monitoring results to continually modify management in order to achieve specific objectives. The proposed action and grazing alternatives will provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired resource conditions are not being achieved, adaptive management decisions would be used to modify management. Such changes may include annual administrative decisions to adjust the specific number of livestock, specific dates for grazing, class of animal or pasture rotations. These changes would not exceed the limits for timing, intensity, duration and frequency as defined in the term grazing permit. Adaptive management would be implemented through annual operating instructions, which would adjust livestock numbers and the timing of grazing so that use is consistent with current productivity and capacity and is meeting management objectives.

Adaptive management also includes monitoring to determine whether identified structural improvements are necessary or need to be modified. In the case that changing circumstances require physical improvements or management actions not disclosed or analyzed herein, further interdisciplinary review would occur. The review would consider the changed circumstances and site-specific environmental effects of the improvements in the context of the overall project. Based on the results of the interdisciplinary review, the District Ranger would determine whether correction, supplementation or revision of the EA is necessary in accordance with Forest Service policy or whether further analysis under NEPA is required.

Mitigation and Monitoring Common to All Grazing Alternatives

Upland Mitigation and Monitoring

Forage utilization would be managed at a level corresponding to light to moderate intensity (30-40% on herbaceous key forage species). Use of browse species and annuals would be limited to not more than 50% of current annual growth in order to provide for grazed plant recovery, increases in herbage production and retention of herbaceous litter to protect soils (implementation monitoring) (PR Vol. 2 # 8).

As livestock use each specific unit (pasture), the District will monitor effects of grazing activities in the uplands such as use on herbaceous and woody vegetation, trailing, and effects on soils and wildlife habitat. This information would be used to help determine when cattle should rotate out of the scheduled unit during the grazing season. If livestock are reaching use limits for current annual production or causing other undesirable effects they would be moved from the pasture to the next scheduled unit. Post grazing monitoring would then document effects and, when combined with actual livestock use information over time, would help determine the carrying capacity of each unit for livestock to refine future allotment management. If livestock consistently reach forage use limits before their scheduled move dates, annual authorized numbers would be adjusted in the next year's annual operating instructions. Over time, this information could be used to adjust permitted numbers on the term grazing permit.

The term grazing permit would provide for year long grazing under the Proposed Action and Alternative 3, and seasonal grazing under Alternative 4. If proper use in the management units is reached before the end of the grazing year or season, livestock may have to be removed from the allotment to avoid exceeding utilization guidelines identified in this decision. Better distribution of livestock avoids concentrating effects and provides the best opportunity for livestock to remain on the allotment for the entire grazing season.

Riparian Mitigation and Monitoring

Riparian use guidelines for implementation monitoring will be applied where specialists have identified "key reaches" or "key areas". Key reaches, similar to upland key areas, are those stream channels, springs, or riparian areas that are representative, responsive to changes in management, accessible to livestock, and contain key vegetative species. In early seral or degraded riparian areas, appropriate monitoring cannot take place until riparian vegetation re-establishes.

Once riparian vegetation has become re-established in key reaches and is available for monitoring, riparian utilization measurements (implementation monitoring) will be made following the Interagency Technical Reference (1996), McBride and Grove (2002), and Cowley and Burton (2005) or the most current acceptable method. Use guidelines are as follows: *obligate riparian tree species* – limit use to < 50% of terminal leaders (top 1/3 of plant) on palatable riparian tree species accessible to livestock (usually ≤ 6 feet tall); *deergrass* – limit use to < 40% of plant species biomass; *emergent species* (rushes, sedges, cat-tails, horse-tails) – maintain six to eight inches of stubble height during the grazing period. Once riparian utilization guidelines are met cattle will be moved to the next scheduled pasture regardless of available forage in the uplands.

Additionally, changes in riparian vegetation and stream channel geomorphology condition and trend will be measured at 5 to 10 year intervals (effectiveness monitoring) using protocols described in the Interagency Technical Reference (1996), Cowley and Burton (2005), and Harrelson et al (1994), or the most current acceptable method.

Recreation Mitigation and Monitoring

The permittee would continue to access the Campaign Allotment on existing roads and trails as designated by Tonto National Forest maps to avoid the creation of illegal ATV trails. Access by the permittee to roads closed

on the Forest Service system may be authorized by the agency in writing. Compliance with the Wilderness Act in the Superstition Wilderness area is important and expected of all users on the allotment. The permittee should strive to maintain the untrammeled, natural conditions within the Superstition Wilderness. No motorized equipment should be used in the Wilderness without obtaining authorization from the Regional Forester.

Wilderness Mitigation and Monitoring

The management emphasis for the Superstition Wilderness is on wilderness values. It provides for livestock grazing and recreation opportunities that are compatible with maintaining wilderness values and protecting resources. The Superstition Wilderness Implementation Plan further defines objectives this way: "To provide for livestock grazing as authorized by law, while minimizing its impact on the Wilderness resource and visitors to it, through practical, reasonable, and uniform application of established guidelines and policy."

Section 4(c) of the Wilderness Act of 1964 defines minimum requirements for administrative actions in wilderness areas which includes grazing. Wilderness resources must be considered when preparing range improvement construction standards and techniques (2323.26a).

Section 4(d)(4)(2) in FSM 2320.5 states that "…wilderness designation should not prevent the maintenance of existing fences or other livestock management improvements, nor the construction and maintenance of new fences or improvements which are consistent with allotment management plans and/or which are necessary for the protection of the range".

Heritage Mitigation and Monitoring

New rangeland improvements not currently analyzed in this decision would be assessed for need on a case by case basis. Any range improvement which would disturb soil would require an archaeological clearance by the Forest Archaeologist or a certified para-archaeologist. New improvements not anticipated by this decision would also require a separate analysis to comply with NEPA regulations. Salting, watering, or supplemental feeding would not be permitted where cultural sites or resources exist.

Mitigation of impacts to heritage resources for all alternatives will be accomplished by avoiding these properties through the placement and construction of all range improvements. Minimizing localized concentration of animals, improving livestock distribution across the allotment, and reducing the intensity of grazing will also minimize surface disturbance to heritage resources. Where proposed improvements will involve ground disturbance, 100% archaeological survey will be conducted. Other, more specific mitigation requirements may be identified as each of these improvements is developed and a heritage inventory is made of their areas of potential effect. Such protective measures are developed in accordance with the goals of the project taking into account site vulnerability as well as the methods of project implementation. All inventoried heritage sites are treated as eligible for the National Register of Historic Places with the exception only of those that have been formally determined to be not eligible in consultation with SHPO.

Archaeological clearance must be approved with all necessary consultation with SHPO and the potentially interested Tribes prior to issuing any decision regarding the construction, modification, or removal of all improvements. This approach is based on long-term consultation with SHPO and Region 3 policy as embodied in the *First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities* between the USDA Forest Service Region 3, the State Historic Preservation Officers of Arizona, New Mexico, Texas, and Oklahoma, and the Advisory Council on Historic Preservation, signed 12/24/03, and specifically, Appendix H, the *Standard Consultation Protocol for Rangeland Management* (Protocol) developed pursuant to Stipulation IV.A of the *Programmatic Agreement* is considered to be the "standard operating procedure" for treating potential grazing impacts to heritage resources on the Tonto National Forest.

Protection measures identified under the Protocol include:

1. Archaeological surveys will be conducted for areas proposed for surface disturbance which have no previous survey coverage, or have out-dated surveys which do not conform to current standards.
2. Relocation or redesign of proposed range improvements and ground-disturbing management practices to avoid direct and indirect impacts to historic properties.
3. Relocation of existing range improvements and salting locations sufficient to ensure the protection of historic properties being impacted by concentrated grazing.
4. Fencing or exclosure of livestock from individual sensitive historic properties or areas containing multiple sensitive historic properties being impacted by grazing.
5. Periodic monitoring to assess site condition and to ensure that protection measures are effective.
6. Other mitigation measures involving data recovery, for example, may be developed and implemented in consultation with the SHPO as the need arises. The appropriate tribes will be consulted if the mitigation is invasive or it affects a TCP or other property of concern for them.

These protection measures apply equally to all the proposed alternatives for the Campaign Allotment. Specific protection measures will be developed on a case by case basis.

Monitoring- In accordance with the Protocol, monitoring will be conducted as part of the day-to-day activities of the professional cultural resource specialists and certified para-archaeologists working in the area. Grazing allotments cover most of any given forest, and when archaeologists are in the field conducting surveys they are most likely surveying within a grazing allotment. The archaeologists will use these opportunities to observe and report on grazing activities, the effectiveness of the grazing strategy, and potential impacts to heritage resources. Any incidents of damage to historic properties from grazing will be reported, and the archaeologists will draw upon the protection measured outlined in the Protocol to ensure that the effects are avoided or minimized.

Alternatives

Alternative 1

Proposed Action

The permittee proposes to continue cattle grazing year long on the allotment. In addition, the permittee proposes to change yearling grazing from a fixed, seasonal use to year long use, meaning that yearlings could be placed on the allotment opportunistically based on resource conditions. Those numbers could be combined in the same pastures being utilized by cow/calf pairs or they could be run concurrently in other available pastures as a separate herd. Permitted numbers would remain the same as on the current term grazing permit (see Chapter 1, History and Management). A combination of cows, bulls, and yearlings could be grazed within those limits using a deferred rotation grazing system. The initial stocking rate would be the number of cattle currently authorized on the allotment (275 cows/bulls from November through May, 175 cows/bulls from June through October, and 150 yearlings from January through April). All pastures could be utilized during each grazing year based on resource conditions and water and forage availability. Adaptive management would be implemented as described in Chapter 2.

Proposed Improvements Common to All Alternatives

In the proposed action, the permittee proposes to build a fence to divide the Jojoba/Bobcat unit into two pastures (Map 8). This 1.7 mile fence would help improve livestock distribution in an area that has received high historic use in concentrated areas. Materials for the project will be provided by the permittee and by the Forest Service if range betterment funds are available when construction begins. A site-specific archaeological clearance has already been completed.

During the 36 CFR 251 appeal, the Forest Supervisor determined this fence had already been approved through a decision issued following the 1992 Environmental Assessment. An archaeological clearance was completed and the permittee was allowed to construct the pasture division fence in 2010.

Alternative 2

No Action- No Grazing

Under this alternative, the term grazing permit on the Campaign/ Bar V Bar Allotment would be cancelled following guidance in 36 CFR 222.4 and FSM 2231.62 (PR Vol. 1 #1). Twenty percent of the permitted numbers on the face of the permit would be removed from the allotment each year until no more grazing is permitted. In the event that all cattle are removed from the allotment within one year this decision, due to drought or other circumstances, the permit would be cancelled in whole.

Alternative 3

Modified Proposed Action

Permitted numbers would remain the same as they are on the current term grazing permit (see Chapter 1, History and Management) and a combination of cows, bulls, and yearlings could be grazed within those limits using a deferred rotation grazing system. The initial stocking rate would be the number of cattle currently authorized on the allotment (220 cows/bulls from November through May, 100 cows/bulls from June through October, and 148 yearlings from January through April). Use by yearlings would remain seasonal.

To address concerns for riparian habitat in Tule, Two Bar and Campaign Creeks, grazing use would be limited to winter months (November through March) in the Two Bar, Tule, and Reevis pastures when livestock impacts are less likely in sensitive riparian areas. Additionally, use of the following pastures would be deferred during years lacking significant production (< 100 lbs. /acre of annual forbs and grasses): Grapevine, Badlands, Schoolhouse, West Ridge, Campaign, Spring Creek, Tidwell, and Jojoba. This would help minimize impacts to jojoba and other key browse species during important spring growing periods and would aid in recovery of impaired soils in these pastures. This deferment would not exclude use of these pastures for short periods of time in any given year to allow the permittee to process livestock during key shipping periods. Adaptive management would be implemented as described in Chapter 2.

Alternative 4

Seasonal Use

To address impaired soil, vegetation, and riparian conditions on this allotment, Alternative 4 would permit livestock grazing seasonally on the allotment from October 1 through April 30. Permitted numbers would remain the same as they are on the current term grazing permit (see Chapter 1, History and Management) and a combination of cows, bulls, and yearlings could be grazed within those limits using a deferred rotation grazing system. The initial stocking rate would be the number of cattle currently authorized on the allotment (220

cows/bulls from October through April, 148 yearlings from January through April). All pastures could be utilized during each grazing season based on resource conditions and water and forage availability. Adaptive management would be implemented as described in Chapter 2.

Proposed Improvements Specific to Alternatives 3 and 4

Under Alternatives 3 and 4, the Forest Service proposes construction of a fence in the northern portion of the Badlands (1.3 miles) and Grapevine (1.1 miles) pastures above the high-water mark for Roosevelt Lake (Map 8). This fence would replace existing pasture fences which extend into the lake below the high-water mark. These fences are submerged when the lake level is high, posing a hazard to recreational users. The proposed fence would also exclude livestock grazing along the lake shore to protect emerging riparian vegetation. Establishment of this vegetation could provide critical habitat to southwestern willow flycatchers as it matures. Livestock could continue to use the pastures south of the fence as resource conditions dictated. Construction of additional troughs and pipelines may be necessary to provide water to livestock currently watering from the lake.

Under Alternatives 3 and 4, the permittee would apply a Forest Service lock and chain to a corral gate in Tule Canyon to prevent unauthorized off-road use occurring through the corral into the Superstition Wilderness. The permittee would continue to have horse or foot access through the gate for livestock management. Recreational users would still have access to the Tule trail system at the nearby Tule trailhead.

