

Zapata Ranch

Mann Ranch LLC

Coordinated Resource Management Plan



(View looking west towards the San Pedro River valley, Photograph by Alisha Phipps February 10, 2014)

Introduction

The Zapata Ranch is located 5 miles north of Mammoth, Arizona on the east side of Highway 77. The ranch falls within Township 7 South and Ranges 16 and 17 East (Lookout Mountain and Holy Joe Peak 7.5 Minute Topo Quads). The western boundary of the ranch is Highway 77, the southern and eastern boundaries are the Table Mountain Ranch, and the northern boundary is the Stambaugh Ranch. The ranch is approximately 7,589 acres consisting of deeded land, and leased land from the Arizona State Land Department (ASLD) and the Bureau of Land Management (BLM). The ASLD grazing lease (lease #05-95004) is 6,953.18 acres and permitted for 26.1 AU's or 313.2 AUM's. The BLM grazing lease (lease #4533) is 596 acres and permitted for 2 AU's or 24 AUM's. At this time the BLM land is not being included in this CRMP.

The ranch is part of the Lower San Pedro River watershed (HUA #15050203). The major drainage present on the ranch is Zapata Wash, which is the main access route to the southern portion of the ranch. The ranch is situated within the Upper Sonoran Desert Common Resource Area (CRA 40-1) averaging 10-13 inches of precipitation a year. The nearest climate stations are the Winkelman 12 E and Winkelman 6S stations; the average annual precipitations for the weather stations are 16.56" and 13.79" respectively. The ranch ranges in elevation from the lowest point on the west side of the ranch at 2,270 feet and rises to the east up the foot slopes of the Galiuro Mountains to the highest point of 3,024 feet.

Jack and Catherine Mann bought the Zapata Ranch in 2010 from Ray Ainsworth. Previous owners of the ranch included Tommy Dean and the Ragsdale family. No improvements to the ranch infrastructure were made during recent past ownership. The waters on the ranch include two dirt tanks. There are no current interior fences, other than the small horse pasture at the headquarters.

Jack and Catherine raise White Park cattle. Their commercial herd on the Zapata Ranch is a White Park cross with Brahma's and Angus stock. White Park bulls are used on the commercial herd. The White Park Breed is a relatively ancient breed originating in the British Isles and dating back to the Roman occupation of England. Their color is distinctive, being porcelain white with colored (black or red) points, namely ears, nose, eye rims, and hooves.

Coordinated Plan Participants

Jack & Catherine Mann; Owners & Operators
Natural Resources Conservation Service; Tucson Field Office
Arizona State Land Department
Winkelman Natural Resources Conservation District

Land Status

Private Controlled	40 acres
State Land	6,953.18 acres
BLM	596 acres

Total **7,589 acres (7,133 acres on map with actual fencelines)**

**BLM lands are not being planned for in this CRMP.*

Goals

- Conserve open space and prohibit or mitigate activities that would conflict with the goal
- Become a steward of the land for cattle grazing, sustained and growing wildlife populations, and for the public use
- Protect ecologically sensitive areas
- Maintain and improve species composition, diversity and structure for the desired plant communities needed to protect the land and support the planned land use
- Provide adequate vegetative cover to improve the water quality, prevent accelerated erosion, prevent excess runoff and provide adequate cover for watershed stability and wildlife habitat.
- Maintain a self-sustaining economically feasible ranching operation.
- Manage for the long-term health and diversity of wildlife populations by providing water sources.
- Manage ranch operations to achieve the potential plant community in each ecological site on the ranch

Objectives

- Implement prescribed grazing and rest periods in each pasture that will allow grazed plants to re-grow, regain vigor, produce seed, and establish new plants when climatic condition are favorable.
- Install a new cross fence and 2 new wells to control timing and distribution of livestock grazing by 2016
- Establish 2 permanent monitoring sites in 2014 to measure whether plant community goals are being achieved
- Work with Game & Fish to improve wildlife habitat by partnering on improvements to develop new waters and improve existing water sources.

Benchmark Conditions

Benchmark conditions for the ranch were evaluated by the Natural Resources Conservation Service (NRCS) and the Arizona State Land Department. NRCS inventories and assesses natural resources based on 6 categories; Soil, Water, Air, Plants, Animals and Human (SWAPA+H). Inventory data were gathered at 5 locations on the ranch in 2013. At each location plant species composition

and production in pounds/acre were determined. This information was used to calculate a similarity index comparing present vegetation on the site to reference conditions. Generally a similarity index of <60% is considered to indicate a resource concern for plant productivity and composition. The similarity indices for each of the 5 inventory sites can be found in Appendix D. The soils, vegetation and land type (for example: slope, aspect, upland vs. bottom) information gathered during the inventory was used to make an ecological site map for the ranch. At each location, range health was evaluated using a subjective rating of 17 indicators associated with the soil stability, hydrologic function and biotic integrity of the present situation compared to reference conditions for the site. Each indicator is rated as having none-slight, slight to moderate, moderate, moderate to extreme or extreme departure from what is expected for the site. Ratings of moderate or more departure are considered to indicate resource concerns for that attribute. The range health ratings for the 5 inventory sites can be found in Appendix D.

