ARIZONA WATER SETTLEMENTS ACT PROPOSED WATER IMPOUNDMENT CANYON SURVEY REPORT

Prepared for

New Mexico Interstate Stream Commission

Prepared by

SWCA Environmental Consultants

June 2014

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ACRONYMS AND ABBREVIATIONS

AAs	Assessment Area
AWSA	Arizona Water Settlement Act of 2004
BLM	Bureau of Land Management
CUFA	New Mexico Consumptive Use and Forbearance Agreement
ESA	Endangered Species Act
flycatcher	southwestern willow flycatcher
GIS	geographic information system
GPS	global positioning system
m	meter(s)
NHD	National Hydrography Dataset
NMDGF	New Mexico Department of Game and Fish
NMISC	New Mexico Interstate Stream Commission
NMRAM	New Mexico Rapid Assessment Method
NMRPTC	New Mexico Rare Plant Technical Council
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
SSURGO	Soil Survey Geographic
SWCA	SWCA Environmental Consultants
SWReGAP	Southwest Regional Gap Analysis Project
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOI	wetland of interest

1 INTRODUCTION

The purpose of this report is to provide a preliminary evaluation of the ecological conditions of the aquatic and riparian environments of the Upper Gila River for developing the water allocated to New Mexico under the Arizona Water Settlement Act of 2004 (AWSA) (Public Law 108-451) and the New Mexico Consumptive Use and Forbearance Agreement (CUFA). SWCA Environmental Consultants (SWCA) was retained by the New Mexico Interstate Stream Commission (NMISC) to assess the environments and ecological conditions of potential canyons where water impoundments may be possible. This report provides information to aid the NMISC in determining which canyon(s) might be selected for water impoundment and also outlines potential compliance and mitigation measures necessary for a project to proceed.

The AWSA provides the legal means and up to $128 million in non-reimbursable funding for New Mexico to divert up to 140,000 acre-feet of water (14,000 acre-feet per year on average) over any 10-year period from the Gila Basin. The AWSA guarantees New Mexico at least $66 million (indexed for inflation from 2004; $9.04 million/year in 2012) over 10 years for any project that meets a water supply demand. If New Mexico elects to develop any of the additional water from the Gila River basin, New Mexico is entitled to an additional $34 to $62 million ($100–$128 million total) for infrastructure and associated costs on a construction cost-schedule basis. New Mexico must inform the Secretary of the Interior by 2014 if New Mexico chooses to develop any of the additional water. The purpose of this effort is to determine if it may be possible to develop all or some portion of the additional AWSA water while complying with the NMISC's formally adopted policy to fully consider the unique and valuable Gila River ecology and mitigate any negative impacts. SWCA collaborated with the NMISC to develop a list of environmental attributes or conditions representative of the environmental health and natural resource value of each of the 10 canyons, including an evaluation of any federal or other agency special status species and/or habitats that may be impacted by the proposed project.

This report presents the status of the environmental conditions in each of the 10 canyons (Figure 1) surveyed by SWCA in the fall/winter 2013. These canyons are in the Cliff-Gila valley in Grant County, New Mexico: Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn. A matrix of environmental attributes (rows represent each canyon, columns represent environmental attributes) compiled by SWCA was completed for each canyon to provide the information needed by the NMISC to evaluate the environmental characteristics and values each canyon relative to the other canyons (see Table 1 and Table 2 in Section 3 below). Objective and validated methods were used to provide data on the environmental parameters across all of the canyons. The evaluation and data gathering process was consistent and standardized across all canyons, so each canyon was evaluated for the same features in the same ways.

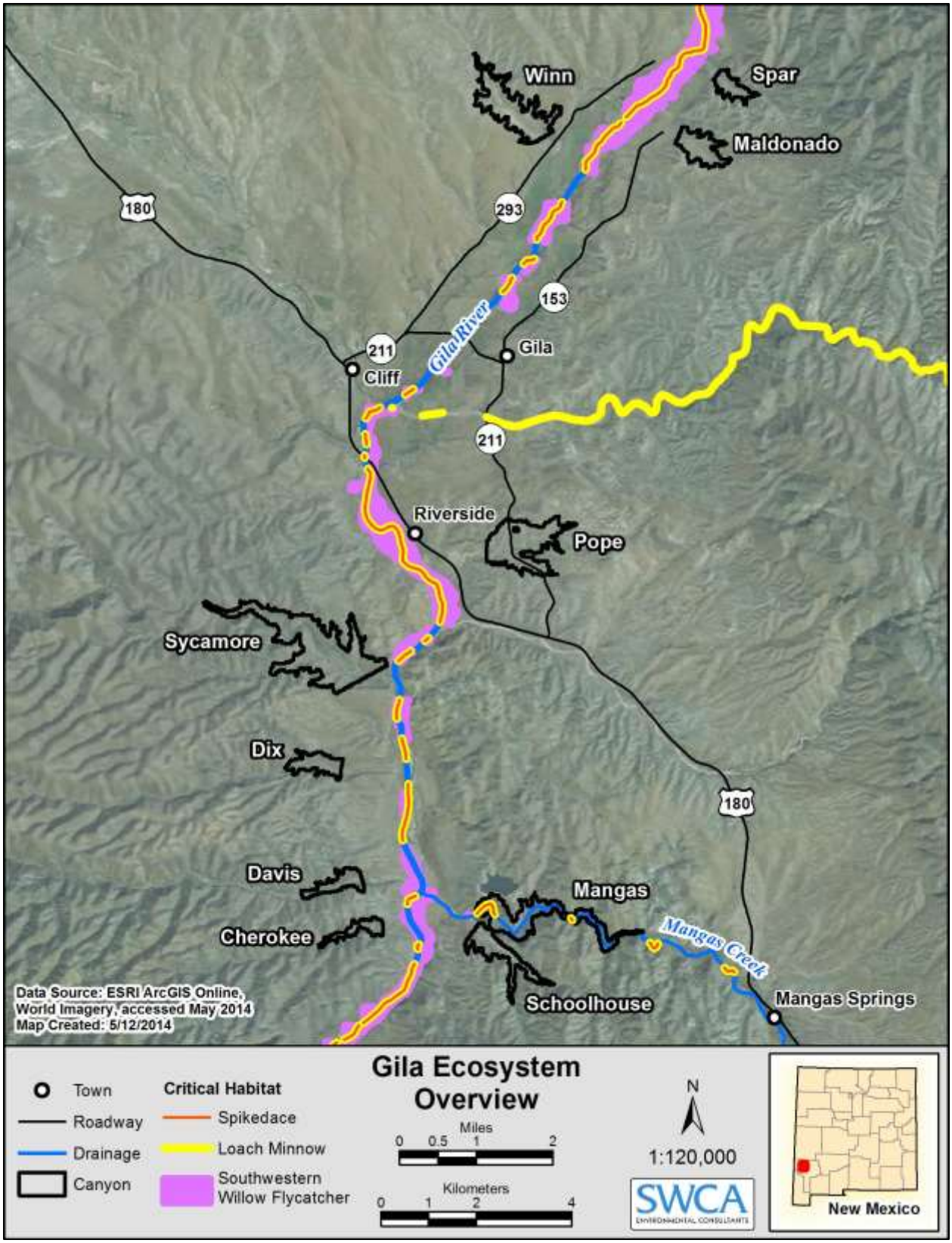

Figure 1. Proposed impoundment canyons in the Cliff-Gila valley. US Fish and Wildlife Service designated critical habitat for 3 special status species also is shown.

2 METHODS

2.1 DESKTOP ANALYSIS

An initial desktop analysis, or in office data gathering process, was conducted to provide preliminary information on the environmental attributes of each of the canyons. The information from the desktop analysis was then used to guide a field survey to verify information gathered in the analysis and obtain any additional information on environmental conditions actually observed in each canyon. For the desktop analysis, a listing of environmental attributes or parameters needed to comparatively evaluate the natural resources and environmental conditions across all of the canyons was compiled by the NMISC and SWCA. SWCA then conducted the office-based desktop analysis to obtain information for the series of environmental attributes or parameters to be used to evaluate the natural resource value of each of the canyons. SWCA developed a preliminary matrix of environmental attributes containing records of information for each environmental attribute for each canyon. Each environmental attribute evaluated is described below.

Canyon Geographic Location: The geographic location of each canyon as defined by the NMISC was incorporated into a geographic information system (GIS) database. The geographic locations were based on project area polygons obtained from the NMISC that designated the portions of each canyon that would be inundated if that particular canyon were chosen for project development. The project area polygons also were used to produce maps that defined the survey areas for this report.

Project Area Acreage: The size of each canyon project area was determined through GIS analysis producing calculated acreages of each canyon project area polygon based on project area GIS files from the NMISC. The number of acres of each canyon project area may be used as a criterion by the NMISC for evaluating which canyon may be appropriate for project development.

Land Ownership: Data received from the NMISC designating ownership of each canyon project area was used to determine if land ownership of each canyon project areas was either private or under the jurisdiction of a public government agency, or a combination of the two. Landownership is needed when requesting access to land.

Special Status Species and Habitat Information: Special status species are species that are rare, threatened, or endangered, and are listed by government agencies to receive special management and regulatory status to protect and enhance viable species populations. Data on special status species and their known habitat characteristics was acquired from the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), New Mexico Department of Game and Fish (NMDGF), New Mexico Energy, Minerals and Natural Resources Department, New Mexico Rare Plant Technical Council (NMRPTC), and Natural Heritage New Mexico (Natural Heritage New Mexico 2013; NMDGF 2013; NMRPTC 2013; USFS 2013; USFWS 2013). Special status species databases and habitat information were used to analyze the potential occurrence for individuals (not necessarily viable breeding populations) of each species within the project boundaries of each canyon.

Information on the known geographic distributions and habitats of each special status plant and animal species with the potential to occur within each canyon was assembled into a listing of all

possible special status species across all of the canyons. SWCA also produced a listing of all potential special status species habitats and USFWS designated critical habitats revealed during the desktop surveys.

In our desktop analysis, a special status species was found to have the potential to occur within a canyon when that canyon was within the species' known geographic distribution and if soils, vegetation community types, and/or aquatic environmental parameters resembled those known to be associated with the occurrence of the species. We define the term potential habitat to designate areas that provide the above environmental characteristics that may support individuals of special status species. Potential habitat is defined as habitat that is not known to be occupied by the species of interest, but has environmental characteristics of areas (i.e., habitat) that are known to be occupied by the species. In other words, a special status species was found to have the potential to occur within a canyon when that canyon was within the species' known distribution and the canyon provided potential habitat for the species. This study did not provide detailed special status species surveys to determine whether potential habitats were occupied.

Critical habitat, as seen on Figure 1, is a term defined in Section 3 of the Endangered Species Act (ESA). The term does not, by itself, indicate the potential for local occurrence of a special status species. Instead, it refers to areas that contain habitat features the USFWS considers to be essential for the survival and recovery of a federally endangered or threatened species. Not all endangered and threatened species are listed with the designation of critical habitat. Critical habitat may include areas occupied by the species, but it may also include areas currently not occupied by the species. In the latter case, critical habitat corresponds to areas the species will need to recolonize in order to grow in numbers and recover. Critical habitat may require special management such as protection from development. For that reason, our desktop analysis includes information on proximity to any designated critical habitat.

The number of special status species that may occur in each canyon, along with the regulatory status of each species, may then be used as a criterion for evaluating the natural resource value of each canyon. If a particular canyon is chosen for project development, species-specific surveys for the presence of special status species will be required. The special status species listings by canyon in this report will provide the basis for those potential future species-specific surveys.

Soil Type: Soils for each canyon project area were classified using data from the Soil Survey Geographic (SSURGO) database from the U.S. Department of Agriculture National Resources Conservation Service (NRCS) (NRCS 2006). This database describes the soils and other soil-related environmental components that have unique morphological, chemical, and ecological properties, including the potential for plant productivity, within the project boundaries. Soils are important in determining the types of biotic communities that are present in different locations. In order to document soil types that may affect biotic spatial patterns and diversity, NRCS soils maps were produced in GIS applications as overlays on the aerial image maps of each canyon project area (NRCS 2006). Soil types were used to evaluate potential habitat for special status species.

Vegetation Community Type: Vegetation community types are assemblages of plant species that tend to be relatively consistent in composition over landscapes and dominated by the same indicator plant species. Different plant communities tend to occur in different environments, and they are key indicators of environmental variability and habitats for animal species. Since

vegetation community types represent different habitats for plant and animal species, they serve as a guide for the occurrences of special status species based on their potential habitats. There are a number of different plant community classifications for the region, each at different spatial scales of ground resolution. The Southwest Regional Gap Analysis Project (SWReGAP) provides the finest spatial resolution plant community type maps available for the canyons and for the overall region surrounding the canyons (U.S. Geological Survey [USGS] 2004; Lowry et al. 2005). SWReGAP mapped vegetation communities or types over the entire Southwest, including the entire Gila River watershed. SWReGAP vegetation maps are based on differential reflectance patterns of land/vegetation surfaces in satellite images, at 30 × 30–m pixel resolution. The provisional SWReGAP vegetation maps were used to characterize the vegetation community types and habitats present within each of the canyon project areas, and a preliminary SWReGAP vegetation community map was constructed for each canyon project area.