Monitoring Methodology

The objective of monitoring is to determine whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions. Monitoring as described below would take place under all grazing alternatives.

The purpose of effectiveness monitoring is to track condition and trend of upland and riparian vegetation, soil, and watersheds. Monitoring of key areas would follow procedures described in the Interagency Technical Reference and the Region 3 Rangeland Analysis and Training Guide (PR Vol. 1 #1). These data are interpreted to determine whether management is achieving desired resource conditions, whether changes in resource condition are related to management, and to determine whether modifications in management are necessary. Effectiveness monitoring would occur at least once over the ten-year term of the grazing authorization, or more frequently if deemed necessary.

The purpose of implementation monitoring is to determine whether grazing meets conservative use guidelines in upland and riparian settings. Implementation monitoring would occur at any time during the grazing year and include such things as inspection reports, forage utilization measurements, livestock counts and range improvement inspections. Utilization measurements would be made following procedures found in the Interagency Technical Reference (BLM et al 1996), "*Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands*" (PR Vol. 1 # 1), and in reference to current scientific papers which are applicable to management of deserts and semi-desert grasslands. Data could include browse utilization measurements, perennial grass stubble height measurements, photo points, or height/weight relationships for certain perennial grass species.

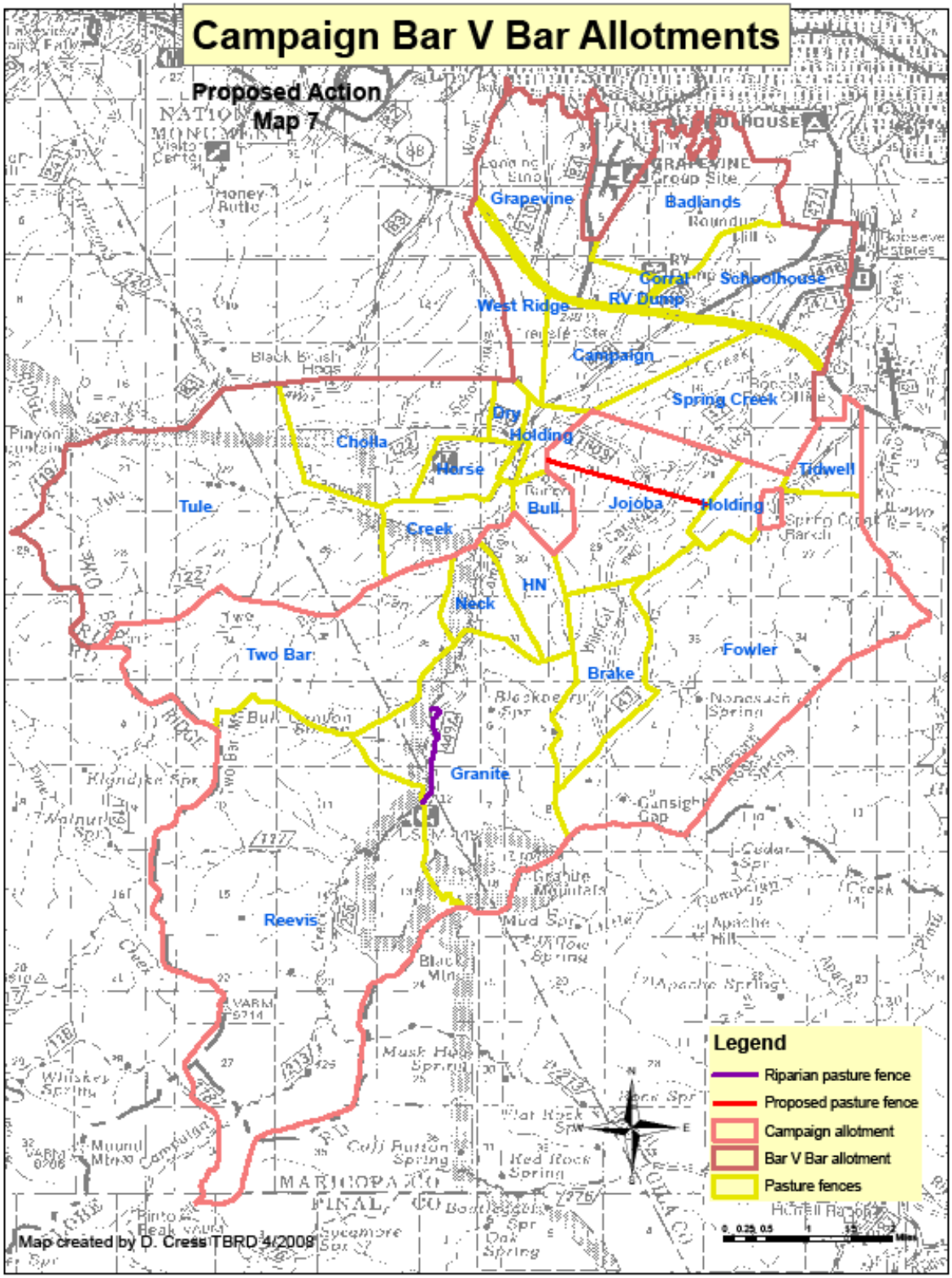
Riparian monitoring techniques are described in "Riparian Area Management Utilization Guidelines" (Grove, McBride 2002) and would gather the information described under the proposed action and alternatives. Monitoring information from the "*Reading the Range*" program would be considered and includes dry weight ranks, fetch relationships (distance to closest perennial plants), and palatable forage production information. Consistent patterns of utilization meeting conservative use guidelines of 30-40% on key species in key upland

areas or meeting Forest guidelines for riparian areas would be used as a basis to modify management practices or take administrative actions such as reducing authorized and permitted numbers in order to reduce utilization in subsequent grazing seasons.

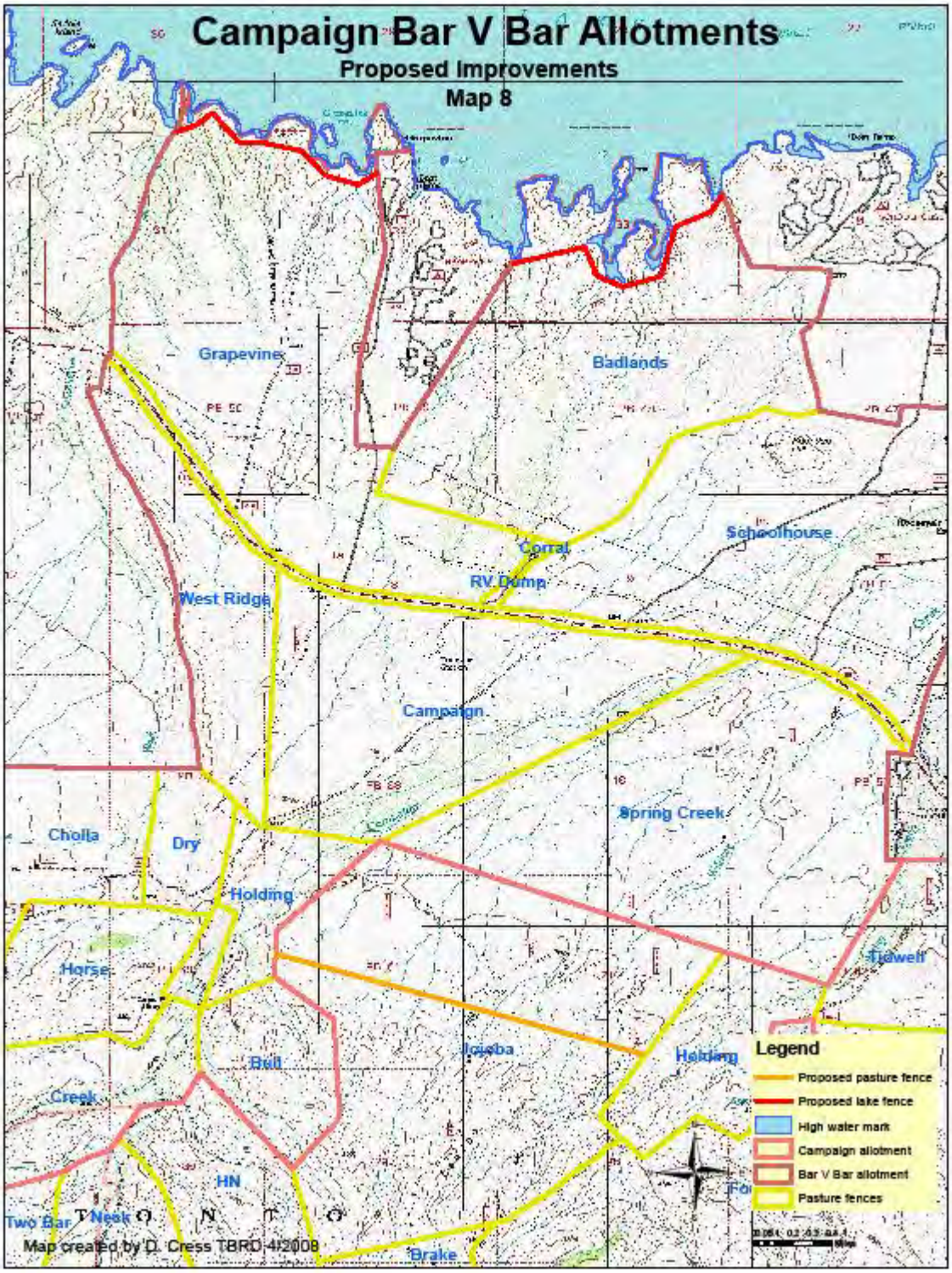
Information would be collected through routine pasture inspections, end of season utilization monitoring, Parker Three-Step monitoring, and Cooperative Extension monitoring through the "*Reading the Range*" program in cooperation with the permittee and other agency representatives. Specific schedules for monitoring would be flexible from year to year based upon resource needs which could change with climatic variations and management changes. Monitoring for plant cover, vigor, recruitment, and diversity using techniques described in aforementioned publications would ensure that wildlife needs and riparian and watershed conditions were moving toward desired conditions as outlined in Chapter 1.

Key areas are described in "Sampling Vegetation Attributes" (Interagency Technical Reference, 1996) as indicator areas that are able to reflect what is happening on a larger area as a result of on-the-ground management actions. A key area should be a representative sample of a large stratum, such as a pasture, grazing allotment, wildlife habitat area, herd management area, watershed area, etc., depending on the management objectives being addressed by the study. Proper selection of key areas requires appropriate stratification.

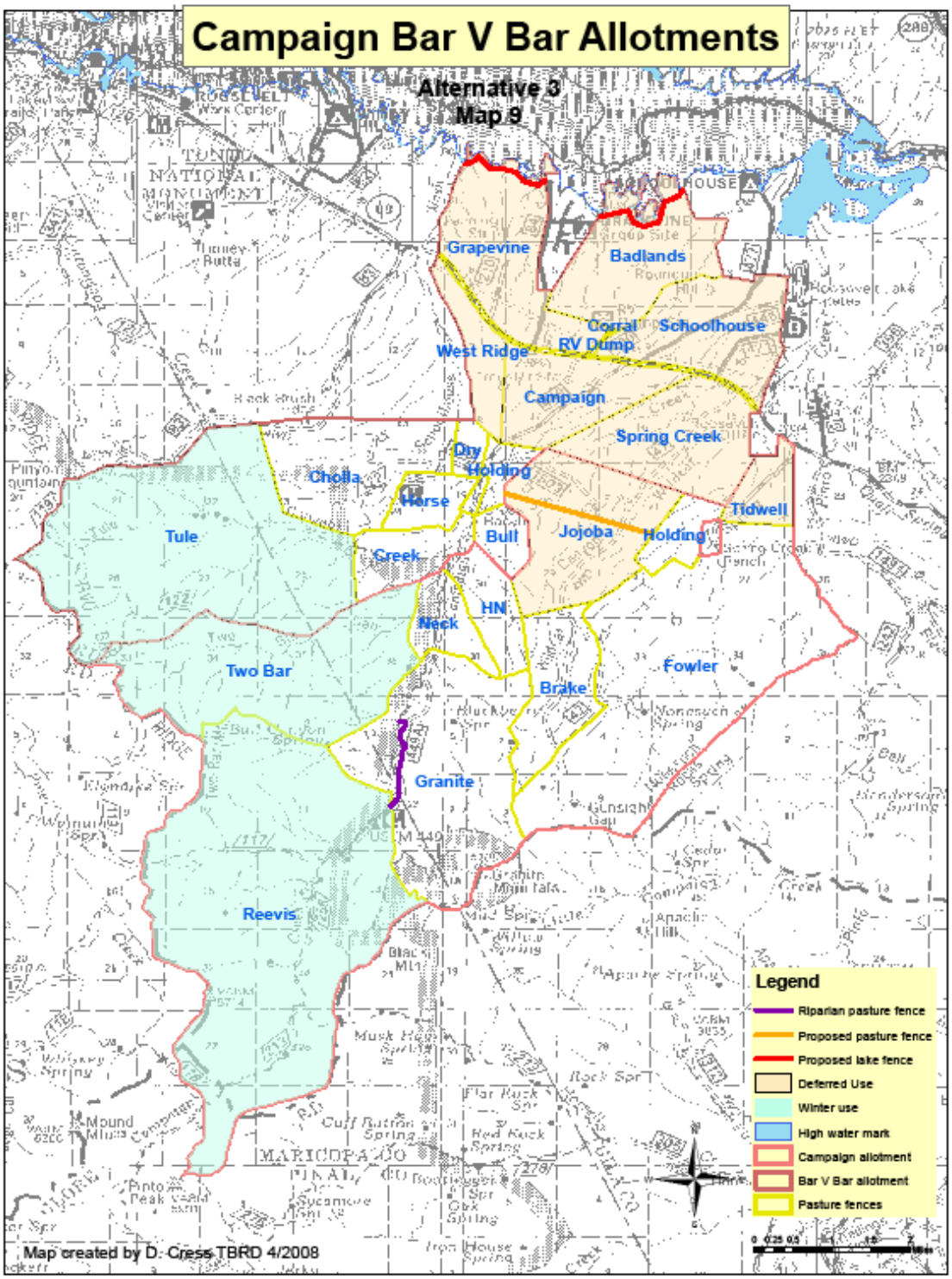
While monitoring techniques as described above would be conducted in key areas, these would not be the sole locations for gathering information from the grazing allotment to make decisions about the timing, intensity, duration, or frequency of livestock grazing in a given grazing season. The overall condition of the allotment and such things as distribution patterns or rangeland improvement conditions could be assessed at any given time to help make those decisions.