The resource assessments made by the NRCS and other observations were used to identify the following resource concerns:

- **Degraded Plant Condition-Undesirable Plant Productivity and Health** – Similarity indices range from 44-69% across the ranch. The Rangeland Health rating for Hydrologic Function is Moderate on at least one ecological site and there were multiple ratings of Moderate or Moderate-Extreme for Biotic Integrity across the ranch. (See Appendix D for ratings).
- **Degraded Plant Condition-Inadequate Structure and Composition** – The Biotic Integrity of many of the ecological sites on the ranch has a Moderate or higher departure due to the absence/lack of perennial grasses and other herbaceous species.
- **Degraded Plant Condition-Excessive Plant Pest Pressure** – There are areas on the ranch that have a high density of jumping cholla that have invaded the sites and disrupted the Biotic Integrity of the plant community.
- **Soil Erosion-Concentrated Flow Erosion** – Gullies forming along edge of ridges on ranch, especially evident on Gypsum Uplands and Slopes.
- **Livestock Production Limitation-Inadequate Livestock Water** – Inadequate reliable water to support sound grazing management for a sustainable number of livestock.
- **Inadequate Habitat for Fish and Wildlife-Habitat Degradation** – Water sources are not permanent and sparse. Insufficient amounts of food sources on some of the sites on the ranch. Many sites lacking the presence of herbaceous plants. Wildlife occurring on the ranch include: mule deer, javelina, mountain lion and coyote.
- **Inefficient Energy Use – Farming/Ranching practices and field operations** – Inefficient use of energy in ranch operations by hauling water increases the dependence on non-renewable energy sources. By drilling new wells and establishing permanent water sources the ranch can save energy by decreasing fuel use and also save time and labor.

The reasons for observed resource concerns are several. First, this area, as in much of Arizona, was heavily grazed year-round from the late-1800s until the mid-1900s. This overgrazing was largely the result of the absence of defined grazing rights which did not provide any incentive for conservative, controlled grazing. This heavy grazing was not only associated with commercial livestock operations but also to homesteaders, miners, woodcutters and other settlers that had cattle, sheep, goats, horses and donkeys. Also, there is knowledge that the ranch has been overgrazed and not well managed in the last 10-30 years before the Mann's ownership.

A lack of infrastructure and improvements on the ranch has greatly impacted the ability to manage livestock and rangeland resources. The primary fencing on the ranch is the boundary fence around the ranch and the small trap splitting off the horse pasture at the headquarters. There is evidence of an old interior fence, running east and west across the ranch, located north of Zapata Ranch and running east from the horse pasture. Also, there were few water developments on the ranch. There is only one permanent water source on the ranch and that is the well at the headquarters. The Mann's use water from the headquarter's well to haul water to different locations on the ranch. There is a record of a well drilled in the Zapata Wash, but it has not been located yet. The ranch is also reliant on 2 dirt tanks directly following the monsoon season. The 2 dirt tanks on the ranch hold water seasonally. Typically the tanks fill up around August/September and are dry by February. The dirt tanks have not caught much water in the last 10 years and are silted in and need to be cleaned out. The two tanks are: Tank 219, located in the southeast corner of the ranch, and Middle Tank, located north of Zapata Wash in the center of the ranch. The lack of water sources and the seasonally limited availability of the water historically created areas of high use as cattle concentrated around the existing water sources. Moreover, the labor and time required for hauling water and the use of resources and fuel makes for a costly and inefficient situation.

The production in recent years has been greatly diminished due to lack of "normal" rain. This has had a major impact on both soil and vegetation resulting in accelerated erosion. According to the U.S. Drought Monitor "ongoing drought conditions are impacting native vegetation across the Sonoran Desert in southern Arizona (Associated Press, June 17, 2012). Many desert-adapted plant species are suffering under the current drought, as are prickly pear, saguaro cacti, and other succulent plants." (<http://www.climas.arizona.edu/swco/jun2012/arizona-drought-status>).

This CRMP is only for the State Trust and Private lands on the Zapata Ranch. There is also a BLM grazing lease within the ranch boundaries that Jack and Catherine Mann hold. However, at this time, conservation efforts have not been planned on the BLM lands and are thus not being included in this CRMP. It is the Mann's intention to add the BLM grazing lease into a CRM plan at a future date. The BLM grazing lease is the Zapata allotment, #4533. The Arizona State Land Department Grazing Lease is #05-95004.

Range Improvements

Existing Range Improvements

Current range improvements consist of 1 well, watering facilities, 4 corrals, 2 dirt stock tanks and boundary fencing. All existing improvements are listed in Appendix A.

Proposed Range Improvements

Planned improvements consist of cross fencing and watering systems with pipelines, watering facilities, wells and solar pumping plants. It is planned to drill two new wells: one by the Northeast Corrals with a solar pump, new storage tank and trough. The other well is to be drilled by Tank 219 storage tank with a solar pump and new trough. A pipeline will be installed, running north, from the 219 well to Middle Tank to provide water to that storage tank and trough. Also, the Mann's would like to re-establish the old cross fence that runs west-east from the Horse Pasture along a ridge to the east boundary of the ranch. Developing dispersed water sources on the ranch would improve grazing management and resource management. This improved ranch management would also help to reduce the historical grazing pressure from the areas with the existing water sources. The Planned Schedule of Improvements is listed in Appendix A and each improvement has been given a priority rating (High, Medium, Low) based on the current needs of the ranch.

Alternatives

Alternative improvements for the future may include adding more pipelines from the new planned wells to better distribute water across the ranch if the wells will support them. Especially from the new well by the Northeast Corrals, pipelines could be installed running west down the ridges to add additional troughs towards the center of the ranch. Also, salt/supplement blocks could be dispersed to more remote portions of the ranch to better distribute and manage grazing use. Another option, instead of cross fencing the ranch, would be to install fencing around the waters to control the availability of water and thus the cattle movements. Another alternative that might be discussed in the future would be the treatment of the areas invaded with jumping cholla. There are some heavily infested areas along the ridges north and east of Middle Tank and northeast of Tank 219.

Grazing Management

Numbers and Season of Use

The permitted number of livestock on the Zapata Ranch is 28 Animal Units (AUs), or 337 Animal Unit Months (AUMs). A breakdown by land status is as follows:

STATE	26.1 AU's	313.2 AUM's
*BLM	2 AU's	24 AUM's
Total	28.1 AU's	337.2 AUM's

**BLM lands are not being planned for in this CRMP.*

Current Grazing System

A year-long continuous grazing system has been employed for many years on the Zapata Ranch. The herd size is small enough that the cattle drift and disperse between the different water locations. However, since there is no cross-fencing the cattle can travel across the ranch, from water to water.