The SWReGAP maps do contain errors from incorrect interpretation of spectral data, and most of the images were not ground-truthed by SWReGAP, but are generally accurate (Lowry et al. 2005). To increase accuracy of the SWReGAP vegetation maps for each of the canyons, each initial SWReGAP vegetation map for each canyon was secondarily evaluated by examining vegetation patterns with Google Earth images to verify the SWReGAP maps. Based on this analysis and associated corrections, a second set of corrected vegetation community type maps was then produced to be field verified or ground-truthed during field surveys. SWReGAP maps and associated descriptions of each plant community type were used to describe the vegetation community types and their acreages within each of the canyon project areas. The diversity of plant communities present in each canyon was used as a criterion for evaluating the natural resource value of each canyon, and vegetation community types also were used to evaluate potential habitat for special status species.

Water Body, Flowlines, and Freshwater Springs Data: Water body, flowlines, and freshwater springs data acquired from the USGS National Hydrographic Dataset [NHD] describe any water bodies and freshwater springs that occur within the individual canyon project boundaries. The database also classifies channels as ephemeral, intermittent, or perennial (see below) (USGS NHD 1999–2001, 2013). Aquatic environments or habitats are especially important in Southwest canyons for several of the identified special status species, as well as for providing important habitat for many other plant and animal species. Based on NHD flowline information (USGS NHD 1999–2001), aquatic habitat data, and aerial images, SWCA prepared a preliminary record of stream flow regimes (perennial, intermittent, ephemeral) and aquatic habitats for each canyon. These aquatic habitats included lakes, ponds, streams, rivers, canals, and reservoirs to be used in general mapping and support data analysis of any surface water systems in each canyon following Levick et al (2008):

Ephemeral: A stream or portion of a stream that flows briefly in direct response to precipitation in the immediate vicinity, and whose channel is at all times above the groundwater reservoir.

Intermittent: A stream where portions flow continuously only at certain times of the year, for example, when it receives water from a spring, groundwater source, or surface source, such as melting snow (i.e., seasonal). At low flow there may be dry segments alternating with flowing segments.

Perennial: A stream or portion of a stream that flows year-round is considered a permanent stream, and for which baseflow is maintained by groundwater discharge to the streambed due to the groundwater elevation adjacent to the stream typically being higher than the elevation of the streambed.

These preliminary determinations of stream flow types were then verified in the subsequent field survey. In addition, special attention was given to the flow regime of each canyon and how the riparian vegetation and soils are indicators of a healthy ecosystem. Formal wetland delineations (U.S. Army Corps of Engineers [USACE] 1987, 2010) were not conducted; instead, SWCA identified and recorded the occurrence of wetland habitat in each of the canyons. Potential wetlands were identified from aerial images and SWReGAP vegetation maps. SWCA additionally documented and recorded the presence of any natural freshwater springs in each canyon. The types of water bodies present in each canyon were used as a criterion for evaluating the natural resource value of each canyon. Additionally, knowledge of water bodies present is used to evaluate potential habitat for special status species.

Wetlands and Riparian Data: Wetlands and riparian data were acquired from the USFWS National Wetlands Inventory (NWI) to describe any wetlands or other special aquatic habitats within the project boundaries (USFWS 2011). Knowledge of wetlands and riparian areas present was used to evaluate potential habitat for special status species.

The New Mexico Rapid Assessment Method (NMRAM): NMRAM (Muldavin et al. 2012) evaluation for riparian/wetland ecological condition provides a rapid assessment method that produces scores for a variety of environmental attributes that indicate the ecological condition of riparian wetland areas and is applicable to riparian areas that do or do not contain wetlands. The NMRAM was used as a tool to evaluate the ecological condition, function and complexity or diversity of riparian corridor(s) of each canyon. The NMRAM protocols were developed for mid-elevation streams in northern New Mexico. The biotic metrics and protocols are appropriate for the Gila River watershed, but abiotic metrics are probably not appropriate (E. Muldavin, personal communication, 2013), so abiotic metrics were not evaluated. A modification of the NMRAM specifically for the Gila River watershed is currently underway, but the abiotic metric protocols are not yet complete for use. The NMRAM is based on locating specific Assessment Areas (AAs) along streams of interest and then evaluating environmental characteristics of those riparian zones and scoring the conditions of each environmental attribute on a scale of 1 to 5. Each of the individual metric scores are then averaged together to produce an overall ecological condition score for each AA. The number of AAs per stream segment, or canyon stream or arroyo in this case, is determined by examining aerial images in advance and locating AAs in appropriate locations to capture the range of riparian environmental variability along each stream reach of interest. The desktop-corrected (i.e., based on Google Earth image verification) SWReGAP maps (see above) were used to visually determine if riparian wetlands or phreatophytic vegetation existed within each canyon. If identified, these locations were designated as a wetland of interest (WOI), and AAs for each canyon were defined and delimited on the preliminary SWReGAP maps for each canyon according to the NMRAM protocols for Level 1 (desktop/GIS) analysis. NMRAM biotic metric scores for each canyon may be used by the NMISC to help evaluate the natural resource value of each canyon. The specific steps employed for the NMRAM desktop analysis were as follows:

a. The WOIs (or patches of phreatophytic vegetation linked to groundwater) were located along the riparian corridors located in the bottoms of each canyon within each potential impoundment area (canyon polygon). Initial observations from aerial images indicated that the stream channels in most of the canyons appeared to be largely ephemeral and did not appear to support wetlands or phreatophytic riparian or wetland vegetation (if so, see item c. below).
b. The AAs were located within each WOI identified in each canyon. Each canyon provisional AA was drawn on each SWReGAP map for each canyon. The lateral extent of each AA was defined as the flood-prone width, which should include each WOI along each channel. If riparian corridors or WOIs were significantly interrupted (interruption > in length than the lengths of the riparian corridors), then more than one AA was designated per canyon. The linear extent of AAs was approximately 200 m along the stream channel within each WOI in each canyon, unless significantly interrupted by human disturbance.
c. If no wetlands or obvious riparian vegetation patches were identified, a portion of each stream or wash that appeared to support the vegetation patch(s) most likely to be associated with the stream hydrology was selected to serve as the WOI and AA. Those AAs were approximately 200 m in length and were otherwise defined by the standard NMRAM rules. Barren, dry stream channel beds were substituted for open water.
d. WOIs and associated AAs were hand drawn on hard-copies of each SWReGAP vegetation map for each canyon. These maps were then taken to the field, verified, and modified, and the Level 2 metrics were evaluated and scored (see below). If riparian vegetation and/or wetlands were discovered in canyons that were not identified in the Level 1 analysis, then the WOIs and AAs were added to those maps in the field and evaluated for Level 2 metrics.

2.1.1 Desktop Analysis Summary

All information derived from the above analyses was incorporated into a preliminary matrix of environmental attributes to be evaluated in each canyon. GIS aerial image maps of 1) SWReGAP vegetation and NMRAM WOI and AA locations, 2) NRCS soils types, and 3) aerial images without any mark-ups to view topography and landscape features were produced for each canyon. The preliminary matrix of all canyons and their environmental attributes was then updated in the desktop survey to provide a summary overview of what information was currently available, as well as what information was lacking and would need to be obtained from on the ground field surveys (see Table 1 below).

2.2 Field Protocols

Field surveys were then conducted during the fall and winter of 2013 to 1) verify the accuracy of data collected during the initial desktop analysis and 2) collect any new additional information on the environments of each canyon that was not available from existing information sources, including conducting NRCS Pasture Condition (see below) and NMRAM riparian health evaluations.

An additional rapid assessment method used to rate the ecological health of soils and vegetation on grazed pastures or rangeland, the NRCS Pasture/Rangeland Condition method (NRCS 2003) was included as part of the field surveys to evaluate the environmental condition of the landscapes of each canyon. Like the NMRAM, NRCS Pasture Condition scores also rate the environmental conditions of an area of interest based on a series of specific parameter or metric scores, providing both individual metric scores and an overall score for the entire area. For the canyon survey, Pasture Condition scoring was completed separately for the upland areas and for the riparian corridor(s) of each canyon. The NRCS Pasture Condition score evaluates the current pasture productivity and the stability of its plant community, soil, and water resources. It also identifies what treatment needs, if any, are required to improve a pasture's productivity and protect soil, water, and air quality. Data collected using this methodology included percent desirable plants, plant cover, plant diversity, plant residue (leaf litter and dead standing), percent legumes (because they fix nitrogen in the soil), uniformity of use, livestock concentration areas, soil compaction, and erosion. The Pasture Condition scores for each parameter range on a scale of 1 to 5, with 1 being the poorest condition score. Plant vigor, a measurement of the overall health and stress in the plant community, was not evaluated during the surveys because plant vigor assessments require plant tissue sampling and chemical analysis, which are beyond the scope of this project. The other metrics that were used do provide useful scores of rangeland environmental/health conditions, which are appropriate for this project. All NRCS metric indicator scores were filled out on individual data sheets for each canyon, and the final NRCS summary score was also recorded on the "Environmental Survey of Gila Watershed Potential Impoundment Canyons" data sheet. Each NRCS indicator was evaluated and given a score of 1 through 5 depending on the criteria for each indicator. Refer to Appendix B for indicator definitions.

The 10 canyons (see Figure 1) that were surveyed are located in the Cliff-Gila valley in Grant County, New Mexico. Three of the canyons (Maldonado, Spar, and Winn) are located north-northeast of the Cliff-Gila area, and the remaining seven are south of the Cliff-Gila area (Cherokee, Davis, Dix, Mangas, Pope, Schoolhouse, and Sycamore). Refer to Appendix A for individual canyon maps. Each of the 10 canyons was visited in October or December 2013. Landowner permission was obtained and access granted prior to each visit. SWCA biologists Matthew McMillan and Joanna Franks conducted the surveys at each canyon with SWCA Senior Ecologist, Dr. David Lightfoot supervising the first 3 days of surveys.

SWCA biologists hiked throughout each canyon and recorded information on field data sheets, global positioning system (GPS) units, and digital cameras. Ground-truthing was conducted to view all portions of each canyon, including side canyons, ridge tops, etc., within each canyon potential impoundment polygon. The modified SWReGAP aerial image maps for each canyon were ground-truthed in each canyon to verify the existence and extent of vegetation communities and the presence of all other (non-vegetation community) criteria listed in the preliminary matrix. GPS coordinates were collected for each environmental attribute where appropriate. All data were recorded on individual data sheets for each assessment method for each canyon. Final data were also recorded on "Environmental Survey of Gila Watershed Potential Impoundment Canyons" data sheets and digitized after the field surveys. Changes drawn on the hardcopy aerial image maps were digitized in GIS and acreages of each SWReGAP vegetation community were calculated for each canyon. Updated final maps showing all features from both the desktop analysis (corrected) and field surveys were produced in GIS following the field survey. Photographs along with location and bearing information were taken within each canyon, and

information regarding each photograph was recorded on a data sheet. All data sheets and maps with hand-drawn corrections were scanned and stored electronically (pdf) as back-up files. Final data for NMRAM and NRCS Pasture Condition scores from each canyon were presented graphically as bar charts.

During the field surveys, SWCA evaluated each canyon project area for known and potential habitat for each special status species identified during the desktop analysis. Any such habitats were documented and photographed, and the spatial extent of the habitat was recorded with a GPS unit. SWCA verified and recorded the overall habitat diversity within each of the canyons on the modified SWReGAP aerial image maps and associated data sheets. SWCA also verified the occurrence of vegetation communities, as well as the presence of all other habitats not identified during the desktop analysis. These habitats were documented and photographed, and the spatial extent of the habitat was recorded with a GPS unit.

Based on NHD flowline and aquatic habitat data, SWCA verified and recorded the stream flow regimes (perennial, intermittent, ephemeral) and aquatic habitats for each of the canyons. These aquatic habitats include lakes, ponds, streams, rivers, canals, and reservoirs and were used in general mapping and support data analysis of any surface water systems in each canyon. These habitats were documented and photographs were taken of each habitat type. The spatial extent of aquatic habitats was recorded with GPS units. SWCA verified and recorded riparian vegetation and soils within each of the canyons on the modified SWReGAP aerial image maps and associated data sheets. In addition, special attention was given to the flow regime of each canyon and how the riparian vegetation and soils are indicators of a healthy ecosystem. Although a formal wetland delineation (USACE 1987, 2010) was not conducted, SWCA verified and recorded the occurrence of wetland habitat in each of the canyons. SWCA identified potential wetlands based on two of the three USACE wetland criteria: dominance and/or a prevalence of hydrophytic vegetation and wetland hydrology (USACE 1987, 2010). The wetland boundary was recorded with a Trimble XH GPS unit with sub-foot accuracy.

SWCA verified and recorded the presence of any natural freshwater springs in each of the canyons. These habitats were documented and photographed, and the spatial extent of the habitat was recorded with a GPS unit. SWCA also documented any sensitive habitats that may have developed due to the influx of water from the spring(s).

Level 2 (field survey) NMRAM evaluations were conducted using the NMRAM Field Guide and associated data forms (Muldavin et al. 2003). Only the landscape and biotic metrics were evaluated and scored as mentioned above. A summary of the field protocols follows for each WOI and AA in each canyon.

1. Using the GIS-produced field map, each WOI(s) and AA(s) in each canyon was evaluated, each canyon preliminary vegetation map was corrected, and changes were made to the hardcopy field maps as needed.
2. Each WOI Cover Worksheet was completed.
3. All biotic metrics were evaluated and scored on a scale of 1 (poor) to 4 (excellent):
    - Relative native plant community composition

- Vegetation horizontal patch structure
- Vertical vegetation structure
- Native riparian tree regeneration
- Invasive exotic plant species cover

4. The Stressor Checklist was completed.
    - Environmental stressors were evaluated and scored on the checklist
5. Photo points were established and photographs taken.
    - Photographs were taken of the following AA attributes:
        - General environmental condition
        - Dominant plant communities
        - Stream condition
6. The Quality Assurance Checklist was completed for each canyon to verify all data have been collected correctly.