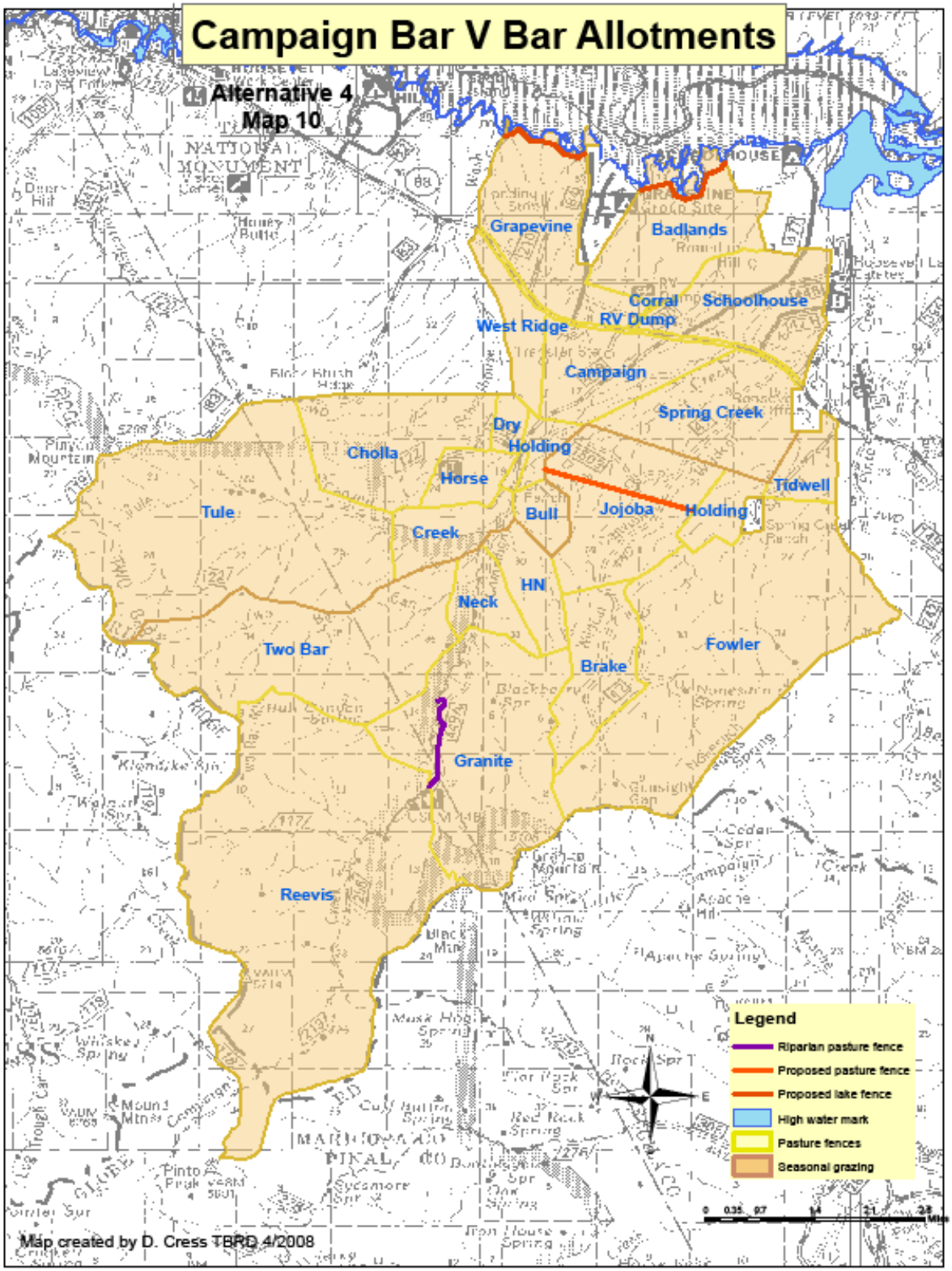
Map 7- Proposed Action



Map 8- Alternative 3 (*proposed division fence between Jojoba and Bobcat pastures has been completed)*



Map 9- Alternative 3



Map 10- Alternative 4

CHAPTER 3-ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart at the end of Chapter 3.

Soils

Livestock grazing can affect soil quality in several ways. Pressure exerted on the soil surface by large animals can cause compaction. Heavy grazing can reduce vegetation and litter cover. These factors can lead to decreased rainfall infiltration, increased runoff, increased erosion, and reduced soil organic matter and root growth. Changes in soil quality can also affect the productivity and composition of plant communities (NRCS, 2001; PR Vol. 3 #17).

Direct Effects: Hoof action of cattle can directly impact soils by compacting them. Compaction decreases water infiltration, restricts rooting depth, and increases the potential for erosion by water. The risk for compaction is greatest when soils are wet (NRCS, 1996). Trailing by cattle on steeper slopes can physically displace soils, leading to erosion. Cattle tend to concentrate on flatter areas especially if they are fairly open. Holechek (1992) reports that cattle tend to use 10 to 30% slopes thirty percent less than 0 to 10% slopes and 30 to 60% slopes sixty percent less than flats. Slopes over 60% are seldom used (Holechek, 1992). Because cattle tend to use flatter slopes, areas of impacted soils are more often found on gentler rather than steeper slopes.

Indirect Effects: Cattle indirectly impact soils by removing vegetation, resulting in a loss of protective cover and litter. The loss of vegetation and litter reduces infiltration and exposes the soils to raindrop impact and overland flow thus leading to soil surface crusting and increased erosion. The reduced cover can also cause a loss of soil organic matter and a reduction in soil microbes which play a significant role in nutrient cycling. Soils that are lower in organic matter have poor structure which can affect water infiltration and root growth.

Cumulative Effects: Cumulative effects include direct and indirect effects of the proposed action and alternatives when added to all past, present and reasonably foreseeable future actions. Past grazing actions have resulted in soil erosion and compaction while current management has, in some cases, prevented or slowed recovery. Other actions occurring in the project area that can impact soils and vegetation include recreation, roads, OHV use, livestock and wildlife grazing, and wildfire. Improperly maintained roads can cause soil erosion where runoff from roads is allowed to concentrate. Road maintenance that includes Best Management Practices (FSH 2509.25) should reduce sedimentation into streams and be beneficial to the watershed.

A long history of livestock grazing has most likely contributed to the existing soil, riparian and stream channel conditions. The existing soil conditions on much of the flatter, more accessible portions of the Campaign Allotment are less than satisfactory and this has reduced their ability to function properly.

Environmental Consequences by Alternatives

The four alternatives include: Alternative 1 (Permittee Proposed Action), Alternative 2 (No Grazing), Alternative 3 (Modified Proposed Action), Alternative 4 (Seasonal Use).

Criteria used to evaluate alternatives.

The alternatives are contrasted based on the likelihood of upland vegetation and soils attaining the short and long-term desired conditions described in the Affected Environment. The likelihood of attaining desired conditions depends largely on the type of management and stocking rates. Meeting short-term utilization goals will limit the annual impacts of livestock grazing. Long-term desired conditions are measured through effectiveness monitoring. Generally grazing intensity has a greater influence on impacts to soils and vegetation than timing of grazing.

The Campaign Allotment is largely dominated by browse; chaparral on the steeper granite slopes in the southern portion and jojoba on Sonoran Desert scrub in the flatter northern portion. Grasslands occur in a narrow transitional area near the middle of the allotment. Soils in less than satisfactory condition are generally on gentler slopes in the northern part of the allotment under Sonoran Desert scrub and some semi-desert grassland vegetation. These areas include the Grapevine, Badlands, Schoolhouse, West Ridge, Campaign, Spring Creek, Tidwell, and Jojoba Pastures. Forage utilization would be managed at a level corresponding to light to moderate intensity (30 to 40% on herbaceous species, 50% on shrubby species and annual forbs/grasses). However, because of the degraded conditions of the jojoba communities in the above mentioned pastures, utilization standards may not be fully appropriate for these ecosystems. The limit on browse use does not speak to the issue of the establishment or survival of jojoba seedlings in these areas of unsatisfactory soils where reproduction is sparse and other desirable Sonoran Desert plants are absent (Cress, 2008). The use limit also does not consider the effects of grazing on compacted soils. Achieving a 50% use rate on jojoba neither ensures seedling survival or improvement in compacted soils. It is questionable if achieving a 50% use rate will achieve desired conditions. Even with proper utilization hoof action may slow or prevent recovery of compacted soils. Stocking rate (number of cattle days per unit area) may be a more important gauge than utilization (Engels 1999).

Utilization monitoring is appropriate for grasslands and chaparral. If monitoring of key areas within these vegetation types shows that utilization limits are acceptable then management goals can be expected to be met. While it is also important that the 50% utilization limit on jojoba not be exceeded, even if this is met, management goals of improved soil and vegetation conditions may not necessarily follow. Other measurements may be more appropriate. Therefore the alternatives will be evaluated on the likelihood of: (1) chaparral and semi-desert grassland ecosystems meeting management goals as gauged by utilization limits and (2) Sonoran Desert scrub meeting management goals as gauged by density of grazing.

Proposed Action:

Direct and Indirect Effects: The success of meeting the short and long-term desired conditions will depend on timely monitoring and cattle management. The potential for adverse effects of cattle grazing soil and vegetation is greatest under this alternative. Forty percent of the soils are in less than satisfactory condition, many with a significant increase in bulk density resulting from compaction (FSH 2509.18-99-1). Conservative use guidelines could be met and still not allow compacted soils to recover. Rates of recovery are difficult to predict but rates are predicted to be slow if recovery occurs at all. Recovery of compacted soils is strongly correlated with grazing intensity (Engels, 1999).

In other areas of the allotment (mostly semi-desert grasslands and chaparral) soil and vegetation conditions are in better condition. Achieving use guidelines in these areas should allow conditions to improve and, over time, reach desired conditions.

Cumulative Effects: The direct and indirect effects of grazing in the uplands when combined with other past, present or reasonably foreseeable actions (cumulative effects) may slow or prevent recovery of those ecosystems in poor condition. In other areas, where ecosystems are in better condition, effects will be small.

No Grazing Alternative:

Direct and Indirect Effects: Since hoof action of cattle can cause direct impacts by compacting soils and since compaction decreases water infiltration, restricts rooting depth, and increases the hazard of water erosion (NRCS, 2001), the quickest and most likely recovery from past grazing activities would occur with complete protection from grazing. The amount of time required for complete recovery of degraded systems can vary from several years to decades depending on the severity of the impacts and the nature of the ecosystem. Studies in southeastern Arizona showed an increase in infiltration and decrease in compaction when cattle were excluded (Castellano 2006). The greatest improvement occurred in an area excluded for 54 years and least in an area excluded for 11 years. Although soil conditions that are currently less than satisfactory are attributable to the cumulative effects of historic grazing, continued grazing could slow or prevent recovery in some areas.

The No Grazing Alternative will be the most likely to allow recovery of impacted soils.

Cumulative Effects: The direct, indirect, and cumulative effects of eliminating grazing impacts will generally be beneficial and provide the best potential for attaining desired conditions.

Modified Proposed Action:

Direct and Indirect Effects: The effects of this alternative will be similar to Alternative 1 for most of the allotment but expected to improve conditions more quickly for the Grapevine, Badlands, Schoolhouse, West Ridge, Campaign, Spring Creek, Tidwell, and Jojoba Pastures, which will be deferred during years lacking significant production of annuals. Since these pastures will be rested completely in some years, impacted soils are more likely to recover. A possible negative impact is that these pastures will be grazed only during years of higher precipitation when soils are likely to be wet. Wet soils are easier to compact than dry soils (Engels, 1999). This can be minimized by using soil moisture content to help determine range readiness for livestock turnout in those pastures. Overall, the effects on these pastures would be more positive than Alternative 1 and 4 but not as beneficial as Alternative 2.

Although certain elements (cool season grazing) of Alternative 4 are preferable to this alternative, overall Alternative 3 remains the best strategy from a soils perspective because of deferred use of pastures in poor condition.

Cumulative Effects: The direct and indirect effects of this alternative when combined with other past, present, or reasonably foreseeable actions (cumulative effects) could result in desired conditions being reached at a faster rate than Alternatives 1 and 4 but more slowly than Alternative 2.

Seasonal Use:

Direct and Indirect Effects: The overall effects of this alternative will be slightly better than Alternative 1 but not as positive as Alternative 3. For the bulk of the unsatisfactory soils; which occur mostly in the Grapevine, Badlands, Schoolhouse, West Ridge, Campaign, Spring Creek, Tidwell, and Jojoba Pastures; Alternative 3 is much more positive since these pastures will be deferred when production of annuals is low. For the remainder of the allotment, Alternative 4 will be slightly better than Alternatives 1 and 3. Although grazing intensity generally has a greater influence on impacts to soils and vegetation than timing of grazing (Galt, 1999) cool season grazing normally leads to better cattle distribution. This would allow more traditionally heavily used areas to recover faster. A negative aspect is that soils are normally wetter in cool seasons and are more subject to compaction.