Planned Grazing System

The Coordinated Resource Management team for the Zapata Ranch will provide input for a planned grazing schedule. Since the ranch is not split into pastures, the grazing will be rotated and managed by using the waters. The planned grazing system will take season of use into

account. Season of use will also be affected by the availability of water and completion of the planned improvements. Since the main feed source for cattle on the ranch is palatable browse (shrubs), grazing management attempts to target the spring growing season (March-May) as the critical season for rest. The new waters that are planned will aide in distributing grazing pressure and decreasing labor expenses. Old, existing water sources can be turned off and the areas surrounding them allowed to rest when the cattle begin to use the new watering systems. As with any plan it is necessary to monitor the progress in order to know whether or not it is achieving the intended goals and objectives.

Flexibility

Due to the annual variability in forage production, resulting from yearly fluctuations in the weather, it may be necessary to move livestock earlier or later than planned. Stocking rates in times of drought should be conservative and should be based on vegetation condition, livestock health and the producer's management experience. Adaptive management provides the flexibility to adjust livestock numbers and timing of grazing so that use is consistent with current forage productivity and is meeting management objectives. Under the proposed adaptive management strategy, the number of livestock, specific dates for grazing, class of animal and modifications in livestock movements may be changed as necessary and appropriate, based on the implementation of improvements and the monitoring data. It is intended that grazing areas will be used at varying times during the year to limit repeated growing season use of a grazing area as much as possible. All plan participants involved in this plan agree to work together to ensure the best available management strategy. The rancher will keep records, such as "in" and "out" dates and numbers of livestock and provide this actual use information to the participating agencies each year upon request.

Salting / Supplemental Feeding

Trace mineral blocks are provided to the herd year round.

Monitoring Plan

General

Monitoring documents changes in selected attributes overtime and can be used to evaluate the effects of livestock use on the rangeland resource in association with other data, and to aid in management decisions necessary to maintain or improve rangeland condition. Participants in this coordinated resource management plan agree to participate in annual monitoring on the ranch.

Vegetative Information

The Zapata Ranch lies within the Common Resource Area (CRA) of 40-1, the Upper Sonoran Desert. Elevations range from 2,270 feet on the west side of the ranch along Highway 77 and rising to 3,024 feet to the east on the foot slopes of the Galiuro Mountains. Precipitation averages 10 to 13 inches a year. The soil temperature regime is thermic (the mean annual soil temperature is 59° F or higher but lower than 71.6° F) and the soil moisture regime is typic aridic (soil is dry for at least half of the growing season and moist for less than 90 consecutive days). The ranch occurs within the Basin and Range Physiographic Province which is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valley and basins. Igneous, metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

Ecological sites within CRA 40-1 are: Limy Upland-Deep, Limy Slopes, Gypsum Slopes, Volcanic Hills, Loamy Upland, Clay Loam Upland and Sandy Bottom. An Ecological Site Legend is attached in Appendix C and an Ecological Site map is included.

Key browse species include jojoba (*Simmondsia chinensis*), range ratany (*Krameria erecta*), mesquite (*Prosopis velutina*), Palo Verde (*Parkinsonia microphylla*), wolfberry (*Lycium spp.*), whitethorn acacia (*Acacia constricta*), Mormon tea (*Ephedra spp.*), slender janusia (*Janusia gracilis*) and false mesquite (*Calliandra eriophylla*). These species were chosen because they are fairly abundant throughout the ranch and are nutritious and well-liked by cattle and wildlife.

Grass species that do occur include purple three-awn (*Aristida purpurea var. purpurea*), sideoats grama (*Bouteloua curtipendula*), bush muhly (*Muhlenbergia porteri*), blue three-awn (*Aristida purpurea var. nealleyi*), slim tridens (*Tridens muticus*), sand dropseed (*Sporobolus cryptandrus*), fluffgrass (*Dasyochloa pulchella*), sacaton (*Sporobolus wrightii*) and black grama (*Bouteloua eriopoda*).

Inventory

Five inventory transects were used to collect baseline vegetation composition and production data, but these may or may not be used as Key Areas for future monitoring of range trend. Data collected on each transect included production, composition, similarity indices and rangeland health. Inventory points differ from Key Areas and are typically not used for permanent monitoring. The Double Sampling method was used to collect data for each transect to collect annual production data. At least one inventory site was located within each ecological site. A description of the current state of each ecological site is listed in Appendix D. Locations for the inventory sites are as follow:

Inventory Points	Ecological Site	CRA	Section	Township & Range	UTM's (NAD 83, Zone 12)	Elevation	Date
T-1	Limy Upland, Deep	40-1	SW¼, SW¼, Sec. 30	T7S, R17E	0532523, 3628003	2465'	5/14/13
T-2	Volcanic Hills	40-1	NE¼, SW¼, Sec. 28	T7S, R17E	0536171, 3628454	2855'	7/9/13
T-3	Gypsum Upland	40-1	NE¼, SW¼, Sec. 30	T7S, R17E	0533045, 3628497	2498'	8/12/13
T-4	Loamy Upland	40-1	NE¼, SE¼, Sec. 28	T7S, R17E	0536972, 3628392	2931'	8/14/13
T-5	Limy Slopes	40-1	SW¼, NE¼, Sec. 28	T7S, R17E	0536444, 3628911	2863'	2/10/14

Key Areas

Permanent monitoring transects will be established on State Trust land. Transects shall be placed to reflect livestock management and should be placed on major ecological sites. Monitoring data will be used in part to guide the management of the ranch. New Key Areas can be established or abandoned as deemed necessary. Key Area locations will be decided in coordination with the rancher/lessee and the land management agencies. Participants in this coordinated resource management plan agree to participate in annual monitoring on the ranch. An Ecological Site Map with site specific descriptions can be found in the Appendix C.