All NMRAM biotic metric data were filled out on individual data sheets for each canyon, and the final NMRAM for each AA in each canyon score was also recorded on the "Environmental Survey of Gila Watershed Potential Impoundment Canyons" data sheet.

The final data from each canyon survey are presented in the final matrix of environmental attributes, as well as individually summed scores for each attribute (see Table 2 in Section 3).

3 RESULTS

The preliminary desktop analysis matrix of environmental attributes for each canyon is presented in Table 1, and the field verified and final matrix of environmental attributes for each canyon is presented in Table 2. Corresponding data for each canyon is also found within each canyon subsection in the text below. Both a preliminary desktop survey and a field verification survey were performed for most of the canyons. However, the NMISC and SWCA were not granted permission by landowners to conduct field surveys for Cherokee Canyon, Mangas Canyon, or the private land of Schoolhouse Canyon. Therefore the results below for those canyons are based only on the preliminary desktop analysis with no field verification.

The desktop analysis for federal and state special status species revealed that 135 special status species occur in Grant County (Appendix C). Of these 135 species, 62 were eliminated from further consideration based on habitat(s) that were clearly beyond the known geographic or elevational range of the species, did not contain vegetation or landscape features known to support these species, or both. The remaining 73 species have the potential to occur within all or some of the canyons and were analyzed in further detail (Table 3). Seven out of the 73 species are designated as threatened or endangered by the USFWS with an additional three listed as proposed species and three listed as candidate species. Twenty-six of the 73 species are designated as threatened or endangered by the NMDGF.

During the field surveys, SWCA investigated the presence of each special status species and their habitat preferences, and documented any habitats that could support special status species. Designated critical habitat occurs all along the Gila River for the southwestern willow flycatcher (*Empidonax traillii extimus*; flycatcher) and in the Gila River and Mangas Creek for both loach minnow (*Tiaroga cobitis*) and spikedace (*Meda fulgida*). Our desktop and field surveys revealed that in the areas that we sampled only Mangas had known habitat and Sycamore Canyon had potential habitat for these three species. Please refer to Appendix E for data sheets and Appendix F for photographs for each of the canyons.

Table 1. Desktop Analysis Matrix of Environmental Attributes Analyzed for Each Canyon

Canyon	Total Acres	Total Hectares	Land Ownership	USGS 7.5' Quadrangle	Critical Habitat (Y/N)	Distance to Nearest Critical Habitat (type, feet)	Heritage Program (count)		Biotic Community (Brown)	Ecoregion (Griffith)	ProvisionalSWReGAP Vegetation Community Types (numbers are SWReGAP codes for each type)		SWCA/Google Earth Verified SWReGAP Vegetation Community Types (numbers are SWReGAP codes for each type)		Spring (count)	NWI Wetland			NWI Riparian[3]		NHD Waterbody[4]		NHD Flowline
							Public	Private			Type	Acres	Type	Acres		Count	Type	Total Acres	Count	Acres	Count	Acres	Type
Cherokee	62.61	25.34	P	Mangas Springs 32108-G5	N	SWFL, 1,405 ft to E; LM/SD, 2,581 ft to W	1	3	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	10.32 3.89 48.26 0.14	**S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S115** Madrean Juniper Savanna	33.26 21.49 7.86	—	1	Riverine	7.40	2	0.41	—	—	Intermittent Ephemeral
Davis	83.74	33.89	P	Mangas Springs 32108-G5	N	SWFL, 2,810 ft to E; LM/SD, 3,493 ft to E	2	4	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S094** North American Warm Desert Lower Montane Riparian Woodland and Shrubland **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	37.89 1.31 0.22 43.16 1.17	**N11** Open Water **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	0.53 70.61 12.61	—	1	Riverine	16.05	10	21.46	1	0.25	Intermittent
Dix	94.84	38.38	P	Cliff 32108-H5	N	SWFL, 3,383 ft to E; LM/SD, 4,532 ft to E	1	4	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S062** Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	8.75 19.07 1.33 3.34 59.37 2.98	**S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	67.16 27.68	—	1	Riverine	5.63	7	16.28	—	—	Intermittent
Maldonado	122.19	49.45	P	Canteen Canyon 33108-A5	N	SWFL, 1,962 ft to NW; LM/SD, 3,287 ft to NW	0	1	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S010** Colorado Plateau Mixed Bedrock Canyon and Tableland **S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	1.36 2.08 2.92 44.75 69.30 1.78	**D01** Disturbed/ Nonspecific **S020** North American Warm Desert Wash **S115** Madrean Juniper Savanna	7.57 32.73 81.90	—	1 1	Riverine Other	7.04	—	—	—	—	Intermittent
Mangas	271.18	109.74	BLM/P/ NMDGF	Mangas Springs 32108-G5	Y[1]	SWFL, 3,546 ft to W;	5	6	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S035** Madrean Pine-Oak Forest and Woodland **S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S094** North American Warm Desert Lower Montane Riparian Woodland and Shrubland **S112** Madrean Pinyon-Juniper Woodland	2.38 88.32 32.83 0.07 35.13 112.46	**S019** North American Warm Desert Volcanic Rockland **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S094** North American Warm Desert Lower Montane Riparian Woodland and Shrubland **S115** Madrean Juniper Savanna	18.29 8.13 178.73 26.04	—	1	Riverine	11.65	11	17.63	—	—	Intermittent Ephemeral
Pope	303.87	122.97	P	Cliff 32108-H5	N	SWFL, 3,088 ft to SW; LM/SD, 4,083 ft to SW	0	0	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	20.90 10.78 25.93 237.71 8.54	**D01** Disturbed/ Nonspecific **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S115** Madrean Juniper Savanna	8.91 40.49 61.40 193.07	—	1	Riverine	3.57	—	—	—	—	Intermittent

Table 1. Desktop Analysis Matrix of Environmental Attributes Analyzed for Each Canyon

Canyon	Total Acres	Total Hectares	Land Ownership	USGS 7.5' Quadrangle	Critical Habitat (Y/N)	Distance to Nearest Critical Habitat (type, feet)	Heritage Program (count)		Biotic Community (Brown)	Ecoregion (Griffith)	ProvisionalSWReGAP Vegetation Community Types (numbers are SWReGAP codes for each type)		SWCA/Google Earth Verified SWReGAP Vegetation Community Types (numbers are SWReGAP codes for each type)		Spring (count)	NWI Wetland			NWI Riparian[3]		NHD Waterbody[4]		NHD Flowline
							Public	Private			Type	Acres	Type	Acres		Count	Type	Total Acres	Count	Acres	Count	Acres	Type
Schoolhouse	146.76	59.39	P/FS	Mangas Springs 32108-G5	N	SWFL, 2,316 ft to W; LM/SD, 823 ft to NW	3	6	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	50.54 6.45 80.70 9.07	**S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S115** Madrean Juniper Savanna	123.07 7.97 15.71	—	1	Riverine	20.38	1	3.40	—	—	Ephemeral
Spar	67.53	27.33	FS	Canteen Canyon 33108-A5	**N**	SWFL 1,441 ft to NW; LM/SD 2,012 ft to NW	0	1	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	0.89 3.05 61.82 1.77	**S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S115** Madrean Juniper Savanna	40.20 6.15 21.18	—	1	Riverine	6.25	—	—	1	0.05	Intermittent Ephemeral
Sycamore	567.66	229.73	BLM/P/S	Antelope Ridge 32108-H6 Cliff 32108-H5	N	SWFL, 431 ft to E; LM/SD, 2,523 ft to SW	1	7	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S035** Madrean Pine-Oak Forest and Woodland **S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S062** Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S094** North American Warm Desert Lower Montane Riparian Woodland and Shrubland **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	1.01 68.71 119.72 29.92 26.07 3.78 290.56 27.89	**D01** Disturbed/ Nonspecific **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S094** North American Warm Desert Lower Montane Riparian Woodland and Shrubland **S115** Madrean Juniper Savanna	41.32 126.97 235.88 98.22 65.28	1[2]	3 1	Riverine Freshwater Forested/ Shrub Wetland	15.99	13	47.83	1	0.51	Intermittent
Winn	277.16	112.16	P	Canteen Canyon 33108-A5	N	SWFL, 2,623 ft to SE; LM/SD, 3,470 ft to SE	0	2	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S020** North American Warm Desert Wash **S057** Mogollon Chaparral **S058** Apacherian-Chihuahuan Mesquite Upland Scrub **S062** Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	9.53 14.16 6.93 1.33 112.57 126.52 6.13	**D01** Disturbed/ Nonspecific **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	34.40 159.63 83.13	—	1	Riverine	38.01	—	—	—	—	Intermittent

[1] Spikedace, loach minnow.
[2] Source: USGS topographic quad/Geographic Names Information System.
[3] Type: Forested/Shrub Riparian.
[4] Type: Lake/Pond.
Note: P = Private; BLM = Bureau of Land Management; NMDGF = New Mexico Department of Game and Fish; FS = U.S. Forest Service; S = State; SWFL = southwestern willow flycatcher; LM = loach minnow; SD = spikedace.

Table 2. Field Verified Matrix of Environmental Attributes Analyzed for Each Canyon

Canyon	Total Acres	Total Hectares	Land Ownership	USGS 7.5' Quadrangle	Critical Habitat (Y/N)	Distance to Nearest Critical Habitat (type, feet)	Heritage Program (count)		Biotic Community (Brown)	Ecoregion (Griffith)	SWCA Ground-Truthed SWReGAP Vegetation Community Types (numbers are SWReGAP codes for each type)		Spring (count)	Wetland (count)	Water Body		Flowline Type	NRCS Pasture Condition Score		NMRAM Score
							Public	Private			Type	Acres			Count	Acres		Upland	Riparian	
Cherokee	62.61	25.34	P	Mangas Springs 32108-G5	N	SWFL, 1,405 ft to E; LM/SD, 2,581 ftto W	1	3	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	—	—	—	—	—	—	Intermittent Ephemeral	—	—	—
Davis	83.74	33.89	P	Mangas Springs 32108-G5	N	SWFL, 2,810 ft to E; LM/SD, 3,493 ft to E	2	4	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**D01** Disturbed/Nonspecific **N11** Open Water **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S112** Madrean Pinyon-Juniper Woodland	27.64 9.61 1.40 38.01 7.08	2	—	1	0.25	Intermittent	24	22	2.7
Dix	94.84	38.38	P	Cliff 32108-H5	N	SWFL, 3,383 ft to E; LM/SD, 4,532 ft to E	1	4	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S115** Madrean Juniper Savanna	41.15 35.56 18.13	—	—	—	—	Intermittent	23	21	2.9
Maldonado	122.19	49.45	P	Canteen Canyon 33108-A5	N	SWFL, 1,962 ft to NW; LM/SD, 3,287 ft to NW	0	1	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**D01** Disturbed/Nonspecific **S020** North American Warm Desert Wash **S115** Madrean Juniper Savanna	56.67 17.31 48.20	—	—	—	—	Intermittent	28	25	2.9
Mangas	271.18	109.74	BLM/P/ NMDGF	Mangas Springs 32108-G5	Y[1]	SWFL, 3,546 ft to W	5	6	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	—	—	—	—	—	—	Intermittent Ephemeral	—	—	—
Pope	303.87	122.97	P	Cliff 32108-H5	N	SWFL, 3,088 ft to SW; LM/SD, 4,083 ft to SW	0	0	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**D01** Disturbed/Nonspecific **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S109** Chihuahuan-Sonoran Desert Bottomland and Swale Grassland **S115** Madrean Juniper Savanna	9.59 42.43 64.22 0.13 187.49	—	—	—	—	Intermittent	38	37	2.5
Schoolhouse	146.76	59.39	P/FS	Mangas Springs 32108-G5	N	SWFL, 2,316 ft to W; LM/SD, 823 ft to NW	3	6	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**S020** North American Warm Desert Wash **S112** Madrean Pinyon-Juniper Woodland **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	7.69 17.31 0.08	—	—	—	—	Ephemeral	21	22	3.1
Spar	67.53	27.33	FS	Canteen Canyon 33108-A5	N	SWFL 1,441 ft to NW; LM/SD 2,012 ft to NW	0	1	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**D01** Disturbed/Nonspecific **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S115** Madrean Juniper Savanna	38.61 1.61 11.94 15.37	—	—	1	0.05	Intermittent Ephemeral	24	23	2.7

Table 2. Field Verified Matrix of Environmental Attributes Analyzed for Each Canyon

Canyon	Total Acres	Total Hectares	Land Ownership	USGS 7.5' Quadrangle	Critical Habitat (Y/N)	Distance to Nearest Critical Habitat (type, feet)	Heritage Program (count)		Biotic Community (Brown)	Ecoregion (Griffith)	SWCA Ground-Truthed SWReGAP Vegetation Community Types (numbers are SWReGAP codes for each type)		Spring (count)	Wetland (count)	Water Body		Flowline Type	NRCS Pasture Condition Score		NMRAM Score		
							Public	Private			Type	Acres			Count	Acres		Upland	Riparian			
Sycamore	567.66	229.73	BLM/P/S	Antelope Ridge 32108-H6 Cliff 32108-H5	N	SWFL, 431 ft to E; LM/SD, 2,523 ft to SW	1	7	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**D01** Disturbed/Nonspecific **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe **S094** North American Warm Desert Lower Montane Riparian Woodland and Shrubland **S112** Madrean Pinyon-Juniper Woodland **S115** Madrean Juniper Savanna	81.64 110.87 213.81 106.10 2.47 52.78	—	1 (0.16 acres)	1	0.51	Intermittent	19	25	AA #1 3.1	AA #2 2.8	AA #3 2.0
Winn	277.16	112.16	P	Canteen Canyon 33108-A5	N	SWFL, 2,623 ft to SE; LM/SD, 3,470 ft to SE	0	2	Semidesert Grassland	23b, Madrean Lower Montane Woodlands	**D01** Disturbed/Nonspecific **S020** North American Warm Desert Wash **S077** Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	29.88 136.05 111.23	—	—	—	—	Intermittent	—	—	—		

[1] Spikedace, loach minnow.
[2] Source: USGS topographic quad/ Geographic Names Information System.
Note: P = Private; BLM = Bureau of Land Management; NMDGF = New Mexico Department of Game and Fish; FS = U.S. Forest Service; S = State; SWFL = southwestern willow flycatcher; LM = loach minnow; SD = spikedace.