Certain elements (cool season grazing) of Alternative 4 are preferable to the other action alternatives but overall Alternative 3, because of deferment of use in pastures in poor condition, is preferable.

Cumulative Effects: The direct and indirect effects of grazing in the uplands where ecosystems in poor condition when combined with other past, present or reasonably foreseeable actions (cumulative effects) may slow or prevent recovery of in these areas. In other areas, where ecosystems are in better condition, effects will be small. The overall effects of this alternative are not nearly as beneficial as Alternative 2, slightly less beneficial than Alternative 3, and more beneficial than Alternative 1.

Vegetation and Range Improvements

A review of the best available scientific information from the field of rangeland management supports the concept that conservative or moderate livestock use yields results in plant vigor and diversity that are similar to an absence of livestock grazing (Holochek et al. 1999, Navarro et al. 2002, Loeser et al. 2007; PR Vol. 1 #1). These studies do not specify whether soils influenced by livestock grazing pressure were in satisfactory condition or some form of impaired condition (i.e. compacted) when the studies began. Climatic fluctuations such as precipitation rates continue to play a significant role in this concept as well. Stocking rates must be assessed frequently on this grazing allotment, regardless of the alternative chosen, due to bimodal, localized precipitation patterns and frequent regional drought events.

Predicted climatic changes over the next several years indicate warmer and drier conditions will develop in the southwest. A recent summary of scientific information provided in *Rangelands* (Archer and Predick, 2008; PR Vol. 2 #8) notes that these projections will likely affect vegetation composition, diversity, and rate of growth in desert ecosystems, reduce water availability, and trigger soil erosion losses through a reduction in stability as soil moisture content decreases and the intensity of rainfall events increases. Adaptive management strategies will become increasingly important if this occurs.

Direct and Indirect Effects: Livestock grazing on vegetation directly impacts plants by removing current year's growth. Warm season perennial grasses such as curly mesquite and three-awns are opportunistic and will become productive following not only summer monsoonal moisture but spring moisture as well. Grama (*Bouteloua*) species should receive very light grazing pressure during periods of rapid growth, which typically follow summer monsoon rain events. They can then be grazed more aggressively following seed set in the fall and winter months with little negative effect. Curly mesquite (*Hilaria belangeri*) should be protected from use during key growth periods to facilitate seed set and stolon production, which can help stabilize loose soils (USDA Forest Service 1988).

Other important forage species on this allotment include a variety of shrubs. The leaves and beans of jojoba (*Simmondsia chinensis*) are palatable and nutritious and provide an important source of forage in Sonoran Desert pastures (NRCS Plants Database, 2008). A study conducted on the allotment demonstrated jojoba's tolerance of browsing by cattle. Jojoba initiated new twigs from lateral buds to compensate for the loss of apical buds and twigs. Heavy browsing greatly reduced shrub size and forage yield, but moderate browsing resulted in yields similar to those on ungrazed plants (NRCS Plants Database, 2008; Roundy and Ruyle, 1989). Plants on the Campaign Allotment at lowest elevations are hedged from high historical use and occur in areas of compacted soils. They may respond differently to livestock browsing than plants used in this study (Range Specialist Existing Condition Report, 2008).

Studies on jojoba seedling survival indicate that rates of survival are dependent on climatic and biotic factors. Seedlings in sheltered areas had a higher rate of survival than those more exposed to climatic extremes and

rodent predation (Sherbrooke, 1977). Macroplots (.10 acre circular plots) were established by Forest and Park specialists on the Tonto National Monument, which contains comparable vegetation and soils and has not been grazed for 30 years. Results of those macroplots indicated a high presence of jojoba seedlings under existing mature vegetation with high surface litter presence. Jojoba seedlings were observed only sporadically on the Campaign Allotment during Forest data collection visits and pasture inspections, although young plants were observed in some areas during 2007 *Reading the Range* monitoring (PR Vol. 2 #8). An appropriate level of seedling recruitment for viable population sustainability is not well-demonstrated in current literature.

Studies considering other woody, perennial Sonoran Desert species indicate that climate and elevation are more responsible for diversity and density than livestock grazing (TNC, 2005). Perennial grasses are also more dependent upon climatic factors for survival however some studies indicated that grasses were more vigorous when grazing pressure occurred during dormancy (TNC, 2005).

Saguaro seedling establishment is slow and highly dependent upon temperature, rainfall (soil moisture), and herbivory by insects. Micro-sites (nurse plants) are important for regulating temperature and providing shade essential for saguaro establishment. Livestock negatively affect saguaro seedling establishment through trampling under nurse plants (particularly mesquite and palo verde) and through herbivory. Indirect effects can also occur through the reduction of multi-storied shrubby canopy layers, which in turn reduces litter, understory cover, and nurse plant cover (TNC, 2005).

Biological soil crusts in the Sonoran Desert influence nutrient cycling, nitrogen fixation, and nutrient availability to plants; seedling germination and vascular plant growth; water infiltration and runoff; and soil stabilization and erosion. Livestock grazing negatively affects soil crusts through trampling, which reduces biological crust cover, frequency biomass, species richness and diversity, and ecological function (TNC, 2005). These crusts are also affected by mechanical disturbances from off-road vehicles.

The conclusion of a literature synthesis provided by The Nature Conservancy is that “continuous grazing in which livestock are maintained within fenced allotments year long is not a feasible grazing management strategy on Sonoran Desert public lands” (TNC, 2005). The report also states that flexible stocking rates and the ability to move livestock quickly in response to changing conditions is the best management strategy.

The flowers and beans of catclaw (*Acacia*), mesquite (*Prosopis*), and mimosa are palatable and desirable to livestock when being produced in late spring and early summer following adequate winter precipitation. In years of low precipitation or during hot summer months, these plants often become dormant and retain only a minimum cover of leaves.

False mesquite (*Calliandra*) produces good quality browse in early spring following adequate winter precipitation and is often available before the onset of perennial grasses. It has a tendency to become dormant in early summer when precipitation is scarce but will become productive again following adequate moisture from summer monsoon rains. False mesquite can withstand aggressive grazing pressure and often becomes the dominant forage plant on the landscape when perennial grasses have been removed (USDA Forest Service 1988).

Various species of spring annuals are the preferred choice for livestock grazing when adequate winter moisture allows sufficient growth. Spring annuals can occur in all life zones on the Campaign allotment but are most prevalent at the lowest elevation in the Sonoran Desert. They are most abundant following winter and early spring rains when the ground begins to warm, usually in March and April but occasionally extending into early May. Pasture inspections on the Campaign Allotment and others on the Tonto Basin Ranger District indicate that grazing pressure on accompanying shrubs is reduced while annuals are green and palatable. Once annuals begin to cure, use of palatable shrubs in those areas begins to increase in response to new growth and flower

production resulting from winter moisture. Grazing of annual forbs and grasses led to changes in composition of annual plant communities in a two-year study on grazed versus ungrazed desert sites (Waser and Price, 1981). Sites became dominated by a few annual species while those considered relatively rare on the sites tended to drop out of grazed sites.

Cumulative Effects: The Campaign grazing allotment is adjacent to three other livestock grazing allotments within the same watersheds, two of which are administered by the Tonto Basin Ranger District. Only one of these allotments is currently active (Schoolhouse). It is conservatively stocked at this time. Cumulative watershed effects for these allotments being grazed under conservative use guidelines and adaptive management techniques are anticipated to be minimal in contrast to the size and complexity of the watersheds themselves (Map 11).

Historic grazing on this allotment also contributed to cumulative effects. Stocking rates were disproportionately high during the first half of the 20th century. Impaired soils and vegetation observed today are likely a result of those early impacts followed by stocking rates of several hundred animals each year throughout the remainder of that century. Historical overuse by livestock in the lower elevations and flatter terrain of the allotment has led to impaired soil conditions and a reduction in the vigor and diversity of desirable plant species (Range Specialist Report, Soils Specialist Report; PR Vol. 1 #45; 2 #8).

Recent pasture inspections indicate that livestock distribution is generally satisfactory on the allotment. Continued attention by the permittee to proper distribution of livestock on the allotment is essential to reaching desired conditions. Even with improved water developments and properly maintained pasture divisions, livestock will still tend to concentrate on flatter terrain and near surface water. Many of these areas already exhibit impaired soil and vegetation conditions and proper use levels may be met quickly with concentrated use. Changes in management will be necessary if herding and salting are not effective in distributing animals across the landscape.

Environmental Consequences by Alternatives

The alternatives are contrasted based on the likelihood of upland vegetation and soils attaining the short and long-term desired conditions described in the Affected Environment. The likelihood of attaining desired conditions depends largely on the type of management, permittee effort, and stocking rates. Meeting short-term utilization goals will limit the annual impacts of livestock grazing. Long-term desired conditions are expected to improve by implementing a conservative adaptive management, deferred rotation grazing strategy. Conditions will be measured through effectiveness monitoring.

Proposed Action:

Implementation of adaptive management, conservative upland forage utilization guidelines, and conservative riparian forage utilization guidelines would allow this action to move vegetative conditions on the allotment toward desired conditions as outlined in Chapter 1 of the EA. The flexibility given to resource managers to adjust the timing, intensity, frequency, and duration of livestock grazing in any pasture at any time will ensure that plants are not used beyond levels that will provide for recovery, improved vigor, and recruitment of desirable species. The rate of recovery of vegetation impacted by historical overuse will depend not only on these guidelines but also on soil conditions and the climatic factors mentioned in the previous section.

Direct and Indirect Effects: The permittee proposal to divide the Jojoba/ Bobcat pasture into two units would help improve livestock distribution in an area of high historical and concentrated use. Rotation of livestock through the two smaller units would be shorter in duration, although higher in intensity if numbers remain the same. Each pasture could be rested more frequently over time, which could be beneficial to the recovery of

impaired Sonoran Desert vegetation. Due to the impaired soils in this pasture, however, vegetation recovery will depend heavily on the ability of the soils to recover to a more stable and productive state.

The permittee also proposes to stock yearlings opportunistically at any time of the year rather than confining use to the spring months (January through May). Implementation of this action could provide protection to Sonoran Desert pastures typically stocked with yearlings during wet spring months when critical shrub growth was occurring. Yearlings could then be stocked during months when soil moisture content was low and jojoba and other desert shrubs had finished producing new growth. This would facilitate recovery of impaired vegetation and move conditions more quickly toward management objectives described in Chapter 1.

Grazing capacity is expected to remain similar to current stocking rates initially, with the potential to increase capacity over time as soils and vegetation recover.

Cumulative Effects: Continued livestock grazing combined with historic overgrazing effects on this allotment may slow the rate of recovery of impaired vegetation and soils. Effects of livestock grazing on this allotment in combination with grazing on adjacent allotments may increase the cumulative effects of sedimentation into the Salt River and Pinto Creek watersheds (Map 11). Pinto Creek has been assessed by ADEQ as "impaired by selenium and copper" from mining operations and natural deposits in the Pinto Creek watershed (PR Vol. 2 #16). Given the size of the watershed and the amount of land not currently grazed, effects from sedimentation are expected to be insignificant. Livestock grazing would not contribute to mineral effects in Pinto Creek.

No Grazing Alternative:

Direct and Indirect Effects: The effects of conservative grazing on vegetation in Sonoran Desert and semi-desert systems have been demonstrated to be similar to no grazing effects, although grazing pressure on Sonoran Desert vegetation results in a greater loss of annual forb species diversity and biological soil crusts. Recovery of desirable plant species in the absence of grazing may initially be faster in some areas, particularly riparian areas, but those rates will depend on soil recovery, precipitation and other climatic factors. Deer and other wildlife will still provide grazing and browsing pressure to plants. Areas of traditional livestock concentration, such as near water developments or salting and bedding grounds may recover fastest in the absence of livestock grazing. This alternative provides the best opportunity for allowing plants to maximize growth given the description of plant phenology provided above. The alternative does not meet Forest Service policy for land management (FSM 2202.1, 2203.1; PR Vol. 1 #1).

If land managers choose to remove range improvements from the allotment, there may be consequences to recreational users and wildlife. Often, recreational users take advantage of existing corrals and water developments to care for their horses or mules while using National Forest System trails. Wildlife has grown accustomed to reliable water at water developments, so there may be short-term detrimental impacts to their populations without those water sources. Wildlife species such as birds and deer, however, may benefit from the removal of pasture fences on the allotment. If range improvements were left on the allotment, arrangements would need to be made for their maintenance. Currently, permittees are responsible for maintenance of all improvements under the terms of their grazing permits (PR Vol. 1 #1).

Livestock ranching plays an historical as well as economic role in the small communities near the Campaign Allotment. This no grazing alternative would have a negative economic impact to the permittee and his employees directly and an indirect economic effect to the small communities as well. The magnitude of these effects, particularly the indirect effects, is difficult to predict.

Cumulative Effects: Over time, an absence of livestock grazing has the potential to provide for improved soil and vegetation conditions.