Methods and Responsibilities

1. Actual Use
The lessee will record actual use data throughout the year showing when, where, and how many livestock used the ranch during the grazing year.
2. Climate
Rainfall gauges should be installed on the ranch, and rainfall records should be kept by the producer.
3. Frequency
The frequency method is very useful for determining percent presence for each species encountered within a total number of quadrat placements. A 40 x 40 cm quadrat is used for pace frequency. This method has not yet been conducted on the ranch. It will be used when key areas are established.
4. Composition
Percent composition of the species by weight will be estimated using the Dry Weight Rank methods. This method ranks the three species which contribute the highest percentage of biomass in the quadrat. A 40 x 40 cm quadrat is used for Dry Weight Rank. This method has not yet been conducted on the ranch. It will be used when key areas are established.
5. Repeat Photography
Photographs will be taken at each trend location to qualitatively assess changes in rangeland trend.
6. Ground Cover
Ground cover data will be collected when the Frequency and/or Composition methods are used. Ground cover data, expressed as a percentage, reflects the amount of litter, vegetative root bases, gravel and rocks present to intercept raindrop impact before reaching the soil and of bare ground exposed to climatic events. Cover data is collected with each quadrat placement.

Monitoring data will be collected by NRCS and ASLD personnel and the producer.

Timetable for Data Collection

Data collection is planned to occur every fall for the 1st three years after a transect is established and then every 2 to 5 years thereafter or more regularly as deemed necessary. The first three years of data collected on a site will serve as a base line for future trend analysis.

Evaluation and Revision

A review of the plan will be conducted each year in cooperation with the producer. Data collected from the monitoring sites will be used to aid in management decisions.

Plan Approval

We, the undersigned, have participated in the development of the Coordinated Resource Management plan, concur with the plan, and will act to implement it to the best of our ability.

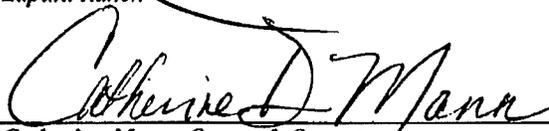
Accepted by:



07 MAR 2014

Jack Mann, Owner & Operator
Zapata Ranch

Date



07 March 14

Catherine Mann, Owner & Operator
Zapata Ranch

Date



3/14/2014

Stephen Williams, Director
Natural Resources Division
Arizona State Land Department

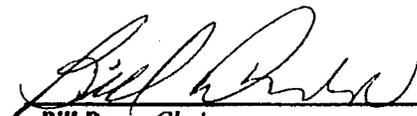
Date



3/7/14

Kristen Egen, District Conservationist
Natural Resources Conservation Service, Tucson Field Office

Date



4/9/14

Bill Dunn, Chairman
Winkelman Natural Resources Conservation District

Date

(Appendices and maps attached)

APPENDIX A

Existing Range Improvements

Improvement	Description/Location	Elevation	GPS Coordinates (NAD 83)	Comments	Ownership
Wells					
1	HQ (Well ID: 55-646307)	2192'	0530164, 3629175	cased to 90 ft., static water 20-30 ft. deep	State
Storage Tanks					
1	HQ	2192'	0530164, 3629175	4,000 gallon steel storage	State
2	Tank 219 Corrals	2912'	0536640, 3627639	4,000 gallon steel storage	State
3	Middle Tank Corrals	2648'	0534864, 3628826	1,800 gallon steel storage	State
4	NE Corner	2632'	0534618, 3630707	4,000 gallon steel storage	State
Troughs					
1	HQ	2192'	0530164, 3629175	800 gallon galvanized steel	State
2	Tank 219 Corrals	2874'	0536599, 3627529	300 gallon steel	State
3	Middle Tank Corrals	2613'	0534852, 3628852	802 gallon galvanized steel	State
Pipeline					
1	Tank 219 storage tank to trough @ corrals	2874'	0536599, 3627529	800 gallon galvanized steel	State
2	Middle Tank storage tank to trough	2613'	0534852, 3628852		
Dirt Tanks					
1	Tank 219	2861'	0536575, 3627502	Holds water, seasonally. Needs cleaning	State
2	Middle Tank	2600'	0534841, 3628880	Holds water, seasonally. Needs cleaning	State
Corrals					
1	HQ	2192'	0530164, 3629175	Panel corrals	State
2	Tank 219 Corrals	2874'	0536599, 3627529	Wire corrals	State
3	Middle Tank Corrals	2648'	0534864, 3628826	Panel corrals	State
4	NE Corner	2632'	0534618, 3630707	Old wire corrals (needs repair)	State

APPENDIX A (continued)

Planned Improvements

Priority	Improvement	Elevation	GPS Coordinates/ Location (NAD 83)	Comments	Ownership
New Well in NE corner					
High	Drill New Well	2640'	N½, Sec. 20, T7S, R17E	Drill new well, >400 ft. deep	State
High	Solar pumping plant at new well			>400 ft. deep	State
High	Storage Tank at new well			2,500 gallons	State
High	Trough at new well			750 gallons	State
New Well in SE Corner					
High	Drill New Well	2730'	Sec. 28, 29, 32, or 33, T7S, R17E	Drill new well, >400 ft. deep	State
High	Solar pumping plant at new well			>400 ft. deep	State
High	Storage Tank at new well			2,500 gallons	State
High	Trough at new well			750 gallons	State
Medium	Fence			Install new cross fence along old fenceline route to split ranch east & west into two pastures.	State
Clean & Seal Dirt Tanks with Bentonite					
Low	Tank 219	2861'	0536575, 3627502	Clean and seal with bentonite	State
Low	Middle Tank	2600'	0534841, 3628880	Clean and seal with bentonite	State

APPENDIX B

Climate

Monthly Average Temperature (Degrees Fahrenheit)

The average maximum temperature for the area is 82.2° Fahrenheit and the average minimum temperature is 47.4° Fahrenheit. Below is the chart of the monthly temperature averages for the Winkelman 6S climate station.