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Plants					
Gila brickellbush	*Brickellia chenopodina*	SoC	SoC	Restricted to alluvial soils along the Gila River; 1,370 m (4,500 feet).	Cherokee, Davis, Dix, Pope, and Sycamore
Davidson's cliff carrot	*Cymopterus davidsonii*	SoC; USFS:S	SoC	Cool, rocky places in piñon-juniper woodland and lower montane coniferous forest; 1,980–2,440 m (6,500–8,000 feet).	Cherokee, Davis, Dix, Pope, and Sycamore
Metcalfe's ticktrefoil	*Desmodium metcalfei*	SoC; USFS:S	SoC	Rocky slopes and canyons in grasslands, oak/piñon-juniper woodlands, and riparian forests; 1,310–2,000 m (4,000–6,500 feet).	Cherokee, Davis, Dix, Pope, and Sycamore
Mogollon whitlowgrass	*Draba mogollonica*	SoC	SoC	Cool, moist northern slopes of mountains, ravines and canyons on volcanic rocks, and soil in montane forests; 1,500–2,900 m (5,000–9,000 feet).	Cherokee, Davis, Dix, Pope, and Sycamore
New Mexico gumweed	*Grindelia arizonica* var. *neomexicana*	SoC	SoC	Rocky slopes and ledges in piñon-juniper woodland and lower montane coniferous forest; 2,000–2,300 m (6,500–7,500 feet).	Cherokee, Davis, Dix, Pope, and Sycamore
Maguire's beardtongue	*Penstemon linarioides maguirei*	SoC	SoC	Limestone cliffs in piñon-juniper woodland; 1,830–1,980 m (6,000–6,500 feet).	Cherokee, Davis, Dix, Pope, and Sycamore
Piños Altos fame flower	*Phemeranthus humilis*	SoC	SoC	Shallow, gravelly, usually clayey soils overlying rhyolite, usually on rock benches in sloping terrain, but also in soil pockets overlying rock in nearly level areas; Madrean grassland, oak woodland, or piñon-juniper woodland, often with *Nolina microcarpa* and *Agave*.	Cherokee, Davis, Dix, Pope, and Sycamore
Slender spiderflower	*Peritoma multicaulis*	SoC	E	Wet, saline or alkaline soils; often in and around alkali sinks, alkaline meadows, or old lake beds.	Sycamore
Parish's alkali grass	*Puccinellia parishii*	SoC; BLM:S	E	Alkaline springs, seeps, and seasonally wet areas that occur at the heads of drainages or on gentle slopes at 800–2,200 m (2,600–7,200 feet) range-wide. The species requires continuously damp soils during its late winter to spring growing period. It frequently grows with saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), sedges (*Carex* sp.), bulrushes (*Scirpus* sp.), rushes (*Juncus* sp.), spike rushes (*Eleocharis* sp.), and yerba mansa (*Anemopsis californica*).	Sycamore
Invertebrates					
Desert viceroy butterfly	*Limenitis archippus obsoleta*	SoC	–	Lower montane and valley riparian corridors with willow (*Salix* sp.), cottonwood (*Populus* sp.), or aspen.	Mangas and Sycamore
Bearded mountainsnail	*Oreohelix barbata*	USFS:S	–	Rock rubble along streams where adequate leaf litter is present.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Blunt ambersnail	*Oxyloma retusum*	USFS:S	–	Found in marshes and hot springs along east fork and main stem of the Gila River.	Mangas and Sycamore
Mayfly	*Ameletus doddsianus*	USFS:S	–	Occurrence of this species in the Gila River represents the southernmost part of its range	Mangas and Sycamore

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Invertebrates (continued)					
Notodontid moth	*Euhyparpax rosea*	USFS:S	–	This notodontid moth is known to occur in oak-juniper or oak-pine habitats near Silver City in southwestern New Mexico.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Birds					
Gray hawk	*Buteo nitidus maxima*	SoC; USFS:S; BLM:S	–	Gray hawks inhabit lowland riparian, deciduous woodlands. Cottonwoods woodlands, especially where desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins. Also inhabits open woodland, pasturelands, and open country with scattered trees in arid situations. Gray hawks have been observed occasionally in the Gila River valley near Red Rock and Cliff since 2004 and represents the northernmost extent of their range in New Mexico.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Swainson's hawk	*Buteo swainsoni*	USFS:S	–	Occurs throughout most of New Mexico in low- to mid-elevation open areas with scattered trees in semi-desert grasslands, Chihuahuan desertscrub, shinnery oak, and agricultural areas. Known to also inhabit ponderosa pine, aspen (hardwoods), chaparral, and piñon-juniper forest types. Migrates and summers statewide, but are irregular in winter.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Osprey	*Pandion haliaetus carolinensis*	USFS:S	–	Desert riparian deciduous woodlands and marshes. Cottonwood woodlands with desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins.	Davis, Sycamore, and Mangas
Baird's sparrow	*Ammodramus bairdii*	SoC; USFS:S; BLM:S	T	In New Mexico it has been found in a variety of habitats, ranging from desert grasslands in the south to prairies in the northeast and mountain meadows in the north. Breeds in shortgrass prairies.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Varied bunting	*Passerina versicolor versicolor*	USFS:S	T	In New Mexico, this Neotropical migrant summers regularly in small numbers in Hidalgo, Doña Ana, and Eddy Counties where it prefers dense, shrubby riparian habitat in relatively arid canyons. Also known from Grant, Luna, Socorro, Sierra, and Otero Counties. This is primarily a Mexican species that enters the United States only along the Mexican border in Arizona, New Mexico, and Texas.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Burrowing owl	*Athene cunicularia hypugaea*	USFS:S; BLM:S	–	Found typically in semiarid grasslands and prairies especially in association with prairie dog colonies, in desert scrub, and in agricultural and semi-urban environments, including along canals and arroyos. Most nests in the state are in prairie dog towns, but in some areas the species uses old burrows of rock squirrels (*Spermophilus variegatus*), badgers (Mustelidae), banner-tailed kangaroo rats (*Dipodomys spectabilis*), rock squirrels (*Sciurus spermophilus*), or other fossorial mammals for the availability of burrows.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Birds (continued)					
Elf owl	*Micrathene whitneyi whitneyi*	USFS:S	–	Occur in riparian and wooded lowland areas (including cienegas) and lower montane regions (foothills and canyons below 2,134 m [7,000 feet]). Cottonwood woodlands with desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins. Migrate and summer in the extreme southwest north to the southwestern Mogollon Plateau and are considered rare to common. Uncommon summer residents that breed in the Gila National Forest.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Common ground-dove	*Columbina passerina pallescens*	USFS:S	E	In New Mexico, this species prefers brushy, shrubby riparian habitat or edges of riparian woodlands and shrublands, especially mesquite thickets. It also occurs along streams and canyon bottoms in desert shrub dominated by mesquite (*Prosopis* sp.) or prickly pear (*Opuntia* sp.), and in abandoned agricultural fields with tall weeds. It occurs year-round in New Mexico in the southernmost part of the state.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Sprague's pipit	*Anthus spragueii*	C; USFS:S; BLM:S	–	Prefers dry, open grasslands with native grasses of intermediate height and thickness with moderate litter depths. Non-breeding habitat in the southwest may include taller grass than in areas typically used for breeding and some shrub cover. Wintering areas may have grasses and greater than 60% grass canopy cover. Sprague's Pipit's occur in grasslands in southern New Mexico from October to early April.	Cherokee, Davis, Dix, Maldonado, Pope, Schoolhouse, Spar, Sycamore, and Winn
Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	PT; USFS:S	s	Occurs in dense riparian areas and associate most commonly with cottonwood habitats or other native forests. Nests preferentially in large patches of moist cottonwood-willow woodland with high canopy closure.	Sycamore and Mangas
Gray vireo	*Vireo vicinior*	USFS:S	T	Gray vireos typically prefer open piñon-juniper woodland or juniper savannah with a shrub component. In New Mexico, the species usually occurs in chaparral-juniper, piñon-juniper, and piñon-madrone associations but is also found in oak scrub and chaparral regions in the eastern part of the range. Gray vireo may be found in the Guadalupe and southern Sacramento Mountains; the Organ and San Andres Mountains; the southern Peloncillo Mountains; the Silver City area; in the foothills of the Magdalena, Manzanita, and Sandia Mountains; western Santa Fe County; a few canyons in the western Zuni Mountains; and in San Juan and Rio Arriba Counties in appropriate habitat.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Bell's vireo	*Vireo bellii*	SoC; USFS:S	T	This species characteristically occurs in dense shrubland or woodland along lowland stream courses, with willow, mesquite, saltcedar (*Tamarix* sp.), and seepwillow (*Baccharis* sp.) being characteristic plant species.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Costa's hummingbird	*Calypte costae*	USFS:S	T	Costa's hummingbird is primarily a desert scrub species of the Sonoran and Mojave Deserts, particularly along washes, canyons, and rocky slopes. Where riparian and desert shrub habitats interface, it often remains in the more xeric areas. At the eastern limit of its breeding range in New Mexico, it occupies more characteristic Chihuahuan desert shrub and foothill/montane shrub habitats.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Birds (continued)					
Lucifer hummingbird	*Calothorax lucifer*	USFS:S	T	This species prefers Chihuahuan desert scrub and concentrates in rugged canyons, along slopes in dry mountain ranges (especially along rocky hillsides and talus slopes), and in dry washes vegetated with desert scrub, such as shrubby trees (juniper, piñon, oak), cactus, yucca, ocotillo, and agave. Nest sites are selected on slopes above rocky or wooded washes. In New Mexico, a small breeding population is present in the Peloncillo Mountains, but individuals have also been recorded in Grant, Luna, and Sierra Counties.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Loggerhead shrike	*Lanius ludovicianus*	USFS:S; BLM:S	s	In New Mexico, loggerhead shrike occurs in many lowland habitats statewide. This species is associated with open country and with short vegetation, including desert grasslands and shrublands and open woodlands or juniper savannah.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Gray catbird	*Dumetella carolensis ruficrissa*	USFS:S	–	Gray catbirds live amid dense shrubs, vine tangles, and thickets of young trees in both summer and winter, but are known to inhabit human disturbed areas, such as clearings, roadsides, fencerows, abandoned farmland, and residential areas. In New Mexico, they inhabit riparian shrubland/woodland at lower (853–1,676 m [2,800–5,500 feet]) and middle (1,524–2,286 [5,000–7,500 feet]) elevations where stream conditions provide sufficient permanent moisture for emergent plants, or for a narrow band of deciduous trees and shrubs. At lower elevations they inhabit riparian areas characterized by cottonwood and sycamore, at mid-elevation by white alder (*Alnus rhombifolia*) and bigleaf maple (*Acer macrophyllum*), and at high elevation by willow. Gray catbirds are rare transients in the Gila National Forest.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Thick-billed kingbird	*Tyrannus crassirostris*	USFS:S	E	In New Mexico, this species requires native broadleaf riparian habitats characterized by mature cottonwoods and sycamores. They are known to occupy riparian canyons with cottonwood and Arizona sycamore (*Platanus wrightii*). Known to use a broad array of habitats containing large deciduous trees, including open areas in tropical deciduous forest, riparian growth, thornscrub, thorn forest, and oak woodland.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Belted kingfisher	*Megaceryle alcyon*	USFS:S	–	Belted kingfishers generally inhabit areas along streams, rivers, lakes, and marine estuaries. The species generally prefers open, moving water, and avoids areas where water is turbid or obscured by floating or emergent vegetation. Stream riffles are often a major source of prey, and may be used as cues for assessing habitat quality. Vegetation within these areas often consisted of cattails and rushes, but other plant species (including occasional woody shrub and tree species) were frequently present. Belted kingfishers summer almost statewide and have been recorded in summer at least occasionally south to the Gila, Middle Rio Grande, lower Pecos, and lower Canadian River valleys. They migrate and winter statewide.	Mangas and Sycamore