Modified Proposed Action:

Direct and Indirect Effects: Effects from this alternative would be similar to those described under the proposed action. Implementation of adaptive management, conservative upland forage utilization guidelines, and conservative riparian forage utilization guidelines will allow this action to move vegetative conditions on the allotment toward desired conditions as outlined in Chapter 1 of the EA. The flexibility given to resource managers to adjust the timing, intensity, frequency, and duration of livestock grazing in any pasture at any time will ensure that plants are not used beyond levels that will provide for recovery, improved vigor, and recruitment of desirable species. The rate of recovery of vegetation impacted by historical overuse will depend not only on these guidelines and on soil conditions but also on the climatic factors mentioned in the previous section.

Limiting grazing in the Tule, Two Bar, and Reevis Pastures to winter months (November through March) would protect riparian vegetation in Tule, Two Bar, and Campaign Creeks and allow herbaceous and woody vegetation to recover more quickly than under Alternative 1. Deferred use of the Grapevine, Badlands, Schoolhouse, West Ridge, Campaign, Spring Creek, Tidwell, and Jojoba Pastures during years lacking significant annual forage production would minimize grazing pressure on shrubby vegetation. This in turn would improve habitat for saguaro and jojoba recruitment and provide an opportunity for smaller shrubby vegetation to increase in composition and vigor.

The permittee proposal to divide the Jojoba/ Bobcat pasture into two units would help improve livestock distribution in an area of high historical and concentrated use. Rotation of livestock through the two smaller units would be shorter in duration, although higher in intensity if numbers remain the same. Each pasture could be rested more frequently over time, which could be beneficial to the recovery of impaired Sonoran Desert vegetation. Due to the impaired soils in this pasture, however, vegetation recovery will depend heavily on the ability of the soils to recover to a more stable and productive state.

The Forest Service proposal to build fences along the lake in the Schoolhouse and Grapevine Pastures would directly affect riparian vegetation by eliminating grazing pressure. Bermuda grass, salt cedar (*Tamarix spp.*), cottonwoods, and other riparian species would respond quickly to an absence of use by livestock but would continue to be affected by fluctuating lake levels. The remaining portions of these pastures would be affected by changing livestock distribution patterns as cattle search for new water and forage locations. Areas of vegetation previously lightly used may experience higher utilization levels. Biological soil crusts not previously exposed to concentrated impacts may be negatively affected. Water developments would need to be constructed to replace access to lake water and enhance proper livestock distribution.

The Grapevine, Schoolhouse, and Badlands Pastures are currently divided by fences running north/south into the lake. When water levels are low, these fences are exposed and necessary for livestock control under current management. When water levels are high, these fences are submerged and pose a hazard to recreational users enjoying water sports near the shoreline. The proposed fence in the Schoolhouse and Grapevine Pastures would be constructed above the high water mark, eliminating the need for pasture fences running into the lake. This would prevent potential injuries to recreational users and any subsequent liability to the Forest Service.

Cumulative Effects: Continued livestock grazing combined with effects from historic overgrazing on this allotment may slow the rate of recovery of impaired vegetation and soils. Effects of livestock grazing on this allotment in combination with livestock grazing on adjacent allotments may increase the cumulative effects of sedimentation into the Salt River and Pinto Creek watersheds. Given the size of these watersheds and the amount of land not currently grazed, these effects are expected to be insignificant. Deferred use of pastures containing the most impaired soils and vegetation would further minimize runoff potential as soils and vegetation recover. Livestock grazing would not contribute to mineral effects in Pinto Creek.

Grazing capacity is expected to remain similar to current stocking rates initially, with the potential to increase capacity over time as soils and vegetation recover.

Overall, this alternative would provide more protection to impaired upland and riparian vegetation than Alternative 1.

Seasonal Grazing:

Direct and Indirect Effects: A seasonal alternative would provide rest from livestock grazing pressure to resources on the allotment from June 1 through September 30. Impacts to soils and vegetation would still occur during the winter precipitation period, so monitoring would be important to keep use levels on vegetation within acceptable limits. A lack of grazing pressure on vegetation stressed during the hot summer months could help move those plants toward desired conditions more quickly than with grazing pressure. In years of adequate precipitation, vegetation could experience strong growth and reproduction in the absence of livestock grazing during key periods and could help move vegetation more quickly toward desired conditions as well. This is dependent upon soil conditions and climatic factors as well and not merely the absence of livestock grazing.

Seasonal grazing would provide the opportunity to apply a rest rotation grazing strategy to this allotment instead of deferred rotation grazing. A seasonal grazing strategy would provide more flexibility to land managers and allow pastures with impaired soils and vegetation to be rested more frequently during the grazing season, particularly when drought conditions persist. This would also improve habitat for saguaro and jojoba recruitment and provide an opportunity for smaller shrubby vegetation to increase in composition and vigor in Sonoran Desert pastures. Limiting grazing to cooler months would protect riparian vegetation in Tule, Two Bar, and Campaign Creeks and allow herbaceous and woody vegetation to recover more quickly than under Alternative 1.

Under the proposed action and alternative 3, it may be necessary for the permittee to move livestock early when conditions are unfavorable for grazing. This could lead to the permittee being required to remove cattle from the allotment if all suitable pastures are utilized before the end of the grazing season.

June on this allotment is typically hot and dry, followed by monsoon rain events in July, August, and September. Based on the description of plant phenology provided earlier in this document, key forage species on the allotment would have a better opportunity for higher production and improving vigor and diversity under this alternative than under a year long grazing alternative.

Economic impacts to the permittee could be greater under this alternative than under year long grazing alternatives, unless a lack of adequate resources forced the removal of livestock from the allotment during a year-long grazing, deferred rotation system. The permittee would be required to remove all livestock from the allotment and care for them for four months, or adopt another management strategy such as yearling production which would allow animals to be sold at the end of the grazing season (late April or May).

Cumulative Effects: Continued livestock grazing combined with effects from historic overgrazing on this allotment may slow the rate of recovery of impaired vegetation and soils. Effects of livestock grazing on this allotment in combination with livestock grazing on adjacent allotments may increase the cumulative effects of sedimentation into the Salt River and Pinto Creek watersheds. Given the size of these watersheds and the amount of land not currently grazed, these effects are expected to be insignificant. Seasonal use of pastures would further minimize runoff potential as soils and vegetation recover. Livestock grazing would not contribute to mineral effects in Pinto Creek.

Grazing capacity is expected to remain similar to current stocking rates initially, with the potential to increase capacity over time as soils and vegetation recover.

Overall, this alternative would provide more protection to impaired upland and riparian vegetation than Alternatives 1 or 3.

Riparian Areas and Streams

Riparian areas have ecological importance beyond their small percentage of land area. This percentage is even smaller in the arid southwestern United States than other regions, and inversely, their importance more critical. Current research shows that grazing has greater effects on southwestern riparian understory plant communities than adjacent upland plant communities. Southwestern riparian plant communities are more sensitive to livestock grazing, and more likely to experience reductions in plant species diversity, than plant communities that evolved with ungulate grazing (Milchunas 2006). Clary and Kruse (2003) concur that southwestern riparian systems have not had the intensive study that other regional riparian ecosystems have had. In their review, they state the necessity to rely on proven principles and practices from other similar riparian areas to fill the gaps in management applications in the Southwest (PR Vol. 3 #21).

Direct Effects: Riparian areas, with their high species diversity and structural complexity, provide critical terrestrial and aquatic habitat to wildlife species from adjacent upland and riparian area environments. Cattle tend to congregate in many riparian areas. They favor riparian forage and water availability, shade in warm months and gentle topography. Excessive grazing and trampling impacts can destabilize and break down stream banks, cause mechanical damage to shrubs and small trees, reduce or eliminate woody seedlings and saplings, expose soils, eliminate or shift native herbaceous species to weedy or exotic species with reduced root systems, and cause widening or incision of stream channels (Trimble and Mendel 1995, Clary and Kruse 2003). These changes may lead to loss of stream stability and function (Rosgen 1996). Stream channel profile, stream bank stability, streamside vegetation, channel bottom embeddedness, stream sediments and stream temperature are all aquatic species habitat features that can be directly or indirectly affected by livestock grazing practices. Maintaining native obligate riparian plants is extremely important to many streams because of their resistance to the erosive energy of flowing water (Clary and Kruse 2003). Herbaceous riparian vegetation is especially important to stabilizing stream bank, point bar and floodplain deposits, critical to the channel restoration process (Clary and Kruse 2003). One of the most important factors influencing riparian conditions is utilization (Mosley et al 1999, Clary and Kruse 2003).

Indirect effects: Stream channels and riparian areas can be affected indirectly by cattle grazing on adjacent uplands within the watershed. Soil compaction, decreased infiltration, and loss or alteration of upland vegetation can cause increased runoff and higher peak flows, leading to channel adjustments and decrease in stream function. Stream channels and riparian areas can be indirectly affected by unstable or degraded channels and riparian areas that may occur upstream or downstream.

Cumulative effects: Most of the stream channels and riparian areas on the Campaign Allotment are in impaired or unstable condition (Mason and Johnson 1999), functioning-at-risk or non-functioning (Barrett et al 1993). Historic grazing has had the most extensive effects within the allotment. The allotment has been grazed for over 100 years. The 2210 range files document poor distribution since 1929, with cattle concentrating on flat areas and near riparian areas. Lacking developed, off-channel waters, cattle spent a disproportionate amount of time in streams and springs, causing deterioration of the channels.

Existing grazing management activities have also affected riparian areas and stream channels but to a lesser degree than historical grazing due to management practices (reduced numbers, increased number of pastures, deferred and rest-rotation schedules, active herding, improved water distribution).

Travel management activities occurring on the allotment that may have impacted streams and riparian areas include roads, lack of road maintenance, and off-road vehicle use. Activities associated with the Reevis

Mountain School; a private inholding located along Campaign Creek between the Reevis and Granite Pastures; include the diversion of water under an existing water right from Campaign Creek and springs that feed Campaign Creek, and riparian vegetation trimming near the channel. The Two Bar Fire of 2005 burned 1800 acres with low fire intensity. There may have been increased post-fire flows in Two Bar Canyon. These activities or disturbances and their impacts vary from short-term (point-in-time) to chronic. They are localized and often have minimal and/or unmeasurable effects to stream channels and riparian areas

The exception to this is Forest Road # 449 that follows Campaign Creek from the highway (SR188) south to the Reevis Mountain School. From SR188 to the Rafter Cross Ranch, Campaign Creek is wide, braided and dry and has low potential for recovery. Above the ranch, the valley bottom narrows and the road crosses the creek several times, introducing a significant amount of sediment.

Introduction of a common herbaceous emergent species, American bulrush (*Schoenoplectus americanus*), should have a positive effect on the recovery of stream channels and riparian areas. American bulrush is relatively resistant to grazing pressure. Limiting initial use after planting and grazing conservatively in subsequent years should result in successful establishment and maintenance.

A statewide ten-year drought has likely had an effect on the Campaign Allotment (Arizona Department of Water Resources, 2008). According to NOAA National Climatic Data Center data, there has been a marked upward trend in the globally averaged annual mean surface temperature since the mid-1970s (Shein 2006). Models used by Seager et al. (2007) to predict how climate change will affect the southwestern United States indicate that the current drought will intensify and continue for years to decades. However, the models are too broad-scale to predict how climate change might affect the monsoons, which contribute 40% of the total annual precipitation received on the Tonto National Forest (Lenart 2005). It is difficult to predict how global warming might affect the Campaign/Bar V Bar Allotment specifically, but it is likely to become warmer and dryer.

Environmental Consequences by Alternatives

Criteria used to evaluate alternatives are based on the likelihood that riparian vegetation and stream channels will achieve desired conditions described in the Tonto Forest Plan (LMP). Desired conditions are categorized as either short or long term. Key reaches were identified where monitoring would occur to determine achievement of desired conditions (Map 6). Key reaches identified include Campaign Creek above the Reevis Mountain School, Campaign Creek below Reevis Mountain School, Two Bar Canyon in two locations, and Tule Canyon.

Proposed Action:

Direct Effects: The potential for adverse direct effects of cattle grazing to stream channels and riparian areas is the greatest under this alternative. All key reaches are in pastures where water available to livestock is located primarily in springs and riparian areas. If the mitigation measures are implemented, direct effects of grazing will be minimized and riparian areas and stream channels should continue to improve. The mitigation measures are generally more difficult to implement between May and the end of October.

Riparian utilization guidelines apply to Campaign Creek in the Reevis Pasture and Tule Canyon. Campaign Creek in the Granite Pasture will be fenced to create a riparian pasture. Cattle will travel through this pasture when moving to and from nearby units, traveling primarily along the road. Use in the riparian pasture is expected to be incidental and not exceed guidelines. Riparian use guidelines do not apply to Spring Creek and Two Bar Canyon because of a lack of measurable vegetation. Although these channels are impaired they have moderate to high potential to support riparian vegetation if grazing use is deferred. Limiting trailing impacts in Tule and Two Bar Canyons is critical to maintaining and/or improving riparian vegetation and stream channel condition.

Indirect Effects: Under this alternative, watershed condition of pastures where key reaches are located would be maintained or improved, minimizing any negative indirect effects to stream channels and riparian vegetation.

Cumulative Effects: If riparian mitigation measures are successfully implemented on an annual basis, the direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, should result in reaching desired conditions, although more slowly than under the No Grazing Alternative.

Consistency with the Tonto National Forest Plan: Complying with riparian mitigation measures will be most difficult under this alternative. If successfully implemented, this alternative would meet the Forest Plan standards listed above to protect, manage, and restore riparian areas.

No Grazing Alternative:

Direct Effects. The No Grazing Alternative reduces direct effects of cattle grazing to recovering stream channels and riparian areas. The potential and rates of recovery are variable and difficult to predict, but will be most rapid under this alternative.