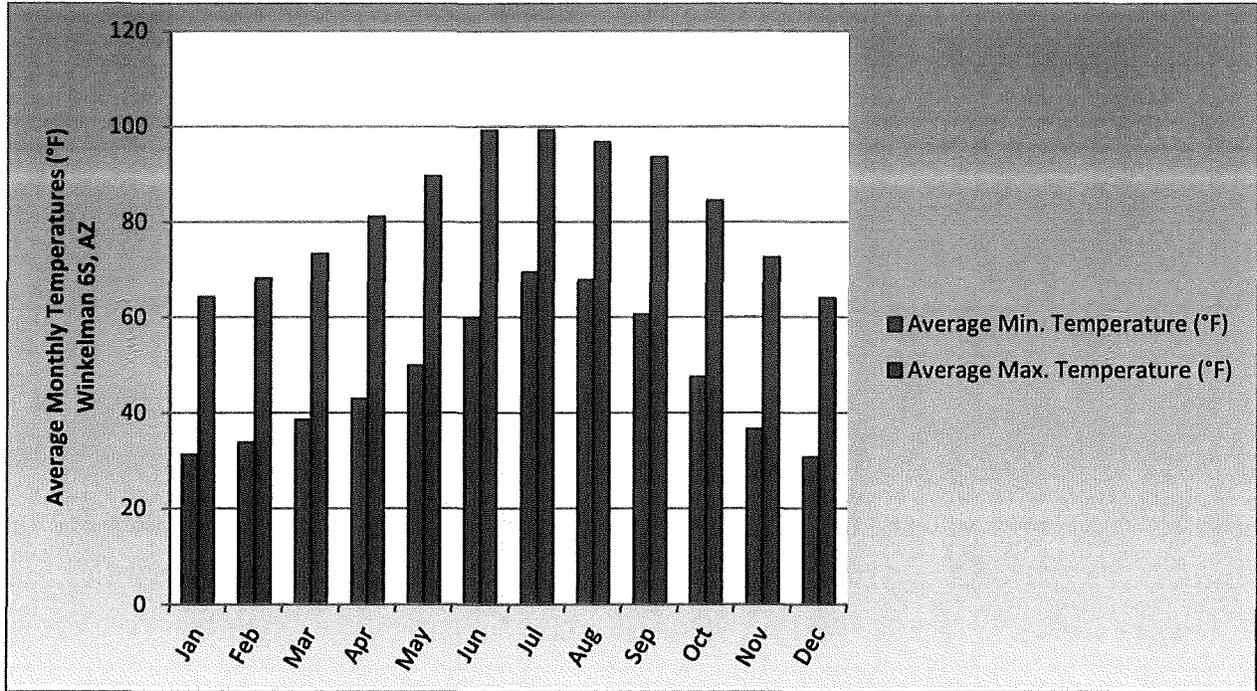


Figure 1: Monthly temperature averages for the Winkelman 6S climate station.

APPENDIX B (continued)

Precipitation Averages (inches)

The average annual precipitation for the weather stations averages 15.18". Approximately 56% of the areas precipitation falls between October and April, while 44% normally falls between May and September. Below are charts depicting precipitation records from two different stations, from 1951 to 1995. Numbers were derived from the monthly total precipitation records from both the Winkelman 6S and Winkelman 12 E climate stations.

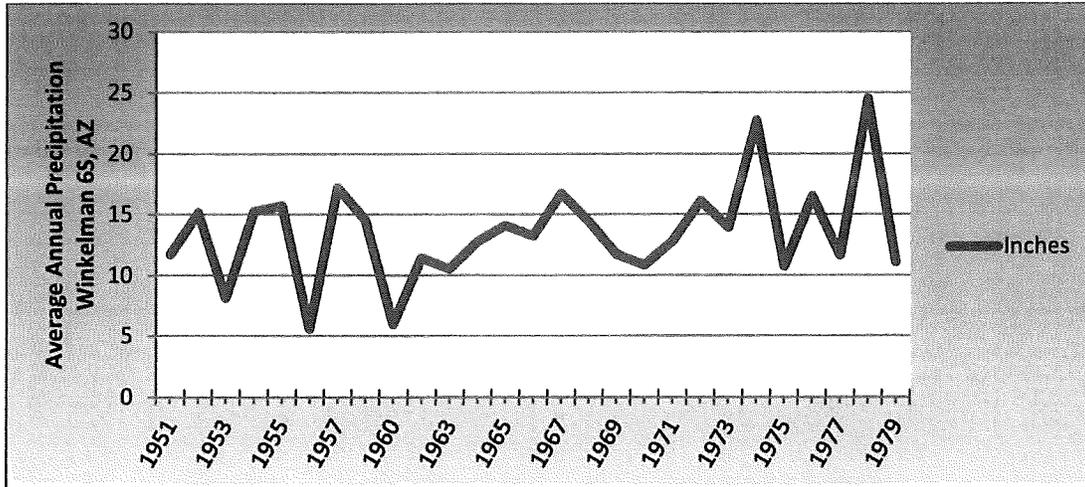


Figure 2: Annual precipitation totals for the Winkelman 6S climate station.