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Birds (continued)					
Buff-collared nightjar	*Caprimulgus ridgwayi ridgwayi*	USFS:S	E	In New Mexico this species has generally been reported only in areas that support arid shrublands and woodlands, generally in rocky canyons and washes that support open stands of mesquite, acacia (*Acacia* sp.), hackberry (*Celtis* sp.), and other brush, with scattered junipers (*Juniperus* sp.) on adjacent slopes. This species occurs almost exclusively in Guadalupe Canyon (Hidalgo County) where it is known to breed, with single occurrences of vagrants in Grant and Doña Ana Counties.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Gila woodpecker	*Melanerpes uropygialis uropygialis*	USFS:S	T	Found only in southwestern New Mexico, where it is a permanent resident in southern Hidalgo County and in the lower Gila Valley in Hidalgo and Grant Counties. Within the state, Gila woodpeckers require well-developed broadleaf riparian woodlands characterized by extensive groves of mature cottonwoods and/or sycamores. Fairly common in cottonwood groves along the Gila River west of Redrock, and in scattered other locations in the southwest part of the state.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Black swift	*Cypseloides niger borealis*	–	s	Black swifts nest colonially on ledges on steep rock faces, usually near or behind waterfalls. Thus, nesting locations are scattered and most are highly inaccessible. This species forages over most montane and lowland habitats, sometimes far from nesting colonies, preying primarily on nuptial flight swarms of winged reproductive ants and other insects.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Abert's towhee	*Melozone aberti aberti*	USFS:S	T	It is found in New Mexico only in Grant and Hidalgo Counties primarily in the Gila Valley and at San Simon Cienega, where it inhabits riparian thickets and similar native habitats.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Southwestern willow flycatcher	*Empidonax traillii extimus*	E; USFS:S	E	Found in dense riparian habitats along streams, rivers, and other wetlands where cottonwood, willow, saltcedar, and Russian olive (*Elaeagnus angustifolia*) are present. Nests are found in thickets of trees and shrubs, primarily those that are 4–7 m (13–23 feet) tall, among dense, homogeneous foliage. Habitat occurs at elevations below 2,590 m (8,500 feet).	Sycamore and Mangas
Fish					
Headwater chub	*Gila nigra*	C; USFS:S	E	Occupies clear temperate waters generally with a moderate gradient. Despite competition with *I. punctatus* it has persisted in headwater streams, or in fluctuating tailwaters of dams	Sycamore and Mangas
Roundtail chub	*Gila robusta*	C; USFS:S; BLM:S	E	Roundtail chub occupy cool to warm water, mid-elevation streams and rivers where typical adult microhabitat consists of pools up to 2.0 m (6.6 feet) deep adjacent to swifter riffles and runs. Cover is usually present and consists of large boulders, tree rootwads, submerged large trees and branches, undercut cliff walls, or deep water.	Sycamore and Mangas
Gila chub	*Gila intermedia*	E; USFS:S; BLM:S	E	The Gila chub generally occurs in pool habitats of small streams or springs.	Sycamore and Mangas
Gila topminnow	*Poeciliopsis occidentalis*	E; USFS:S	T	Typically inhabits lower-elevational (below 1,500 m [4,921 feet]) springs, streams, and the margins of larger bodies of water, where it shows an affinity for areas containing emergent or aquatic vegetation.	Sycamore and Mangas

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Fish (continued)					
Loach minnow	*Tiaroga cobitis*	E; USFS:S	E	Inhabits riffle areas with moderate to rapid water velocities and moderate to high gradients (Propst et al. 1988). The species is most common the interstitial spaces in cobble and rubble. The loach minnow occurs in the San Francisco River from the Upper Frisco Box downstream to the Arizona border (Catron County), the Tularosa River downstream from Cruzville (Catron County), and the Gila River from the East Fork to the Middle Box (Propst et al. 1988).	Sycamore and Mangas
Spikedace	*Meda fulgida*	E; USFS:S	E	Found in clear, low to moderate gradient, permanently flowing streams of the Gila drainage. The larvae and juveniles tend to occupy shallow, peripheral portions of streams that have slow currents and sand or fine gravel substrates. Restricted to portions of the upper Gila River in Grant, Catron, and Hidalgo Counties.	Sycamore and Mangas
Desert sucker	*Catostomus clarkii*	SoC; USFS:S; BLM: S	s	The desert sucker is found in rapids and flowing pools of streams, primarily over bottoms of gravel-rubble with sandy silt in the interstices.	Sycamore and Mangas
Sonora sucker	*Catostomus insignis*	SoC; USFS:S; BLM:S	s	Sonora suckers are found in a variety of habitats from warm water rivers to trout streams.	Sycamore and Mangas
Longfin dace	*Agosia chrysogaster*	USFS:S; BLM:S	–	The habitat of the longfin dace ranges from clear, cool mountain brooks to small, intermittent desert streams with a sand or gravel substrate.	Sycamore and Mangas
Speckled dace	*Rhinichthys osculus*	BLM:S	–	This species is a bottom-dwelling species that inhabits shallow, rocky, headwater streams with relatively swift flow, sometimes in areas with considerable aquatic vegetation.	Sycamore and Mangas
Amphibians					
Chiricahua leopard frog	*Lithobates chiricahuensis*	T; USFS:S	s	Restricted to springs, livestock tanks, and streams in upper portion of watersheds that are free from nonnative predators or where marginal habitat for nonnative predators exists. 1,000–2,710 m (3,281–8,890 feet).	Davis, Mangas, and Sycamore
Lowland leopard frog	*Lithobates yavapaiensis*	SoC; USFS:S; BLM:S	E	Known from 1,128–1,700 m (3,700–5,575 feet) in western Catron, Hidalgo, and Grant Counties. Inhabits permanent to semi-permanent streams and ponds; most populations occupy small streams and rivers, springs, and associated pools at low elevations in desert scrub localities. Reaches the extreme eastern edge of its range in the Southwest.	Davis, Mangas, and Sycamore
Arizona toad	*Anaxyrus miroscaphus*	BLM:S	–	Usually associated with permanent ponds or rocky streams with relatively shallow water flowing over sandy or rocky bottoms. It is generally found in unaltered riparian areas grown to sycamore or cottonwood, and in grasslands, piñon-juniper, or ponderosa pine. Ranges from 1,900–2,700 m (6,234–8,858 feet). Arizona toads are known to be fairly common species in the Gila National Forest.	Davis, Mangas, and Sycamore

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Reptiles					
Reticulate Gila monster	*Heloderma suspectum suspectum*	USFS:S	E	This species reaches the eastern edge of its range in southwest New Mexico where there are only a few isolated records from Hidalgo, Grant, Luna, and perhaps Doña Ana Counties at elevations of 1,860–1,950 m (6,100–6,400 feet). The species typically inhabits rocky drainages and on rugged bajadas, hillsides, and mountain slopes. This includes the lower slopes of mountains and nearby outwash plains, especially in canyons and arroyos where water is at least periodically present. In some areas, they also frequent irrigated farmlands that adjoin those habitat types. Other cover in such areas often includes boulders, rock crevices, downed vegetation, and litter. Known to be common at Redrock Wildlife Area in Grant County.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Desert kingsnake	*Lampropeltis getula splendida*	USFS:S	–	Inhabits areas ranging from rocky slopes, desertscrub, grasslands, and into the lower reaches of Madrean evergreen woodland and Great Basin conifer woodland. It seems to be most abundant in areas near water such as riparian corridors, large drainages, agriculture and orchards, mesquite bosques, and grasslands.	Cherokee, Davis, Dix, Pope, and Sycamore
Mexican gartersnake	*Thamnophis eques*	PT; USFS:S; BLM:S	E	Occurs at scattered sites throughout the Gila and San Francisco watersheds from 1,135–1,652 m (3,690–5,420 feet) in western Grant and Hidalgo Counties. An aquatic species that inhabits riparian areas including cienegas, stock tanks, large-river riparian woodlands and forests, and streamside gallery forests. These are generally characterized by shallow, slow-moving, and at least partially vegetated bodies of water such as around springs. Strongly associated with the presence of a native prey base including leopard frogs and native fish. During August 2002, a single individual was observed and photographed along the Gila River near Riverside, Grant County.	Sycamore
Narrow-headed gartersnake	*Thamnophis rufipunctatus*	PT; USFS:S; BLM:S	T	This is a highly aquatic species and it is restricted to montane and immediately adjacent regions at elevations of 700–2,500 m (2,300–8,200 feet) in Catron, Grant, and Hidalgo Counties where it reaches the northern and eastern edge of its overall distribution. This snake is a habitat specialist, occurring only in shallow, swift-flowing, rocky rivers and streams of the San Francisco and Gila River drainages. It typically inhabits clear, cool, rocky streams using predominantly pool and riffle habitat that includes cobbles and boulders. Most likely surface active between March and November when air temperatures range from 52°F–89°F and water temperatures range from 54°F–72°F. Ranges in the Gila River to the Arizona border (about1,300 m [4,265 feet]).	Sycamore
Texas horned lizard	*Phrynosoma cornutum*	USFS:S; BLM:S	–	In New Mexico, the species is associated with *Yucca-Prosopis-Ephedra* and *Larrea-Acacia-Fouquieria* associations, often in playas or on bajadas and mountain foothills. Inhabits arid and semiarid areas in the southwestern United States, characterized by open country with little vegetation. These areas often consist of grasses interspersed with cacti, yucca, mesquite, and other assorted woody shrubs and trees.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Mammals					
Mexican long-nosed bat	*Leptonycteris nivalis*	E	E	In New Mexico, Mexican long-nosed bats inhabit upper desert scrub and pine-oak woodlands in arid and mountainous areas. Characteristic vegetation in these areas includes agave, juniper, oak, and Mexican piñon (*Pinus cembroides*). Known roosting habitats of this species include caves, rock fissures, hollow trees, abandoned buildings, mines, and human-made structures.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Red western bat	*Lasiurus blossevillii*	SoC; USFS:S	s	Red bats primarily associate with riparian habitats in New Mexico.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Spotted bat	*Euderma maculatum*	USFS:S; BLM:S	T	In New Mexico, the preferred habitat of this species is meadows in subalpine coniferous forest.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Yuma myotis bat	*Myotis yumanensis yumanensis*	BLM:S	s	Occurs in riparian communities, grasslands, semidesert shrublands, mountain brush, woodlands, and desert habitats. It also occurs in arid canyon lands and Sonoran desert scrub. Roosts in caves, mines, cliffs, crevices, buildings, and swallow nests, including cliff swallows.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Townsend's Pale big-eared bat	*Corynorhinus townsendii pallescens*	SoC;	s	This species is strongly correlated to the availability of caves or cave-like habitat, but it also uses abandoned buildings and rock crevices on cliffs. Many bat species are strongly associated with water. Found in a variety of xeric to mesic habitats: scrub-grassland, desertscrub, semidesert shrublands, chaparral, saxicoline brush, tundra, open montane forests, spruce-fir, mixed hardwood-conifer, and oak woodlands and forests	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Cave myotis bat	*Myotis velifer*	USFS:S; BLM:S	s	Inhabits caves in the limestone region of southeastern New Mexico, and it has also roosted in barn swallow nests. It is never more than a few miles from a water source, such as canals, tanks, or creeks. This species is found primarily at lower elevations occurring in short grass plains, scrub-grassland, Chihuahuan desert scrub, Sonoran desertscrub, Plains and Great Basin swamp and riparian scrub, pine-oak woodlands, and oak savannahs.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Fringed myotis bat	*Myotis thysanodes thysanodes*	BLM:S	s	A mid-elevation woodland bat that occurs in montane forest and woodland, mountain meadow, interior chaparral, scrub-grassland, alkali sacaton grasslands. Chihuahuan desertscrub, swamp and riparian forests and scrub, Mohave desertscrub, upland Sonoran desertscrub, and occasionally in tundra.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Mammals (continued)					
Long-legged myotis bat	*Myotis volans interior*	BLM:S	s	Primarily a forest species occurring in chaparral, alpine and subalpine grassland, coniferous forest, scrub-grassland, Chihuahuan desertscrub, watercourse, swamp and riparian forests and scrub, saxicoline brush, oak savannah and woodland, Mohave desertscrub, and upland Sonoran desertscrub.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Western small-footed myotis bat	*Myotis ciliolabrum melanorhinus*	BLM:S	s	This species is widely distributed in the western United States, and found in many habitat types. Occurs in riparian wooded areas, bare rock/talus/cliffs, grassland and shrublands, and coniferous or mixed woodland areas. Generally inhabits desert, badland, chaparral, western coniferous forests and semiarid habitats, more mesic habitats in the southern part of its range. In New Mexico, the distribution of this species seems to be in the ponderosa pine zone, although they occur as low as desert and as high as the lower edges of the spruce-fir zone. Many bat species are strongly associated with water.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Arizona gray squirrel	*Sciurus arizonensis arizonensis*	USFS:S	–	Arizona gray squirrels primarily associate with riparian habitats in New Mexico. Its preferred habitat includes walnuts, sycamores, and cottonwoods. We took one in Mogollon at the upper limit of its range (at 2,134 m [7,000 feet]) from a ponderosa pine.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Botta's pocket gopher	*Thomomys bottae alienus*	USFS:S		They have been found in sycamore, cottonwood, and rabbitbrush riparian habitats. Botta's pocket gopher is a common species in the Gila National Forest.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Yellow nosed cotton rat	*Sigmodon ochrognathus*	SoC; USFS:S; BLM:S	–	Yellow-nosed cotton rats live primarily on rocky slopes with scattered bunches of grass. This species is known to occur in Hidalgo and Grant Counties.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Western spotted skunk	*Spilogale gracilis*	–	s	They are found in sycamore, cottonwood, and rabbitbrush riparian habitats.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Common hog nosed skunk	*Conepatus leuconotus mearnsi*	–	s	They are found in sycamore, cottonwood, and rabbitbrush riparian habitats.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn

Table 3. Special Status Species with the Potential to Occur within Proposed Impoundment Canyons in the Cliff-Gila Valley in Grant County, New Mexico

Common name	Scientific name	Status		Habitat Requirements	Occurs in Project Area
		Federal	State		
Mammals (continued)					
Hooded skunk	*Mephitis macroura milleri*	USFS:S	s	Hooded skunks are found in shortgrass plains, sacaton grassland, sycamore riparian, cottonwood riparian, rabbitbrush riparian, oak savanna.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Ringtail	*Bassariscus astutus flavus*	USFS:S	s	Ringtail cats are found primarily in montane habitats, but are also found in lowlands in rough, rocky country. Ringtails are known to be fairly common species in the Gila National Forest.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn
Rocky mountain bighorn sheep	*Ovis canadensis canadensis*	USFS:S	–	Bighorns inhabit rugged cliffs and crags or other extremely rocky areas adjacent to suitable feeding sites.	Cherokee, Davis, Dix, Maldonado, Mangas, Pope, Schoolhouse, Spar, Sycamore, and Winn

Note: C = Candidate for federal listing as threatened or endangered; E = Endangered; EXPN: Experimental/non-essential population; PE = Proposed endangered; PT = Proposed threatened; S = Special status species; SoC = Species of concern; T = Threatened. For the NMDGF, all sensitive (s) status designations are informal.