Riparian areas are generally regarded as having high inherent potential for recovery from disturbance (Milchunas 2006). Stream channel and riparian area recovery are considered optimal when the direct effects of livestock grazing are eliminated (Clary and Kruse 2003). The amount of time required for riparian recovery after severe degradation can vary from several years to decades (Clary and Kruse 2003). Recovery is dependent on existing condition of the watershed, stream channel and riparian area (flow regime, channel gradient, dominant channel substrate, watershed area, type and extent of riparian vegetation) and future management, climate and natural disturbances (Kindschy 1987, 1994).

Recovery of stream channel function in all key reaches on the Campaign Allotment is closely tied to riparian vegetation recovery. The degree to which riparian flora has been compromised varies among riparian areas, but structural and compositional diversity has been impacted by livestock grazing in all key riparian reaches. Rates of re-establishment and recovery will vary. Riparian tree age class and species diversity is relatively high in Campaign Creek, Tule Canyon and Spring Creek, but low for in Two Bar Canyon. Shrub and herbaceous species diversity and cover are low in all key reaches except Tule Canyon. Cottonwood and willow species have high potential for dispersal into riparian areas because their seeds are wind-borne. For many other species, opportunities for natural re-introduction are low. Fragmented distribution of riparian areas will also influence the rates of species re-establishment.

Indirect Effects: Under this alternative, watershed condition of the pastures where key reaches are located would be maintained or improved at the fastest rate.

Cumulative Effects: The direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, should result in reaching desired conditions at the fastest rate.

Consistency with the Tonto National Forest Plan: Under this alternative, the desired conditions described for stream channels and riparian areas will be achieved in the shortest timeframe.

Modified Proposed Action:

Direct Effects. This alternative is intended to minimize the direct effects of cattle grazing in riparian areas in all of the grazed key reaches with the exception of Spring Creek. Grazing during the winter months provides a higher likelihood of implementing riparian area mitigation measures.

As stated for Alternative 1, riparian utilization guidelines are applicable for Campaign Creek in the Reevis Pasture and Tule Canyon. Campaign Creek in the Granite Pasture will be fenced to create a riparian pasture. Use in the riparian pasture is expected to be incidental and not exceed guidelines. The riparian use guidelines do not apply in Spring Creek and Two Bar Canyons, because of the lack of measurable vegetation. Although these channels are impaired, if grazing use is deferred, they have moderate to high potential to support riparian vegetation. Limiting trailing impacts in Tule and Two Bar Canyons is critical to maintaining and/or improving the riparian vegetation and stream channel condition.

Indirect Effects: Under this alternative, watershed condition of the pastures where key reaches are located would be maintained or improved, minimizing any negative indirect effects to stream channels and riparian vegetation.

Cumulative Effects: If riparian mitigation measures are successfully implemented on an annual basis, the direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, should be comparable to Alternatives 1 and 4.

Consistency with the Tonto National Forest Plan: If riparian mitigation, measures are implemented, this alternative would meet the Forest Plan standards listed above to protect, manage, and restore riparian areas. Efforts to comply with riparian mitigation measures are more likely to be successful for Alternative 3 than Alternative 1.

Seasonal Use:

Direct Effects. Under this alternative, the direct effects of grazing to riparian areas and stream channels are similar to those discussed under Alternative 3. The key difference is that October and April may be hot, riparian tree species will be leafed out, and implementation of mitigation measures may be more difficult.

Because the riparian vegetation in Spring Creek and Two Bar Canyon is too sparse to monitor, this alternative would result in more impacts than Alternative 3 since the key reaches could be grazed during two additional months, October and April. These months are typically hot and cattle would spend more time in the riparian areas. Campaign Creek in the Granite Pasture will be fenced to create a riparian pasture. Use in the riparian pasture is expected to be incidental and not exceed guidelines.

Indirect Effects: Under this alternative, watershed condition of the pastures where key reaches are located would be maintained or improved, minimizing any negative indirect effects to stream channels and riparian vegetation.

Cumulative Effects: If riparian mitigation measures are successfully implemented on an annual basis, the direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects) as listed above, should be comparable to Alternatives 1 and 3.

Consistency with the Tonto National Forest Plan: If riparian mitigation measures are implemented, this alternative would meet the Forest Plan standards listed above to protect, manage, and restore riparian areas. Efforts to comply with riparian mitigation measures are more likely to be successful for Alternative 4 than Alternative 1, but less so than Alternative 3.

Wildlife

Livestock grazing can affect wildlife species and their habitats in several ways if not managed correctly. Grazing may reduce vegetation growth and litter cover. Litter encourages plant recovery after drought because it traps seeds and lowers evaporative loss (Milchunas 2006). The seeds and subsequent plants provide wildlife with food, nesting sites, and cover.

This section summarizes expected effects to wildlife and plant species from implementation of each alternative, including a discussion of impacts to general wildlife, Management Indicator Species (MIS), and TES species. Specific Forest-identified sensitive species include: lowland leopard frog (*Rana yavapaiensis*), bald eagle (*Haliaeetus leucocephalus*), Gila longfin dace (*Agosia chrysogaster chrysogaster*), and Gila topminnow (*Poeciliopsis occidentalis occidentalis*) (PR Vol. 2 #20). Although the USFWS recently announced their intent to consider protecting the northern Mexican garter snake (*Thamnophis eques*) under the Endangered Species Act, and the narrow-headed garter snake (*Thamnophis rufipunctatus*) is a species of concern, we are not considering grazing effects in this assessment. Sampling in the Salt River and area creeks (e.g., Pinto Creek) has not detected this species for several years (Holycross et al. 2006).

Direct Effects: Riparian and upland areas provide important terrestrial and aquatic habitat to wildlife species. Congregation of livestock (herding, stock tank areas, trailering, loading/unloading, maintenance of livestock facilities, branding) may have direct effects to wildlife or associated habitat when considering grazing alternatives. Effects may include removal of vegetation, dust accumulation, noise, soil compaction, and avoidance of areas by wildlife.

Excessive grazing and trampling impacts destabilize and break down stream banks which results in negative effects to aquatic wildlife. These effects may be realized through modification of stream morphology and function, increased siltation, and reduction of woody and herbaceous vegetation. During scouring floods fish populations are more vulnerable to removal without stable banks and associated vegetation in place.

Upland areas and associated habitats may be directly affected by grazing and associated activities through livestock consuming plants, bedding, congregating at water developments, herding, off-loading livestock, and branding activities. Upland vegetation density and composition may be reduced if livestock grazing and associated activities are not managed to reduce or minimize such affects.

Livestock grazing can directly affect fisheries and wildlife by altering riparian and upland soils and vegetation composition, density and structure, water quality, quantity, temperature and flow patterns, shape and form of the stream channel, and aquatic and terrestrial faunal assemblage composition (Kauffman and Krueger 1984; Fleischner 1994, Trimble and Mendel 1995: Belsky et al. 1999).

Indirect Effects: Congregation of livestock (herding, stock tank areas, trailering, loading/unloading, maintenance of livestock facilities, branding) may have indirect effects to wildlife or associated habitat when considering grazing alternatives. Effects may include removal of vegetation, dust accumulation, noise, avoidance of areas by wildlife, soil compaction, and watershed effects. Impacts may vary depending upon circumstances associated with the indirect effects.

Hoof action by livestock can impact soils by compacting them, especially when soils are wet. Compacted soils in uplands have lower rates of water infiltration and may result in increased runoff and soil loss resulting in indirect negative effects to riparian aquatic and terrestrial species. As a result, wildlife habitat may be affected by increased runoff and soil loss, especially if riparian and upland conditions are not properly functioning.

Use of woody and herbaceous vegetation by livestock may result in increased stream temperatures, reduced ground cover, and organic litter which may indirectly affect aquatic and terrestrial wildlife through increased surface runoff and potentially reducing the establishment of additional vegetative cover in the uplands and riparian areas. In addition, habitat available to prey species in the uplands and riparian area may be reduced by livestock grazing, resulting in reduced numbers of prey species and / or increased predation upon those species. Water quality may also be indirectly affected by livestock use in the uplands as a result of decreased infiltration of surface water and livestock fecal accumulation.

Cumulative Effects: Vegetation and soils were most impacted by livestock in the past when the allotment was more heavily stocked than more recent levels. Many of the vegetation communities on gentler slopes have reduced species diversity, decreased plant vigor, and decreased forage production as a result of heavy stocking rates and associated impacts to vegetation, soils, and riparian areas.

Environmental Consequences by Alternatives

The four alternatives include: Alternative 1 (Proposed Action), Alternative 2 (No Grazing), Alternative 3 (Modified Proposed Action, Alternative 4 (Seasonal Use).

Proposed Action:

General Wildlife Effects: Over time, upland habitat capability for game species such as deer and quail may slowly improve due to increases in herbaceous vigor and density in openings resulting from light to moderate use, if management prescriptions are followed and cattle are moved when use guidelines are met. Improvements to upland habitat are expected to be slower under this alternative than other grazing alternatives due to year-long grazing and quicker attainment of authorized utilization levels on browse and herbaceous species. Riparian habitat is expected to improve under this alternative, although at a slower rate than the other alternatives, if management prescriptions are followed and cattle are moved when use guidelines are met.

Small game and non-game species will generally increase over time with an increase in herbaceous cover and herbaceous species diversity, although at slower rates than Alternatives 2, 3, and 4 for the reasons described above. Improvements in resource conditions for associated habitat would be expected to occur more slowly than they would under implementation of any of the other alternatives for the reasons outlined above.

MIS: Generally, with an improvement in soils and vegetation under this alternative, improvements in wildlife habitat should occur over time, although at a slower rate and to a lesser degree than Alternatives 2, 3, and 4 for the reasons mentioned above.

Habitat conditions for riparian (summer tanager, hooded oriole, black hawk, western wood pewee) and aquatic (macroinvertebrates) species are expected to improve over time due to lower grazing levels than historical levels, although at a slower rate than the other alternatives, if management prescriptions are followed and cattle are moved when use guidelines are met. The slower recovery relative to other alternatives is due to year-long use of the allotment.

Species that are indicators of good ground cover (ash-throated flycatcher) and general woodland conditions (juniper titmouse) would likely experience the smallest habitat gain under this alternative than any of the other alternatives because it could result in the lowest potential for an increase in native perennial grasses in the most-frequently used areas. This is due to year-long use of the allotment.

Chaparral species (rufous-sided towhee, black-chinned sparrow) may experience the smallest habitat gain under this alternative than any of the other alternatives reasons outlined above.

Habitat conditions for desert scrub species (black-throated sparrow, brown towhee) are not as likely to improve under this alternative as with other alternatives, due to reasons outlined above.

Special Status Species:

Southwest Willow Flycatcher: This species and its habitat do not occur on this allotment, although established populations occur within two miles of the allotment's northeastern boundary. Because Alternative 1 would allow continued livestock grazing near occupied habitat, a determination of "may effect, not likely to adversely affect" is appropriate. The Biological Assessment (BA), which evaluates effects of the selected action on TES species and their habitat, will contain a more detailed analysis of this species.

Lowland Leopard Frog: Livestock grazing can have positive and negative effects on amphibians (Jennings 1988; Rosen and Schwalbe 1998; Sredl and Saylor 1998). Livestock tanks may benefit amphibians by providing aquatic habitat if they contain approved wildlife escape ramps and are maintained yearlong, even when cattle are not in that pasture. However, overgrazing negatively impacts their habitat by removing herbaceous vegetation. This can increase ambient ground and water temperatures and eliminate undercut banks, increasing the risk of amphibian desiccation (Jennings 1988). Cattle can also trample egg masses and increase levels of organic wastes (Jennings 1988). Overgrazing in upland habitats may increase runoff, which can lead to increased sedimentation of pool habitat in the drainages below (Jennings 1988, Belsky and Blumenthal 1997).

Alternative 1 would be the least beneficial to the lowland leopard frog. Cattle would be able to graze riparian areas during summer months, the frog's breeding season. Additionally, upland soil conditions will likely recover more slowly under this alternative than under the other alternatives.

Gila Longfin Dace: Gila longfin dace may spawn throughout the year but primarily from December to July, and occasionally to September in low-desert habitats. They are omnivorous, but detritus is a major diet component (Minckley 1973, Sublette et al. 1990). Dace will also forage on aquatic invertebrates and algae. They are susceptible to predation, and high crayfish populations may limit their numbers. This fish is widely distributed throughout TNF, but is decreasing throughout their range (R. Calamusso, 2008). The species is present in Campaign Creek, but no data exists for other allotment springs.

Alternative 1 would be the least beneficial for the dace. Cattle would be able to graze riparian areas during summer months, the fish's breeding season. Additionally, upland soil conditions would likely recover more slowly under this alternative than under the other alternatives.

Gila Topminnow: Gila topminnows occupy headwater springs, vegetated margins, and backwater areas of intermittent and perennial streams and rivers. This species prefers shallow warm water and moderate currents with dense aquatic vegetation and algae mats. The reproductive season normally lasts from April through November, but production of young may be year-round in some thermally stable springs. They use a broad spectrum of foods such as detritus and amphipods, but prey on aquatic insect larvae, especially mosquitoes, when abundant. The Gila topminnow is highly susceptible to predation; thus, associated crayfish in streams could contribute to declines in populations through predation or removal of vegetative cover.

Livestock impacts to the topminnow along the riparian zone and stream should be minimal (Behnke and Raleigh 1978). Forest specialists have ongoing documentation of cattle use at Walnut Spring on the Cross F allotment. At this location, cattle graze adjacent to a robust population of Gila topminnow. No negative affects of cattle grazing on this population have been observed. Under this alternative, cattle would be able to graze riparian areas during a portion of the fish's summer breeding season, and upland soil conditions would recover more slowly than under the other alternatives.