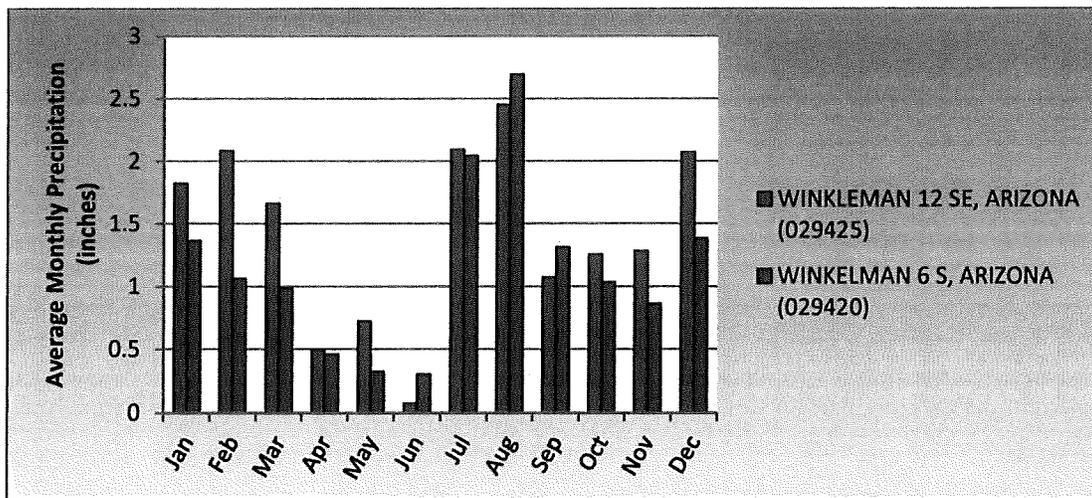


Figure 3: Monthly precipitation averages for the Winkelman 12 E and Winkelman 6S climate stations.

Cool season growth of plants occurs from October-April and warm season growth occurs from May-September due to the rain received during the monsoons. Although animals eat all year round, there is no "all season" plant to use as forage. Knowing that some plants are cool season and some plants are referred to as warm season is a basic key to having quality forage all year long. In the warm season of May through September is when the perennial grasses and summer annual forbs will germinate and grow. In the cool growing season of October through April, due to winter rains, you will see the winter annual forbs growing and the shrubs and trees will put on new growth.

Climate Stations	Warm Season Precipitation	Cool Season Precipitation
	May - September	October - April
Winkelman 12 E	6.4"	10.16"
Winkelman 6S	6.66"	7.13"

APPENDIX C

Common Resource Area

A Common Resource Area (CRA) map delineation is defined as a geographical area where resources, resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area. The Zapata Ranch was mapped in accordance with NRCS guidelines. The ranch is within 40-1 the Upper Sonoran Desert.

Ecological Sites

The ecological concept of plant succession and historic climax plant community is the foundation by which universities, the NRCS, federal and state land owning agencies, and other landowners and managers evaluate rangelands. The concept of plant succession is based upon the process of vegetational development through time where an area is successively occupied by different plants of higher ecological order and greater species diversity. The historic climax plant community refers to the highest ecological development of plant community on a given site as determined by climate, soil and soil parent material, and by topographic, vegetative, natural disturbance regimes (ex. fire) and animal factors. Some species have greater genetic amplitude than others and may occur throughout the different plant successional stages. Sometimes the historic climax plant community is an impractical objective, such as where a naturalized plant community of non-native species becomes established.

The ecological site is the basic mapping unit used in this rangeland inventory. An ecological site is a distinctive kind of rangeland that has the potential to support a native community typified by an association of species different for that of other sites. Ecological site descriptions have been developed within each MLRA. For this ranch, each ecological site was mapped in accordance with these guidelines. Non-native species are not included in the ecological site descriptions.

The inventory data for the ranch was collected in the summer and fall of 2013 by Alisha Phipps, Rangeland Management Specialist, and Jesse Wood, Soil Scientist, for the Natural Resources Conservation Service (NRCS), Jack and Catherine Mann from the Zapata Ranch and Cody Hatfield, Range Resource Area Manager for the Arizona State Land Department. This inventory was conducted using the Double Sampling method to determine Similarity Indices based on pounds/acre of annual production by species compared to the Ecological Site Descriptions.

Ecological sites within CRA 40-1 are: Limy Upland, Deep, Volcanic Hills, Gypsum Upland, Loamy Upland, Clay Loam Upland and Limy Slopes. Some inclusions of other ecological sites occur within each of the larger sites but were too minute to exclude from the larger units.

APPENDIX C (continued)

Current State of Ecological Sites: CRA 40-1

The current state of these sites has been affected by drought. Severe drought has reduced the cover of perennial grasses and forbs across the region and has impacted the growth of the shrubs and trees.

Limy Slopes

The Limy Slopes ecological site occurs in the upper elevations of the Sonoran Desert in southern Arizona. It occurs on hill-slopes and ridge-tops. Elevations for this site range from 2,200 to 3,600 feet. Slopes range from 15% to 45%. Soils are deep and moderately deep formed in limy and gravelly loamy alluvium or colluvium of mixed origin. They are calcareous throughout. Soil surfaces are well covered with rocks and gravels (20-80%). Plant species currently associated with this site include: creosote, jojoba, saguaro, ocotillo, catclaw acacia, palo verde, filaree (*Erodium cicutarium*) and various annual forbs.

Limy Upland, Deep

The Limy Upland, Deep ecological site occurs in the upper elevations of the Sonoran Desert. It occurs on fan terraces, old stream terraces and ridge-tops. Elevations for this site range from 1,900 feet to 3,200 feet. Slopes for this site are less than 15%. This site is comprised of deep and moderately deep soils formed in limy and gravelly loamy alluvium or colluvium of mixed origin. They are calcareous throughout. Plant species currently associated with this site include: Indian wheat, combbur, filaree (*Erodium cicutarium*), woolly daisy, creosote, staghorn cholla, hedgehog cactus, wolfberry, palo verde and jojoba.