3.1 CHEROKEE

Only a desktop analysis has been conducted for Cherokee Canyon at this time due to landowner restrictions. A field verification survey may be conducted in the future pending landowner permission. Cherokee Canyon is west of the Gila River and occurs on the Mangas Springs 32108-G5 USGS 7.5-minute topographic map. The project area in Cherokee Canyon is approximately 62.61 acres and is entirely on private land. The elevational range of the project area is 1,358 to 1,427 m (4,455–4,682 feet) and is approximately 0.84 km (0.52 mile) to the Gila River. SWReGAP revealed that four vegetation habitat types exist within Cherokee Canyon, and these were modified during the desktop analysis to three vegetation habitat types: North American Warm Desert Wash (S020), Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077), and Madrean Juniper Savanna (S115). Acreages for these habitat types are 33.26, 21.49, and 7.86 acres, respectively (see Appendix A). Desktop analysis and evaluation of NWI data revealed that one riverine wetland totaling 7.40 acres and that forested/shrub riparian habitat areas (totaling 0.41 acre) exist within Cherokee Canyon. NHD data revealed that Cherokee Canyon has both intermittent and ephemeral drainages within the project area. No springs or water bodies were identified during the desktop analysis of Cherokee Canyon. NMRAM data and NRCS Pasture Condition scores have not been evaluated for Cherokee Canyon.

Special status plant species identified as potentially occurring in Cherokee Canyon include Gila brickellbush (*Brickellia chenopodina*), Davidson's cliff carrot (*Cymopterus davidsonii*), Metcalfe's ticktrefoil (*Desmodium metcalfei*), Mogollon whitlowgrass (*Draba mogollonica*), New Mexico gumweed (*Grindelia arizonica* var. *neomexicana*), Maguire's beardtongue (*Penstemon linarioides maguirei*), and Piños Altos fame flower (*Phemeranthus humilis*). Special status invertebrate species identified as potentially occurring in Cherokee Canyon include desert viceroy butterfly (*Limenitis archippus obsoleta*), bearded mountainsnail (*Oreohelix barbata*), blunt ambersnail (*Oxyloma retusum*), and notodontid moth (*Euhyparpax rose*). Special status avian species potentially occurring in Cherokee Canyon include Swainson's hawk (*Buteo swainsoni*), northern gray hawk (*B. nitidus maxima*), osprey (*Pandion haliaetus carolinensis*), Baird's sparrow (*Ammodramus bairdii*), varied bunting (*Passerina versicolor versicolor*), burrowing owl (*Athene cunicularia hypugaea*), elf owl (*Micrathene whitneyi whitneyi*), gray vireo (*Vireo vicinior*), Bell's vireo (*V. bellii*), common ground-dove (*Columbina passerina pallescens*), Sprague's pipit (*Anthus spragueii*), Costa's hummingbird (*Calypte costae*), lucifer hummingbird (*Calothorax lucifer*), loggerhead shrike (*Lanius ludovicianus*), gray catbird (*Dumetella carolensis ruficrissa*), thick-billed kingbird (*Tyrannus crassirostris*), belted kingfisher (*Megaceryle alcyon*), buff-collared nightjar (*Caprimulgus ridgwayi ridgwayi*), Gila woodpecker (*Melanerpes uropygialis uropygialis*), black swift (*Cypseloides niger borealis*), and Abert's towhee (*Melozone aberti aberti*). The nearest critical habitat for flycatcher is 428 m (1,405 feet) to the east along the Gila River riparian forest. No special status fish species are anticipated to occur in Cherokee Canyon. The nearest critical habitat for loach minnow and spikedace is 787 m (2,581 feet) to the west in the Gila River.

Special status reptiles identified as potentially occurring in Cherokee Canyon include Texas horned lizard (*Phrynosoma cornutum*), reticulate Gila monster (*Heloderma suspectum suspectum*), and desert kingsnake (*Lampropeltis getula splendida*). Special status mammals identified as potentially occurring in Cherokee Canyon include red western bat (*Lasiurus blossevillii*), spotted bat (*Euderma maculatum*), Townsend's pale big-eared bat (*Corynorhinus*

townsendii pallescens), Yuma myotis bat (*Myotis yumanensis yumanensis*), cave myotis bat (*M. velifer*), fringed myotis bat (*M. thysanodes thysanodes*), long-legged myotis bat (*M volans interior*), western small-footed myotis bat (*M. ciliolabrum melanorhinus*), Arizona gray squirrel (*Sciurus arizonensis arizonensis*), Botta's pocket gopher (*Thomomys bottae alienus*), yellow nosed cotton rat (*Sigmodon ochrognathus*), western spotted skunk (*Spilogale gracilis*), common hog nosed skunk (*Conepatus leuconotus mearnsi*), hooded skunk (*Mephitis macroura milleri*), ringtail (*Bassariscus astutus flavus*), and Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*).

3.2 DAVIS

A field verification survey of Davis Canyon was conducted on October 24, 2013. Davis Canyon is west of the Gila River and occurs on the Mangas Springs 32108-G5 USGS 7.5-minute topographic map. The project area in Davis Canyon is approximately 83.74 acres and is entirely on private land. The elevational range of the project area is 1,368 to 1,414 m (4,488–4,639 feet) and is approximately 1.40 km (0.87 mile) to the Gila River. SWReGAP revealed five vegetation habitat types exist within Davis Canyon and these were modified during the desktop analysis to four vegetation habitat types: Open Water (N11), North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), and Madrean Pinyon-Juniper Woodland (S112). During the field analysis, five habitats were identified in Davis Canyon (see Appendix A): Disturbed/Nonspecific (D01), Open Water (N11), North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), and Madrean Pinyon-Juniper Woodland (S112). Acreages for these habitat types are 27.64, 9.61, 1.40, 38.01, and 7.08 acres, respectively. Field verification of NWI data revealed that no wetlands or riparian habitat exist within Davis Canyon. NHD data revealed that Davis Canyon is an intermittent drainage within the project area. Although no springs or water bodies were identified during the desktop analysis of Davis Canyon, two springs and a 0.25-acre pond (human-made cattle tank) were identified within the project area. The westernmost spring drains through the hillside rock formation into the main drainage in Davis Canyon and eventually dissipates underground. The easternmost spring feeds into a pond that provides water for cattle. This pond may also provide habitat for fauna such as migratory birds and amphibians. During the field survey, a small flock of mallard ducks (*Anas platyrhynchos*) and at least two species of frogs (*Lithobates* sp.) were observed in the pond. Water from the pond seeps back into the main drainage of Davis Canyon from the eastern base of the embankment holding the pond.

Special status plant species identified as potentially occurring in Davis Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New Mexico gumweed, Maguire's beardtongue, and Piños Altos fame flower. Special status invertebrate species identified as potentially occurring in Davis Canyon include desert viceroy butterfly, bearded mountainsnail, blunt ambersnail, mayfly (*Ameletus doddsianus*), and the notodontid moth.

Special status avian species potentially occurring in Davis Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, and Abert's towhee. The nearest critical habitat for flycatcher is

856 m (2,810 feet) to the east along the Gila River riparian forest. No special status fish species were identified as potentially occurring in Davis Canyon. The nearest critical habitat for loach minnow and spikedace is 1,065 m (3,493 feet) to the east in the Gila River.

Special status amphibians and reptiles identified as potentially occurring in Davis Canyon include Chiricahua leopard frog (*Lithobates chiricahuensis*), lowland leopard frog (*L. yavapaiensis*), Arizona toad (*Anaxyrus miroscaphus*), Mexican gartersnake (*Thamnophis eques*), narrow-headed gartersnake (*Thamnophis rufipunctatus*), Texas horned lizard, reticulate Gila monster, and desert kingsnake. Special status mammals identified as potentially occurring in Davis Canyon include the red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

NMRAM data and NRCS Pasture Condition scores for Davis Canyon are listed below in Table 4 and Table 5 and Figure 2 and Figure 3. Rangeland condition for the upland portions of Davis Canyon were 53% of the highest possible score for excellent condition (score of 24 vs. score of 45), and the riparian zone scored even lower with a score of 49% of the highest possible score for excellent condition (score of 22 vs. score of 45). Note that the higher the score, the better the conditions. In summary, the rangeland conditions for Davis Canyon were found to be moderate, not excellent, but not poor. In particular, percent desirable plant species, plant species diversity, and amount of livestock concentration areas all scored low; total percent plant cover, amount of plant residue (leaf litter), uniformity of livestock grazing use and soil surface erosion all scored relatively high. The upland area differed from the riparian area primarily relative to percent legumes (i.e., fix nitrogen for the soil), which were low in the riparian zone, but high in the upland areas.

The NMRAM wetland health score of 2.7 was 68% of the highest possible score (4.0); therefore, riparian environmental health was moderate for Davis Canyon. This canyon scored high on the relative composition of native plant species and a low amount of exotic invasive plant species, but scored low on vegetation horizontal and vertical structural diversity (e.g., habitat patches) and very low on native riparian tree regeneration.

Table 4. NRCS Pasture Condition Individual Metric and Total Scores for Davis Canyon

Indicator	Score	
	Upland	Riparian
Percent desirable plants	1	1
Percent cover	3	3
Plant diversity	1	1
Plant residue	3	3
Percent legume	4	2
Uniformity of use	4	5
Livestock concentration areas	2	2
Soil compaction	3	2
Erosion	3	3
Total	**24 (53%)**	**22 (49%)***

*Percentage represents the % of the total possible score if all subcovers were 5.

Table 5. NMRAM Individual Metric and Total Scores for Davis Canyon

Indicator	Raw	Multiplier	Total
Relative native plant community composition	4	0.3	1.2
Vegetation horizontal patch structure	2	0.2	0.4
Vegetation vertical structure	2	0.2	0.4
Native riparian tree regeneration	1	0.1	0.1
Invasive exotic plant species cover	3	0.2	0.6
Total			**2.7 (68%)***

*Percentage represents the % of the total possible score if all subcovers were 4.

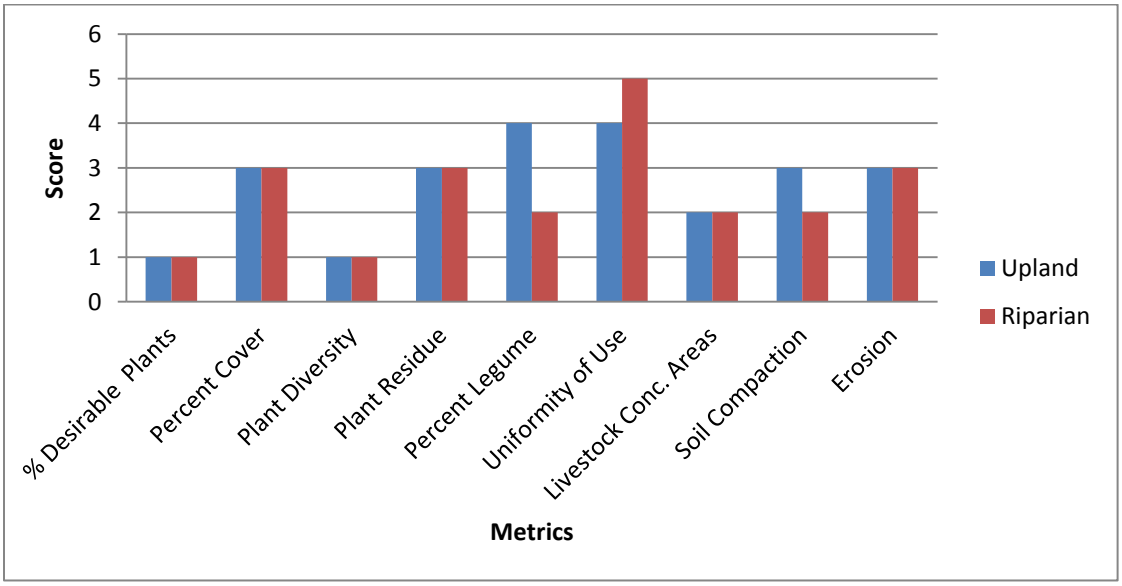

Figure 2. NRCS Pasture Condition individual metric scores for Davis Canyon.