Sonoran Desert Bald Eagle: Threats to the bald eagle include degradation of winter roosts, disturbance at nests, loss of perches (especially snags), and loss of riparian aquatic habitat essential to foraging and nesting. The primary threat is riparian habitat loss due to floods, livestock grazing, and other human disturbances (USFWS 2006). While the pair in this area (Pinto breeding area) currently has viable nest options, generally speaking the loss of large cottonwoods and potential reduction in replacement of older trees may reduce nesting options of eagles in this area in the long term. The USFWS (2006) specifically notes the Pinto breeding area has lost some trees used by eagles. If cottonwood tree density is declining and younger trees do not replace older ones in the Pinto breeding area, then nesting activity may decline in the future.

Cattle from the allotment could graze cottonwood seedlings near the Pinto breeding area along the lake shore but not in upstream reaches flowing into this breeding area. The seedlings and cottonwood seeds that they produce provide future habitat for breeding bald eagles. Because of potential grazing near the breeding area, this alternative has a "may affect not likely to adversely affect" determination.

No Grazing Alternative:

General Wildlife Effects: With discontinuation of grazing, wildlife habitat conditions would improve. Riparian areas would continue to recover from past grazing and fire affects. Recruitment of woody and herbaceous riparian species, including deer grass, would increase. It is expected that, over time, structural and age class diversity in riparian areas would improve. That would result in increased potential for riparian dependant wildlife species to occur on the allotment.

Improvements in the aquatic and riparian habitat will likely be quicker compared to other alternatives. Soil compaction problems and herbaceous plant vigor in key areas would improve without livestock grazing. It is expected that, over time, watershed and soil conditions across the allotment would continue to improve. Upland habitat capability for game species such as deer and quail would generally increase in herbaceous vigor and density in the openings, and an improvement in riparian habitat. Small game and non-game species will generally increase over time with an increase in herbaceous cover and improved species diversity. Improvements in these resource conditions would be expected to occur more quickly than they would under implementation of a grazing alternative.

One negative effect of the no grazing alternative to wildlife would be the removal or lack of maintenance of waters. Water structures that provide water to cattle also provide water to wildlife, including amphibians, birds, ungulates, bears, and bats. Wildlife using these waters may have become dependent on them, and these individuals may suffer from declines. However, these declines would likely be temporary, and the overall improvements of removing cattle may outweigh the short-term costs to wildlife.

MIS: Habitat conditions for these species are expected to improve with a cessation of livestock grazing on the allotment. With an improvement in soils and vegetation, increases in high-quality wildlife habitat should occur over time in all life zones and vegetation communities. Improvements to terrestrial habitat are as described above. The elimination of livestock from stream courses should result in overall improvements in water quality and may result in some increases in macroinvertebrate populations, although the presence of crayfish in streams will still negatively affect macroinvertebrate populations. Elimination of bank trampling and trailing from livestock should more greatly improve aquatic conditions for species than the other alternatives.

Special Status Species:

Southwest Willow Flycatcher: Selection of this alternative would result in a "no effect" determination for the flycatcher. Contributions to negative effects from livestock browsing on potential riparian vegetation habitat and cowbird parasitism would be eliminated for this allotment.

Lowland Leopard Frog: Alternative 2 would be the most beneficial for the species, as eliminating grazing would eliminate detrimental effects caused by grazing in riparian areas and facilitate recovery of impaired upland soils.

Gila Longfin Dace: Alternative 2 would be the most beneficial for the species, as eliminating grazing would eliminate detrimental effects caused by grazing in riparian areas and facilitate recovery of impaired upland soils.

Gila Topminnow: Alternative 2 would be the most beneficial for this species, as eliminating grazing would eliminate detrimental effects caused by grazing on riparian vegetation and facilitate recovery of impaired upland soils. Potential negative effects associated with crayfish in streams on the allotment would still occur.

Sonoran Desert Bald Eagle: Cattle from this allotment will not graze in the Pinto breeding area or in upstream reaches flowing into this breeding area that could supply cottonwood seeds. Cottonwood seeds provide future habitat for breeding bald eagles. Because grazing in this allotment would not directly or indirectly affect breeding bald eagles or their habitat, this alternative has a "no effect" determination.

Modified Proposed Action:

General Wildlife Effects: Over time, upland habitat capability for game species such as deer and quail may slowly improve due to increases in herbaceous vigor and density in openings resulting from light to moderate use. Improvements to upland habitat are expected to be slower under this alternative than Alternative 2 but faster than Alternatives 1 and 4. Riparian habitat and stream channels are expected to improve under this alternative, to a greater extent than under Alternative 1, if management prescriptions are followed and cattle are moved when use guidelines are met. Alternative 3 is better for riparian and upland areas than Alternative 1 due to winter grazing in three pastures and deferred use in eight Sonoran desert pastures during years lacking significant annual forb production.

Small game and non-game species will generally increase over time with an increase in herbaceous cover and species diversity, although at slower rates than Alternative 2 but to a greater extent than Alternative 4. Improvements in these resource conditions would be expected to occur more quickly than they would under implementation of Alternatives 1 and 4.

MIS: Generally, with an improvement in soils and vegetation, improvements in wildlife habitat should occur over time, although at a slower rate and to a lesser degree than Alternative 2 for the reasons mentioned above. Improvements to terrestrial habitat are as described above.

Habitat conditions for riparian (summer tanager, hooded oriole, black hawk, western wood pewee) and aquatic (macroinvertebrates) species are expected to improve over time, due to better cattle distribution through winter grazing versus summer grazing in three pastures.

With improving soils and vegetation, increases in wildlife habitat should occur over time, although at a slower rate and to a lesser degree than Alternative 2 and a greater extent than Alternative 4. Deferred use in years lacking significant annual forb production of low elevation pastures and winter use in three pastures will allow for faster soil recovery than seasonal use. Winter grazing in three pastures and deferred use of eight Sonoran desert pastures during years lacking significant annual forb production will likely improve water quality faster than Alternative 1, to a lesser extent than Alternative 2, and a greater extent than Alternative 4.

Species that are indicators of good ground cover (ash-throated flycatcher) and general woodland conditions (juniper titmouse) would experience greater habitat gains as compared to Alternative 1 because of vegetation and soil improvements as described above. Native perennial grasses in the most frequently used areas of these pastures would be more likely to increase under implementation of this alternative as compared to Alternatives 1 and 4.

Chaparral species (rufous-sided towhee/black-chinned sparrow) may experience a greater habitat gain under this alternative relative to Alternative 1 due to reasons mentioned above.

Desert scrub species (black-throated sparrow, brown towhee) may experience a similar habitat gain under this alternative compared to Alternative 1, but a lesser gain relative to Alternative 2.

Special Status Species:

Southwest Willow Flycatcher: Proposed fencing along the northern portion of the Badlands and Grapevine Pastures will exclude cattle grazing year long from the lake shore. This action will allow for better recruitment of woody riparian vegetation, habitat necessary for flycatcher nesting. Thus, the fence will aid in reducing grazing impacts on flycatchers by increasing potential habitat and, ultimately, flycatcher populations in this area.

During years of high annual forb production, when Badlands and Grapevine pastures along the lake could be utilized, grazing would most likely not occur past May due to high summer temperatures at that elevation. In drier years, use of the Badlands and Grapevine pastures would be deferred if significant annual forb production was not observed.

This management strategy reduces indirect effects by reducing sedimentation of occupied flycatcher habitat as soils improve with more rest. Selection of this alternative would result in a determination of "may affect, not likely to adversely affect".

Lowland Leopard Frog: Alternative 3 would benefit the lowland leopard frog through better cattle distribution associated with winter grazing in Two Bar, Tule, and Reevis pastures and deferred use of eight Sonoran desert pastures during years lacking significant annual forb production. These actions would reduce runoff into associated drainages and minimize grazing and trampling in riparian areas, improving the herbaceous layer which provides cover and egg deposition sites for this species. If a new water system is necessary as a result of fencing off the lake, this could benefit frogs by providing a constant supply of water, provided the permittee maintains the system year long. Alternative 3 would provide the greatest benefits for the frog of all the grazing alternatives, but provide fewer benefits than Alternative 2.

Gila Longfin Dace: Alternative 3 would benefit the Gila longfin dace through better cattle distribution due to winter grazing in three pastures. This action would reduce runoff into associated drainages and minimize grazing and trampling in riparian areas, improving the herbaceous layer which provides shade (and thus cooler water temperatures) and detritus for this species.

Gila Topminnow: Alternative 3 would benefit the Gila topminnow through better cattle distribution due to winter grazing in three pastures. This action would reduce runoff into associated drainages and minimize grazing and trampling in riparian areas, improving the herbaceous layer which provides shade (and thus cooler water temperatures) and detritus for this species. The herbaceous layer is a particularly important habitat component for this fish. Potential negative effects associated with crayfish in streams on the allotment would still occur.

Sonoran Desert Bald Eagle: Cattle from this allotment will not graze in the Pinto breeding area or in upstream reaches flowing into this breeding area that could supply cottonwood seeds. Cottonwood seeds provide future habitat for breeding bald eagles. Because grazing in this allotment would not directly or indirectly affect breeding bald eagles or their habitat, this alternative has a "no effect" determination.

Seasonal Use:

General Wildlife Effects: Over time, an increase in herbaceous vigor and plant density in openings may improve upland habitat capability for game species such as deer and quail, although more slowly than under Alternative 2. Alternative 3, however, would provide the greatest upland habitat capacity of the grazing alternatives through cool season use.

Riparian habitat and stream channels are expected to improve under this alternative, to a greater extent than under Alternative 1, if management prescriptions are followed and cattle are moved when use guidelines are

met. Use of riparian pastures by livestock during the cool season will result in fewer negative impacts to riparian recruitment than summer use. Riparian and aquatic habitat conditions will improve due to better distribution of livestock outside the riparian areas and greater likelihood and ease of meeting riparian use guidelines. Therefore, negative grazing impacts to riparian resources will not be as significant under Alternative 4 as under Alternative 1. Alternative 3, however, would provide for the greatest riparian habitat and stream channel recovery, especially at lower elevations.

Small game and non-game species will generally increase over time with an increase in herbaceous cover and improved species diversity, although at slower rates than Alternative 2. Improvements in these resource conditions would be expected to occur more quickly than they would under implementation of Alternatives 1 or 3 for the same reasons described above.

MIS: Generally, with an improvement in soils and vegetation, improvements in wildlife habitat should occur over time, although at a slower rate and to a lesser degree than Alternative 2 for the reasons mentioned above. Improvements to terrestrial habitat are as described above.

Habitat conditions for riparian (summer tanager, hooded oriole, black hawk, western wood pewee) and aquatic species, including macroinvertebrates, are expected to improve over time, due to better distribution of cattle as a result of cool season grazing.

With improvements in soils and vegetation, increases in wildlife habitat should occur over time, although at a slower rate and to a lesser degree than Alternatives 2 and 3. Improvements to terrestrial habitat are as described under the General Wildlife discussion above.

Species that are indicators of good ground cover (ash-throated flycatcher) and general woodland conditions (juniper titmouse) may experience upwards trends under implementation of this alternative, due to greater livestock distribution and corresponding increase in native perennial grasses in the most-frequently used areas, although to a lesser degree than Alternatives 2 and 3.

Chaparral species (rufous-sided towhee/black-chinned sparrow) may experience greater habitat gains as compared to Alternative 1 due to seasonal use and better livestock distribution, but to a lesser extent than Alternative 3.

Habitat conditions for desert scrub species (black-throated sparrow, brown towhee) are more likely to improve under this alternative as compared to Alternatives 1 or 3 for the same reasons just described.

Special Status Species:

Southwest Willow Flycatcher: Grazing would not occur past May under this alternative. This management strategy reduces indirect effects by reducing sedimentation of occupied flycatcher habitat as soils improve with more rest. Selection of this alternative would result in a determination of “may affect, not likely to adversely affect”.

Lowland Leopard Frog: Seasonal use in Alternative 4 would provide for more herbaceous layer growth in all allotment streams at lower elevations than Alternative 1 but less so than Alternatives 2 and 3.

Gila Longfin Dace: Seasonal use in Alternative 4 would provide for more herbaceous layer growth in all allotment streams at lower elevations than Alternatives 1, but less so than Alternatives 2 and 3.

Gila Topminnow: Seasonal use in Alternative 4 would provide for more herbaceous layer growth in all allotment streams at lower elevations than Alternatives 1, but less so than Alternatives 2 and 3.

Sonoran Desert Bald Eagle: Cattle from this allotment will not graze in the Pinto breeding area or in upstream reaches flowing into this breeding area that could supply cottonwood seeds. Cottonwood seeds

provide future habitat for breeding bald eagles. Because grazing in this allotment would not directly or indirectly affect breeding bald eagles or their habitat, this alternative has a “no effect” determination.

Heritage

Impacts to heritage resources, especially archeological sites, are generally defined as anything that results in the removal of, displacement of, or damage to artifacts, features, and/or stratigraphic deposits of cultural material. In the case of heritage resources which are eligible for inclusion in the National Register of Historic Places, this can also include alterations of a property's setting or context. For traditional cultural properties and sacred places, additional considerations may include alterations in the presence or availability of particular plant species. Heritage resources, depending on their nature and composition, are subject to several different types of impact from activities associated with grazing. Direct impacts from grazing are those resulting from concentrated livestock trampling or construction. Indirect impacts include erosion and changes in vegetative composition and density that alter the setting and geographic context of sites.