Volcanic Hills

The Volcanic Hills ecological site occurs on steep hill-slopes and ridge-tops with slopes greater than 15%. Elevations for this site range from 1,700 feet to 3,500 feet. The site has shallow soils formed over andesite, dacite, basalt and or welded tuff. The soils are non-calcareous in the upper 10 inches and are usually loamy to clay loam in texture. This site has well developed cover of gravel and rock. Plant species currently associated with this site include: creosote, ocotillo, Palo verde, whitethorn acacia, guajilla, jojoba, wolfberry, prickly pear, hedgehog cactus, staghorn cactus, twinleaf senna and various annual forbs.

Clay Loam Upland

The Clay Loam Upland ecological site occurs on alluvial fans and fan terraces with less than 15% slope. Soils are moderately-deep to deep on this site and are not calcareous. The soils have an argillic horizon due to the clay content in the soil and the surface layer is a clay loam in texture. Elevations for this site can range from 1,700 to 3,500 feet. Plant species currently associated with this site: Palo verde, triangleleaf bursage, guajilla, saguaro, creosote, chainfruit cholla and various annual forbs.

Gypsum Upland

The Gypsum Upland ecological site occurs on fan terraces and ridge tops formed on relict lacustrine (lake bed) sediments. These soils are well drained, variable in texture, stratified and high in soluble gypsum. They are moderately deep to deep and underlain in gypsum deposits in places. The soils are calcareous throughout and are on slopes less than 15%. Cryptogams are very common on this site. This site is extremely susceptible to soil piping and sheet, rill and gully erosion due to high concentrations of gypsum in the surface soil. This site is relatively easy to see on the ranch due to the very light (whitish) color of the soil and is located on the western fingers and ridges on the ranch. Plant species currently associated with this site include: saguaro, creosote, Mormon tea, white bursage, whitethorn acacia, stinging serpent, button brittlebush, range ratany, bush muhly and trailing 4 o'clock.

Gypsum Slopes

The Gypsum Slopes ecological site occurs on the slopes along the fan terraces and ridge tops formed on relict lake bed sediments. The difference between the Gypsum Slopes site and the Gypsum Upland site is that the Gypsum Slopes site is found on greater than 15% slopes. Please refer to the Gypsum Upland site description above for further information.

Loamy Upland

The Loamy Upland ecological site occurs on fan terraces and old stream terraces. This site has deep soils which have formed in loamy alluvium. Surface textures range from very gravelly sandy loam to loam. Sandy loam surfaces can be no thicker than four inches. Soils have an argillic horizon near the surface. Plant species currently associated with this site: triangleleaf bursage, whitethorn acacia, wolfberry, jojoba, Palo verde, guajilla, slender janusia, prickly pear, hedgehog cactus, twinleaf senna and various annual forbs.

Sandy Wash

The Sandy Wash ecological site occurs on floodplains, low stream terraces and in channels of major drainage ways. This site benefits from extra moisture received as over bank flooding and/or runoff from adjacent upland sites. The soils are gravelly and sandy alluvium. They are deep and excessively well drained. Textures range from sandy loam to very gravelly sands. Although coarse textures make for low water holding capacities, plant-soil moisture relationships are good due to the extra moisture the soils receive. This site occurs along the Zapata Wash. The plant species primarily associated with this site are: mesquite, giant ragweed, Palo verde and desert willow.

APPENDIX D

Inventory Assessment

The Double Sampling method was used to collect production data on each inventory site. Trees, shrubs, sub-shrubs, cacti, perennial grasses, forbs, annual grasses and annual forbs were all included in the inventory. Composition by weight of individual plant species on the site is derived from this method; in other words, this method helps show what percent each species counted on the site is producing. Total annual production is based on clipping and weighing.

Inventory Points	Ecological Site	CRA	Total Production (lbs/acre) (Tree/Shrub/Grasses/Forbs)
T-1	Limy Upland, Deep	40-1	622
T-2	Volcanic Hills	40-1	644
T-3	Gypsum Upland	40-1	383
T-4	Loamy Upland	40-1	420
T-5	Limy Slopes	40-1	578

Similarity Index

From composition data, we are able to derive similarity indices which convey the likeness of one site to its potential by comparing composition by weight of each species on each site. The similarity index can be used as an assessment of the current plant community in relationship to the desired or climax plant community. Indices that are collected over time can depict the trend or direction of change the current plant communities are heading in relationship to the desired plant community. Management practices are directly affected and may have to be adjusted or implemented to maintain or improve a declining state of a site in order to meet management goals.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described in the Ecological Site Description. Similarity Index is determined by comparing the current annual production and composition of a plant community to the annual production and composition of the Historical Climax plant community described in the Ecological Site Description. Similarity Index is the percentage of a specific vegetation state plant community that is presently on the site.

For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for the group. Divide the resulting total by the total normal year production shown in the plant community description. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

Inventory Points	Ecological Site	CRA	Similarity Index
T-1	Limy Upland, Deep	40-1	44%
T-2	Volcanic Hills	40-1	51%
T-3	Gypsum Upland	40-1	69%
T-4	Loamy Upland	40-1	57%
T-5	Limy Slopes	40-1	62%

APPENDIX D (continued)

Range Health

Rangeland Health is the degree to which the integrity of the soil, vegetation, water and air as well as the ecological processes of the rangeland ecosystem is balanced and sustained. Integrity is defined as maintenance of the structure and functional attributes characteristic of a particular locale, including normal variability.

Range Health was assessed on each ecological site. Attributes including Soil/Site Stability, Hydrologic Function and Biotic Integrity are evaluated and given a rating depicting site resemblance to a reference state. Reference states are a depiction of the proper functioning ecological processes of a site. Each ecological site has a different reference state and desired states should help guide management goals and objectives. 17 indicators are used for the evaluation and when combined give a qualitative assessment of the site.