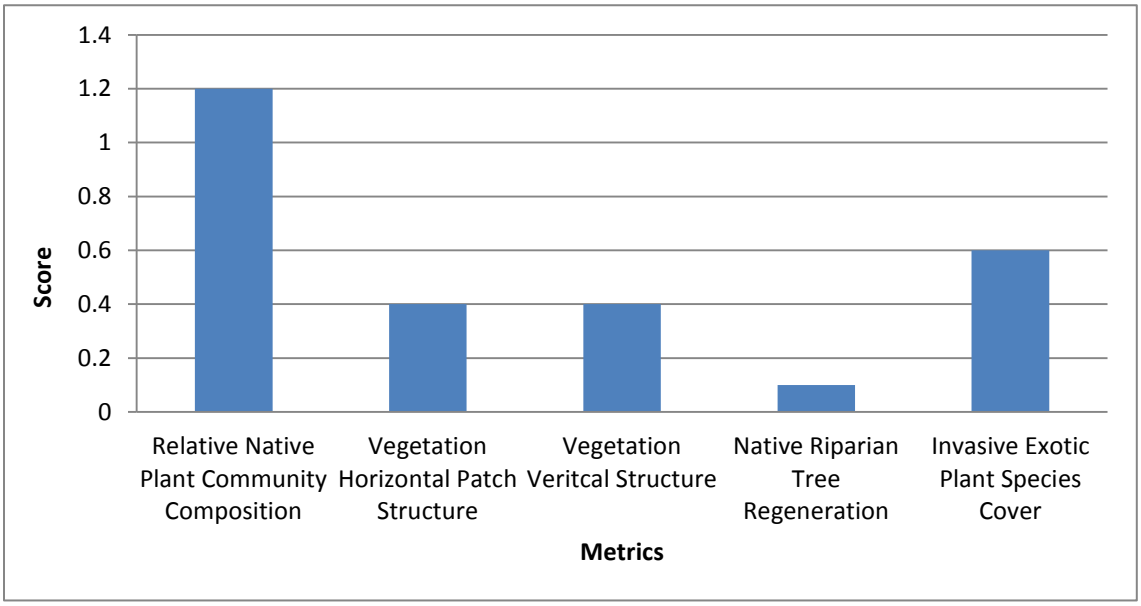

Figure 3. NMRAM individual metric scores for Davis Canyon.

3.3 DIX

A field verification survey of Dix Canyon was conducted on October 25, 2013. Dix Canyon is west of the Gila River and occurs on the Cliff 32108-H5 USGS 7.5-minute topographic map. The project area in Dix Canyon is approximately 94.84 acres and is entirely on private land. The elevational range of the project area is 1,371 to 1,409 m (4,498–4,623 feet) and is approximately 1.56 km (0.97 mile) to the Gila River. SWReGAP revealed six vegetation habitat types exist within Dix Canyon and these were modified during the desktop analysis to two vegetation habitat types: North American Warm Desert Wash (S020) and Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077). During the field analysis, three habitats were identified in Dix Canyon (see Appendix A): North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), and Madrean Juniper Savanna (S115). Acreages for these habitat types are 41.15, 35.56, and 18.13 acres, respectively. Field verification of NWI data revealed that no wetlands or riparian habitat exist within Dix Canyon. Field verification of NHD data revealed that Dix Canyon is an intermittent drainage within the project area. No springs or water bodies were identified during the desktop analysis of Dix Canyon and none were identified during the field survey.

Special status plant species identified as potentially occurring in Dix Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New Mexico gumweed, Maguire's beardtongue, and Piños Altos fame flower. No potential habitat for any of the special status invertebrate species was found in Dix Canyon.

Special status avian species potentially occurring in Dix Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, and Abert's towhee. The nearest critical habitat for flycatcher is 1,031 m (3,383 feet) to the east along the Gila River riparian forest. No special status fish species were identified as potentially occurring in Dix Canyon. The nearest critical habitat for loach minnow and spikedace is 1,381 m (4,532 feet) to the east in the Gila River.

Special status reptiles identified as potentially occurring in Dix Canyon include reticulate Gila monster and desert kingsnake. Special status mammals identified as potentially occurring in Dix Canyon include red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

NMRAM data and NRCS Pasture Condition scores for Dix Canyon are listed below in Table 6 and Table 7 and Figure 4 and Figure 5. Rangeland condition for the upland portions of Dix Canyon were 51% of the highest possible score for excellent condition (score of 23 vs. score of 45), and the riparian zone scored even lower with a score of 47% of the highest possible score for excellent condition (score of 21 vs. score of 45). In summary, the rangeland conditions for Dix Canyon were found to be moderate, not excellent, but not poor. In particular, percent desirable plant species, plant species diversity, amount of livestock concentration areas and amount of soil erosion all scored low, total percent legumes, amount of plant residue (leaf litter),

uniformity of livestock grazing use, and soil surface erosion all scored relatively high. The upland area differed from the riparian area primarily relative to percent of total plant cover, which was low in the riparian zone, but high in the upland areas.

The NMRAM wetland health score of 2.9 was 73% of the highest possible score (4.0); therefore, riparian environmental health was moderate for Dix Canyon. This canyon scored high on the relative composition of native plant species, vegetation vertical structure and amount of exotic invasive plant species, and a low amount of exotic invasive plant species, but scored low on vegetation horizontal structural diversity (e.g., habitat patches), and very low on native riparian tree regeneration.

Table 6. NRCS Pasture Condition Individual Metric and Total Scores for Dix Canyon

Indicator	Score	
	Upland	Riparian
Percent desirable plants	1	1
Percent cover	3	1
Plant diversity	2	2
Plant residue	3	3
Percent legume	4	4
Uniformity of use	3	3
Livestock concentration areas	2	2
Soil compaction	3	3
Erosion	2	2
Total	**23 (51%)**	**21 (47%)***

*Percentage represents the % of the total possible score if all subcovers were 5.

Table 7. NMRAM Individual Metric and Total Scores for Dix Canyon

Indicator	Raw	Multiplier	Total
Relative native plant community composition	4	0.3	1.2
Vegetation horizontal patch structure	2	0.2	0.4
Vegetation vertical structure	3	0.2	0.6
Native riparian tree regeneration	1	0.1	0.1
Invasive exotic plant species cover	3	0.2	0.6
Total			**2.9 (73%)***

*Percentage represents the % of the total possible score if all subcovers were 4.

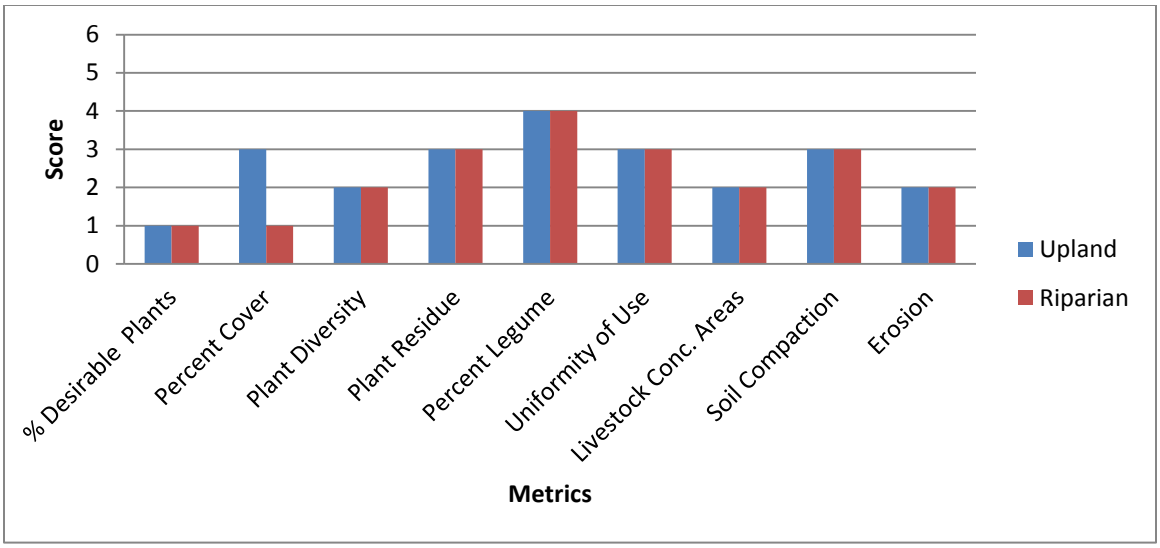

Figure 4. NRCS Pasture Condition individual scores for Dix Canyon.

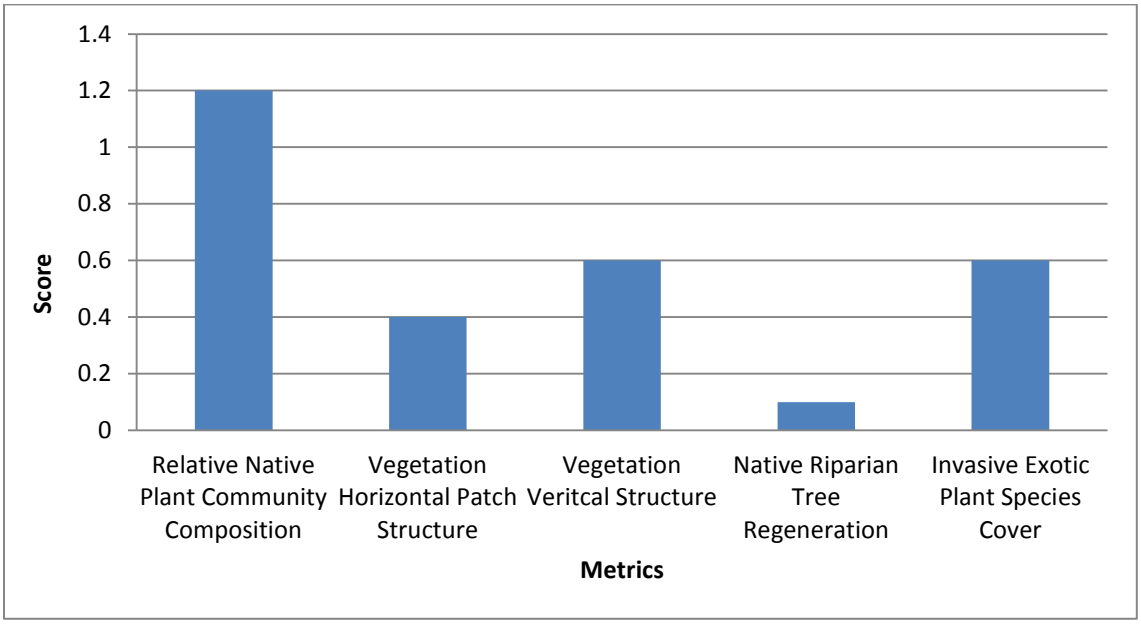

Figure 5. NMRAM individual metric scores for Dix Canyon.

3.4 MALDONADO

A field verification survey of Maldonado Canyon was conducted on October 25, 2013. Maldonado Canyon is east of the Gila River and occurs on the Canteen Canyon 33108-A5 USGS 7.5-minute topographic map. The project area in Maldonado Canyon is approximately 122.19 acres and is entirely on private land. The elevational range of the project area is 1,426 to 1,462 m (4,678–4,797 feet) and is approximately 1.70 km (1.06 miles) to the Gila River. SWReGAP revealed that six vegetation habitat types exist within Maldonado Canyon and these were modified during the desktop analysis to three vegetation habitat types: Disturbed/Nonspecific habitat (D01), North American Warm Desert Wash (S020), and Madrean Juniper Savanna

(S115). During the field analysis, all three of these habitats were identified in Maldonado Canyon (see Appendix A). Acreages for these habitat types are 56.67, 17.31, and 48.20 acres, respectively. Field verification of NWI data revealed that no wetlands or riparian habitat exist within Maldonado Canyon. Field verification of NHD data revealed that Maldonado Canyon is an intermittent drainage within the project area. No springs or water bodies were identified during the desktop analysis of Maldonado Canyon and none were identified during the field survey.

Special status plant species identified as potentially occurring in Maldonado Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New Mexico gumweed, Maguire's beardtongue, and Piños Altos fame flower. No known or potential habitat for any of the special status invertebrate species was found in Maldonado Canyon.

Special status avian species potentially occurring in Maldonado Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, and Abert's towhee. The nearest critical habitat for flycatcher is 598 m (1,962 feet) to the northwest along the Gila River riparian forest. No special status fish species were identified as potentially occurring in Maldonado Canyon. The nearest critical habitat for loach minnow and spikedace is 993 m (3,287 feet) to the northwest in the Gila River.

Special status reptiles identified as potentially occurring in Maldonado Canyon include reticulate Gila monster and desert kingsnake. Special status mammals identified as potentially occurring in Maldonado Canyon include red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

NMRAM data and NRCS Pasture Condition scores for Maldonado Canyon are listed below in Table 8 and Table 9 and Figure 6 and Figure 7. Rangeland condition for the upland portions of Maldonado Canyon was 62% of the highest possible score for excellent condition (score of 28 vs. score of 45), and the riparian zone scored even lower with a score of 55% of the highest possible score for excellent condition (score of 25 vs. score of 45). In summary, the rangeland conditions for Davis Canyon were found to be moderate, not excellent, but not poor. In particular, total percent plant cover and total plant diversity scored low, and amount of plant residue (leaf litter), percent legumes, uniformity of livestock grazing use, soil compaction and soil surface erosion all scored relatively high. The upland area differed from the riparian area primarily relative to percent of desirable plant species, which was low in the riparian zone, but high in the upland areas.