Since site condition assessments for heritage resources are not available for any time prior to the introduction of European livestock species to the Southwest, some level of effect is assumed to have contributed to the current condition of all sites on the allotment. Given the non-renewable nature of heritage resources -- particularly archeological and historic sites -- any portion of them that has been damaged or removed diminishes their cultural and scientific value permanently. The missing parts cannot be replaced. Therefore, all effects to heritage resources are considered cumulative.

Effects Common To All Grazing Alternatives: Based on a history of observation and consultation with the State Historic Preservation Officer (SHPO), managed grazing is not considered in and of itself to constitute an effect on heritage resources when the grazing strategy is designed to match herd size with capacity and distribute livestock as evenly as possible across the allotment in order to avoid localized concentrations of animals and the resultant impacts to soils and vegetation associated with intense trampling. Changes in grazing strategy are likewise not considered to have an effect provided that whatever new strategy is implemented does not alter these conditions.

Adverse effects are likely if a proposed grazing strategy were to introduce livestock into an area not known to have been grazed historically. They may also be expected when a grazing strategy proposes shifting to a more intensive system where higher permitted numbers or high intensity/short duration schedules would concentrate livestock in confined areas where either the absolute or relative stock density would cause a significant increase in surface disturbances due to trampling that would be above previous or existing levels. This could result in either direct or indirect adverse effects depending on the degree of trampling resulting from localized concentration and on the presence or absence of heritage resources in the concentration area, the nature of the resource and its resistance to such impacts, and the distance to other heritage sites. For the most part, these conditions tend to be associated with the construction of range improvements designed to provide water or to concentrate and hold stock for roundup or shipping. Thus, the greatest potential for direct adverse effects to heritage resources is associated with the construction of range improvements and the access roads needed to build and maintain them.

Air Quality

The project area is in a Class II (rural) air quality management area. Air quality in and around the area is high due to the relative isolation from urban centers, limited access, vegetative ground cover, and the scale of the analysis area. Currently, the air quality in the project area is within the Standards and Guidelines of the Forest Plan.

Activities resulting from these grazing alternatives, or the absence of grazing, will not significantly affect the factors contributing to a high quality airshed. Therefore, grazing will not have direct or indirect effects on the air resources in this airshed. Because there are no measurable effects, there will be no cumulative effects to air quality as a result of any of the alternatives considered here.

Economics

The Campaign Allotment is located primarily in Gila County, where income is derived from a variety of sources including mining, state and federal employers, agriculture, and service and trade jobs (PR Vol. 3 #28).

Table 7: Gila County job sources

Category	1990	2000	2002
Agriculture	No data	No data	110
Construction	600	1,050	850
Finance, Ins. Real Estate	300	275	275
Government	2,750	4,725	4,600
Manufacturing	1,425	1,075	875
Mining	1,275	700	650
Service	2,125	2,575	2,800
Trans, Comm., and Utils.	450	500	475
Trade	2,525	3,325	3,100

Source: Arizona Department of Economic Security

According to the Arizona Department of Agriculture there are approximately 4,000 cattle and calves in Gila County, and agriculture as a whole brings over $8,000,000 into the economy. Information from the University of Arizona estimates that livestock sales for the county, based on 2002 census information, generated approximately $2,392,000. Livestock grazing in Gila County potentially affects permittees, who contribute a portion of the cost of range improvements, pay grazing fees, and receive economic returns on their investments in livestock grazing. Nearly all permittees on the Tonto Basin Ranger District supplement their ranching incomes with other sources of income.

Federal government receipts are calculated based on the 2008 grazing fee of $1.35 per animal (cattle and horses). The USDA Forest Service benefits from the collection of grazing fees and expends those fees along with appropriated tax dollars to construct range improvements and administer grazing permits. Payment to Gila County is 25% of total government receipts. The remaining 75% of fees are returned to the Forest Service but may not cover recurring administrative costs.

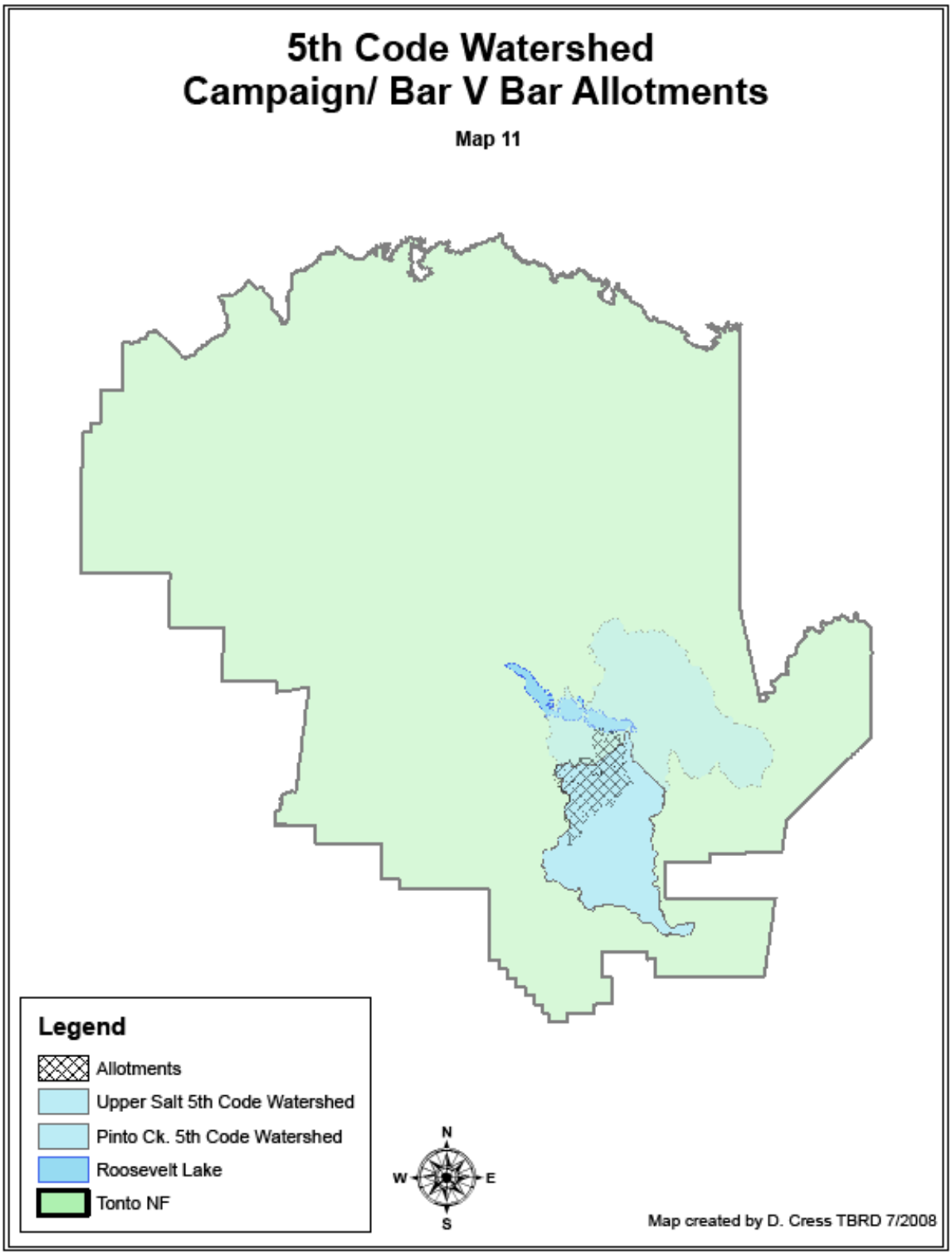
The US Forest Service does not recognize a value associated with term grazing permits and permittees do not hold property rights to grazing allotments. Nevertheless, federal grazing privileges, specifically permit numbers, are often considered in determining the value of base property associated with an allotment. Banks, lending agencies and local taxing authorities sometimes recognize a value associated with a permit.

The proposed action and Alternatives 3 and 4 would continue to offer economic opportunities from livestock grazing to the grazing permittee; Alternative 2 would not. The proposed action and Alternative 3 have the most

potential for economic benefit to the permittee. Selection of Alternative 4 would require the permittee to provide alternative forage for livestock during the summer months, when they were removed from the allotment for seasonal rest of the resources. This could create an economic hardship or require the permittee to invest money in revising his current herd from a cow/calf operation to a yearling operation.

Summary of Alternatives

Issue or concern	Alternative 1-Proposed Action	Alternative 2-No Grazing	Alternative 3-Modified PA	Alternative 4-Seasonal Use
Tonto NF LMP and FS policy	Consistent with the LMP and with FS policy.	Consistent with LMP but not with FS policy (FSM 2202.1, 2203.1).	Consistent with the LMP and with FS policy.	Consistent with the LMP and with FS policy.
Purpose and Need	Authorizes grazing, Provides for adaptive management to meet management objectives.	Does not authorize grazing but achieves LMP resource objectives and addresses resource concerns.	Authorizes grazing and provides for adaptive management to meet management objectives.	Authorizes grazing and provides for adaptive management to meet management objectives.
Soil and Vegetation	Adaptive management would provide for conservative use to help most soils and vegetation move toward desired conditions. Some degraded sites may not recover.	No grazing would provide maximum protection to impaired soils and vegetation conditions from domestic livestock use.	Adaptive management combined with deferred use of key pastures would help protect soils and vegetation and move toward desired conditions more quickly than 1 or 4.	Adaptive management with seasonal use of all pastures would help protect soils and vegetation and move them toward desired conditions more quickly than 1.
Riparian and Hydrology	Adaptive management and conservative use guidelines would help protect riparian areas and move them toward desired conditions.	No grazing would provide maximum protection to riparian areas from domestic livestock use.	Adaptive management combined with deferred use of key pastures would help protect riparian areas and move them more quickly toward desired conditions.	Adaptive management combined with seasonal use of all pastures would help protect riparian areas and move them more quickly toward desired conditions.
Wildlife	Adaptive management and conservative use guidelines would help recovery of wildlife habitat impaired as a result of historic overgrazing.	No grazing would provide maximum protection to wildlife habitat from domestic livestock use. Water provide by range developments could be lost, impacting some segments of the wildlife population.	Adaptive management combined deferred use of key pastures would provide protection for wildlife habitat recovering from historic overuse	Adaptive management combined with seasonal use of all pastures would provide a higher level of protection to wildlife habitat and move it more quickly toward desired conditions.
Recreation	Mitigation and education would help create a balance between recreational user needs and livestock management needs.	Recreational users could benefit from the removal of certain livestock improvements but the loss of water developments or corrals could be detrimental to some.	Mitigation and education would help create a balance between recreational user needs and livestock management needs. Deferred use of key pastures could reduce some conflicts.	Mitigation and education would help create a balance between recreational user needs and livestock management needs. Seasonal use of all pastures could reduce conflicts at certain times of the year.
Permitted numbers	Livestock numbers would be adjusted annually through adaptive management.	Livestock numbers would be reduced to 0 over time.	Livestock numbers would be adjusted annually through adaptive management.	Livestock numbers would be adjusted annually through adaptive management.



Map 11- 5th Code Watersheds

CHAPTER 4-CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

Gary Smith, Tonto Basin Ranger District, District Ranger, Decision-maker

Debbie Cress, Tonto Basin Ranger District Rangeland Management Specialist, ID Team Leader

Annette Smits, Tonto Basin Ranger District Recreation Officer

Shannon Torrence, Tonto Basin Ranger District Wildlife Biologist

Amy Madara-Yagla, Tonto Basin Ranger District Wildlife Biologist

Gregg Dunn, Tonto Basin Ranger District Wildlife Biologist

Mike Behrens, Tonto Basin Ranger District, Fire Management Officer

Jason Cress, Tonto Basin Ranger District, Assistant Fire Management Officer

Kathryn Giroux, Tonto Basin Ranger District, Rangeland Management Specialist

Eric Hoskins, Tonto Basin Ranger District, Rangeland Management Specialist

Hugh Dorathy, Tonto Basin Ranger District, Range Technician

Don Luhrsen, Tonto National Forest, Rangeland Management Specialist

Janet Grove, Tonto National Forest, Riparian Ecologist

Lynn Mason, Tonto National Forest, Hydrologist

Norm Ambos, Tonto National Forest, Soil Scientist

Bob Calamusso, Tonto National Forest, Fisheries Biologist

Scott Wood, Tonto National Forest, Archaeologist

FEDERAL, STATE, AND LOCAL AGENCIES:

Gabrielle Kenton, Tonto National Forest, Forest Planner and NEPA Coordinator

George Robertson, Region 3 Terrestrial Ecosystem Survey Crew, Lead Soil Scientist

Eddie Alford, Arizona State University

Dan Robinett, Robinett Range Resources, LLC

Walt Meyer, University of Arizona

Jim Sprinkle, University of Arizona, Cooperative Extension Services

Arizona Department of Environmental Quality

Natural Resources Conservation Services

Arizona Game and Fish

US Fish and Wildlife Service

Southern Gila County Economic Development Corporation

Arizona Department of Environmental Quality

Arizona Cattle Growers Association

Gila County Cattle Growers Association

Gila County Board of Supervisors

TRIBES:

Hopi Tribe

Pueblo of Zuni

White Mountain Apache Tribe

San Carlos Apache Tribe

Gila River Indian Community

Ft. McDowell Yavapai Nation

Yavapai-Prescott Tribe

Tonto-Apache Tribe

Salt River Pima-Maricopa Indian Community

OTHERS:

Audubon Society

Sierra Club

Western Watersheds Coalition

All permittees on the Tonto Basin Ranger District