Inventory Points	Ecological Site	CRA	Soil/Site Stability	Hydrologic Function	Biotic Integrity
T-1	Limy Upland, Deep	40-1	N-S	S-M	M-E
T-2	Volcanic Hills	40-1	N-S	S-M	M
T-3	Gypsum Upland	40-1	S-M	S-M	S-M
T-4	Loamy Upland	40-1	N-S	S-M	M
T-5	Limy Slopes	40-1	N-S	M	M

Departure from Expected
classifications:

N-S: None to Slight

S-M: Slight to Moderate

M: Moderate

M-E: Moderate to Extreme

E-T: Extreme to Total

Other Attachments

1. Double Sampling, Range Health, and Similarity Index Sheets for each inventory point
2. Conservation Plan Map
3. Ecological Site Map
4. Soils Map

***Additional Information Needed Prior to Practice Installation**

1. Practice Designs
2. ASLD environmental clearances on federal or State Trust Lands
3. NRCS Environmental Evaluation on non-federal lands
4. ASLD written approval to NRCS for installing practices on State Trust Lands (i.e. an approved Application to Place Improvement)

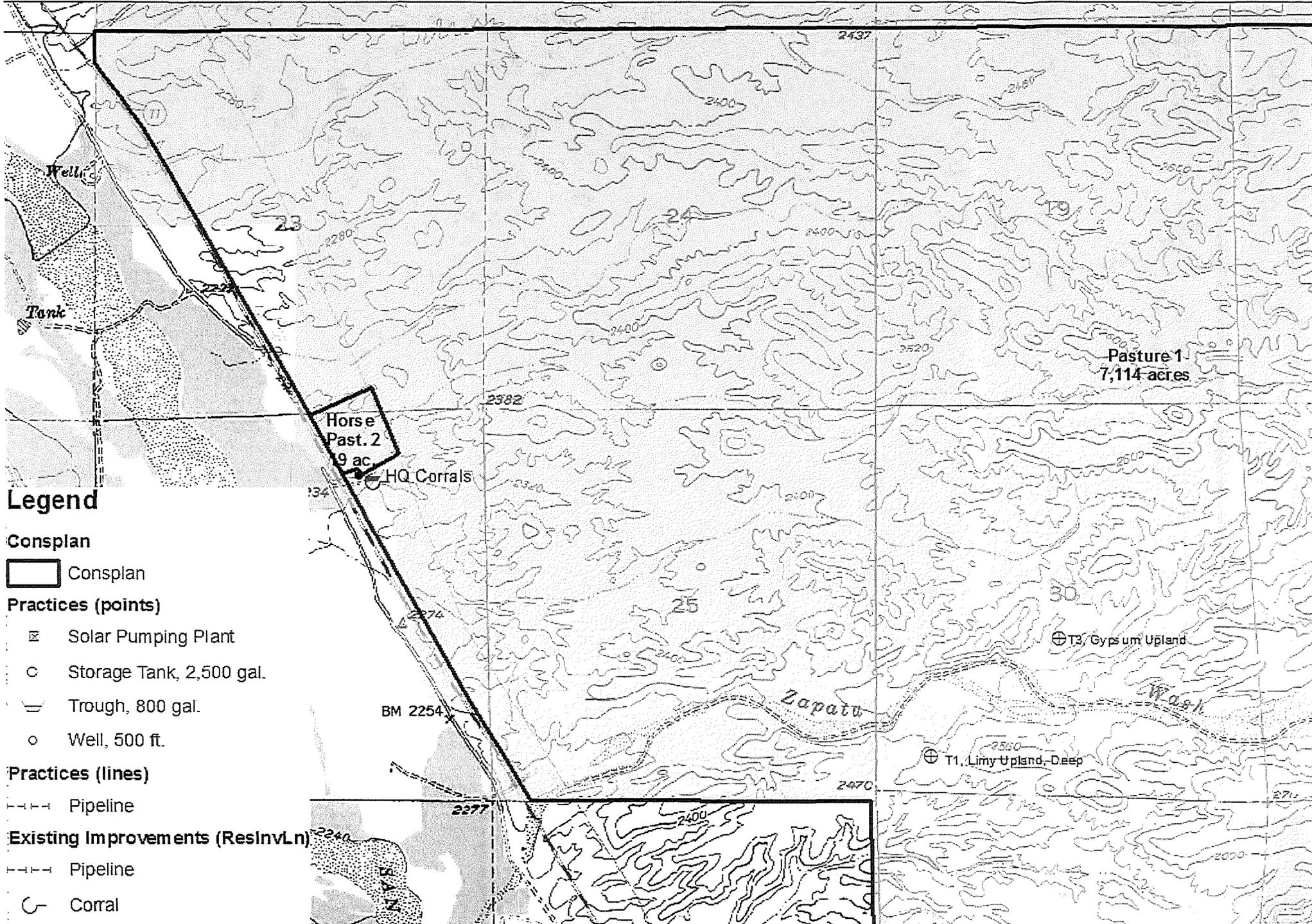
***Additional Information Needed Upon Completion of Practice**

1. Practice Measurement and Certification

Additional Information Needed Yearly

1. *Annual Status Reviews
2. Monitoring Summaries and Rainfall Records

*These requirements would only occur if practice(s) were being installed using NRCS' EQIP funding.



Legend

- Consplan**
- Consplan
- Practices (points)**
- Solar Pumping Plant
 - Storage Tank, 2,500 gal.
 - Trough, 800 gal.
 - Well, 500 ft.
- Practices (lines)**
- Pipeline
- Existing Improvements (ResInvLn)**
- Pipeline
 - Corral