The NMRAM wetland health score of 2.9 was 73% of the highest possible score (4.0); therefore, riparian environmental health was moderate for Maldonado Canyon. This canyon scored high on the relative composition of native plant species, vertical vegetation structure, and amount of exotic invasive plant species, but scored low on vegetation horizontal and vertical structural

diversity (e.g., habitat patches) and very low on horizontal vegetation structure and native riparian tree regeneration.

Table 8. NRCS Pasture Condition Individual Metric and Total Scores for Maldonado Canyon

Indicator	Score	
	Upland	Riparian
Percent desirable plants	3	1
Percent cover	2	2
Plant diversity	2	2
Plant residue	4	3
Percent legume	3	3
Uniformity of use	4	4
Livestock concentration areas	4	4
Soil compaction	3	3
Erosion	3	3
Total	**28 (62%)**	**25 (55%)***

*Percentage represents the % of the total possible score if all subcovers were 5.

Table 9. NMRAM Individual Metric and Total Scores for Maldonado Canyon

Indicator	Raw	Multiplier	Total
Relative native plant community composition	4	0.3	1.2
Vegetation horizontal patch structure	2	0.2	0.4
Vegetation vertical structure	3	0.2	0.6
Native riparian tree regeneration	1	0.1	0.1
Invasive exotic plant species cover	3	0.2	0.6
Total			**2.9 (73%)***

*Percentage represents the % of the total possible score if all subcovers were 4.

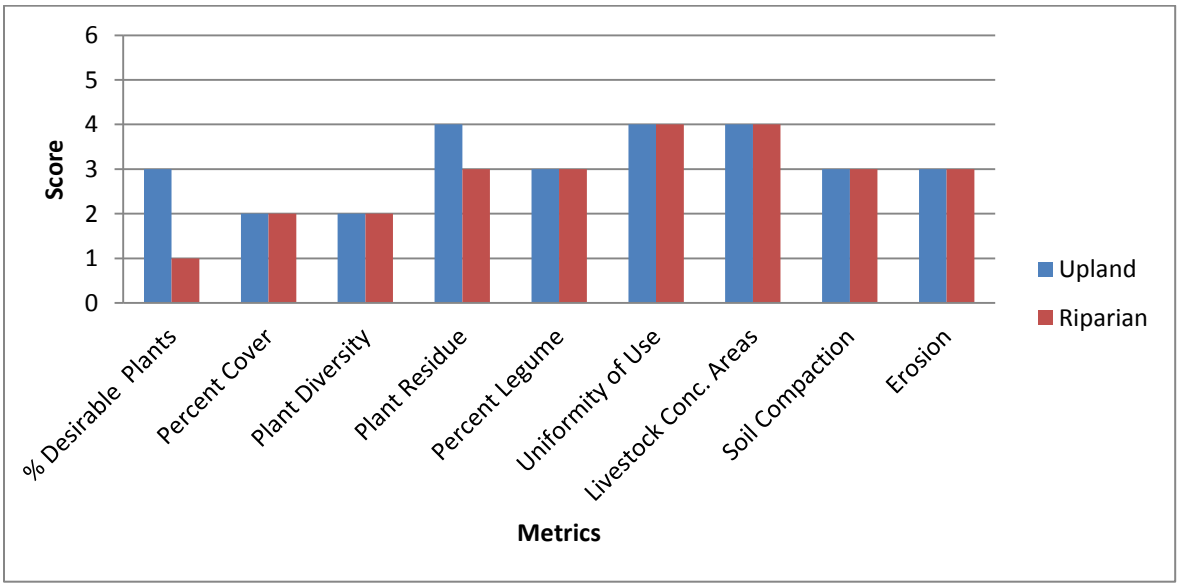

Figure 6. NRCS Pasture Condition individual metric scores for Maldonado Canyon.

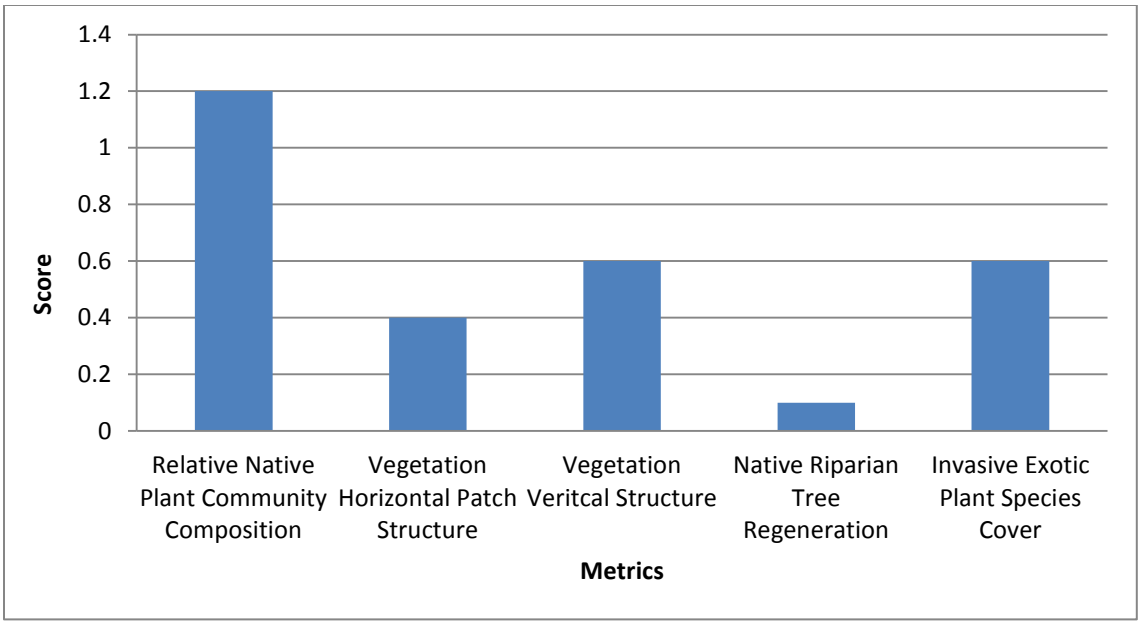

Figure 7. NMRAM individual metric scores for Maldonado Canyon.

3.5 MANGAS

A field verification survey of Mangas Canyon has not been conducted due to landowner restrictions. Mangas Canyon is east of the Gila River and occurs on the Mangas Springs 32108-G5 USGS 7.5-minute topographic map. The project area in Mangas Canyon is approximately 271.18 acres and is located on Bureau of Land Management (BLM) (1.89 acres), NMDGF (51.85 acres), and private land (217.45 acres). The elevational range of the project area is 1,350 to 1,431 m (4,429–4,695 feet) and is approximately 1.30 km (0.81 mile) to the Gila River. SWReGAP revealed that six vegetation habitat types exist within Mangas Canyon and these were modified during the desktop analysis to four vegetation habitat types: North American Warm Desert Volcanic Rockland (S019), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), North American Warm Desert Lower Montane Riparian Woodland and Shrubland (S094), and Madrean Juniper Savanna (S115). Acreages for these habitat types are 18.29, 48.13, 178.73, and 26.04 acres, respectively (see Appendix A). Desktop analysis and evaluation of NWI data revealed that one riverine wetland totaling 11.65 acres and forested/shrub riparian habitat areas (totaling 17.63 acres) exist within Mangas Canyon. NHD data revealed that Mangas Canyon has both intermittent and ephemeral drainages within the project area. No springs or water bodies were identified during the desktop analysis of Mangas Canyon. NMRAM data and NRCS Pasture Condition scores have not been evaluated for Mangas Canyon.

Special status plant species identified as potentially occurring in Cherokee Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New Mexico gumweed, Maguire's beardtongue, slender spiderflower (*Peritoma multicaulis*), Parish's alkali grass (*Puccinellia parishii*), and Piños Altos fame flower. Special status invertebrate species identified as potentially occurring in Mangas Canyon include desert viceroy butterfly, bearded mountainsnail, blunt ambersnail, mayfly, and notodontid moth.

Special status avian species potentially occurring in Mangas Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, Abert's towhee, yellow-billed cuckoo (*Coccyzus americanus occidentalis*), and flycatcher. The nearest critical habitat for flycatcher is 131 m (431 feet) to the west along the Gila River riparian forest.

Mangas Creek is a perennial stream and special status fish species with the potential to occur in Mangas Canyon include headwater chub (*Ictalurus lupus*), roundtail chub (*Gila robusta*), Gila chub (*G. intermedia*), Gila topminnow (*Poeciliopsis occidentalis*), loach minnow, spikedace, desert sucker (*Catostomus clarki*), Sonora sucker (*Catostomus insignis*), longfin dace (*Agosia chrysogaster*), speckled dace (*Rhinichthys osculus*), and black bullhead (*Ameiurus melas*). Critical habitat for the loach minnow and spikedace occurs within Mangas Creek.

Special status amphibians and reptiles identified as potentially occurring in Mangas Canyon include Chiricahua leopard frog, lowland leopard frog, Arizona toad, Mexican gartersnake, narrow-headed gartersnake, Texas horned lizard, reticulate Gila monster, and desert kingsnake. Special status mammals identified as potentially occurring in Mangas Canyon include red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

3.6 POPE

A field verification survey of Pope Canyon was partially completed on October 22, 2013. The remaining portion of Pope Canyon (west of New Mexico Highway 211) was surveyed on December 16, 2013. Pope Canyon is east of the Gila River and occurs on the Mangas Springs 32108-G5 USGS 7.5-minute topographic map. The project area in Pope Canyon is approximately 303.87 acres and is entirely on private land. The elevational range of the project area is 1,377 to 1,421 m (4,518–4,662 feet) and is approximately 1.47 km (0.91 mile) to the Gila River. SWReGAP revealed five vegetation habitat types exist within Pope Canyon and these were modified during the desktop analysis to four vegetation habitat types: Disturbed/Nonspecific habitat (D01), North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), and Madrean Juniper Savanna (S115). During the field analysis, five habitats were identified in Pope Canyon (see Appendix A): Disturbed/Nonspecific habitat (D01), North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (S109), and Madrean Juniper Savanna (S115). Acreages for these habitat types are 9.59, 42.43, 64.22, 0.14, and 187.49 acres, respectively. Desktop analysis and evaluation of NWI data revealed that no wetlands or riparian habitat exist within Pope Canyon. However, in the western portion of Pope Canyon a cattle ranching corral exists in which a human-made cattle tank exists along with a small overflow pond. This cattle tank was full of water during the December field survey and is fed from a windmill-driven well. The overflow pond is adjacent to the cattle tank and is approximately 0.02 acre. The pond did not have all three USACE criteria to classify as a wetland. Field verification of NHD data revealed

that Pope Canyon has both intermittent and ephemeral drainages within the project area. No springs or water bodies were identified during the desktop analysis of Pope Canyon.

Special status plant species identified as potentially occurring in Pope Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New Mexico gumweed, Maguire's beardtongue, and Piños Altos fame flower. Special status invertebrate species identified as potentially occurring in Pope Canyon include desert viceroy butterfly, bearded mountainsnail, blunt ambersnail, mayfly, four-spotted skipper skipperling (*Piruna polingii*), notodontid moth, and Arizona snaketail (*Ophiogomphus arizonicus*).

Special status avian species potentially occurring in Pope Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, and Abert's towhee. The nearest critical habitat for flycatcher is 941 m (3,088 feet) to the southwest along the Gila River riparian forest. No special status fish species were identified as potentially occurring in Pope Canyon. The nearest critical habitat for loach minnow and spikedace is 1,244 m (4,083 feet) to the southwest in the Gila River.

Special status reptiles identified as potentially occurring in Pope Canyon include reticulate Gila monster and desert kingsnake. Special status mammal species identified as potentially occurring in Pope Canyon include red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

Partial NMRAM data and NRCS Pasture Condition scores for Pope Canyon are listed below in Table 10 and Table 11 and Figure 8 and Figure 9. These scores represent only the upper half of the Pope Canyon project area, east of New Mexico Highway 211. Rangeland condition for the upland portions of Pope Canyon were 84% of the highest possible score for excellent condition (score of 38 vs. score of 45), and the riparian zone scored slightly lower with a score of 82% of the highest possible score for excellent condition (score of 37 vs. score of 45). In summary, the rangeland conditions for Pope Canyon were found to be good. In particular, all metrics scored high except for percent legumes, both for the upland and riparian portions of the canyon

The NMRAM wetland health score of 2.5 was 63% of the highest possible score (4.0); therefore, riparian environmental health was moderate for Pope Canyon. This canyon scored high on the relative composition of native plant species and amount of exotic invasive plant species, but scored very low on vegetation horizontal and vertical structural diversity (e.g., habitat patches), and on native riparian tree regeneration.

Table 10. NRCS Pasture Condition Individual Metric and Total Scores for Pope Canyon

Indicator	Score	
	Upland	Riparian
Percent desirable plants	5	4
Percent cover	4	4
Plant diversity	5	5
Plant residue	3	3
Percent legume	2	2
Uniformity of use	5	5
Livestock concentration areas	5	5
Soil compaction	5	5
Erosion	4	4
Total	**38 (84%)**	**37 (82%)***

*Percentage represents the % of the total possible score if all subcovers were 5.

Table 11. NMRAM Individual Metric and Total Scores for Pope Canyon

Indicator	Raw	Multiplier	Total
Relative native plant community composition	4	0.3	1.2
Vegetation horizontal patch structure	1	0.2	0.2
Vegetation vertical structure	1	0.2	0.2
Native riparian tree regeneration	1	0.1	0.1
Invasive exotic plant species cover	4	0.2	0.8
Total			**2.5 (63%)***

*Percentage represents the % of the total possible score if all subcovers were 4.

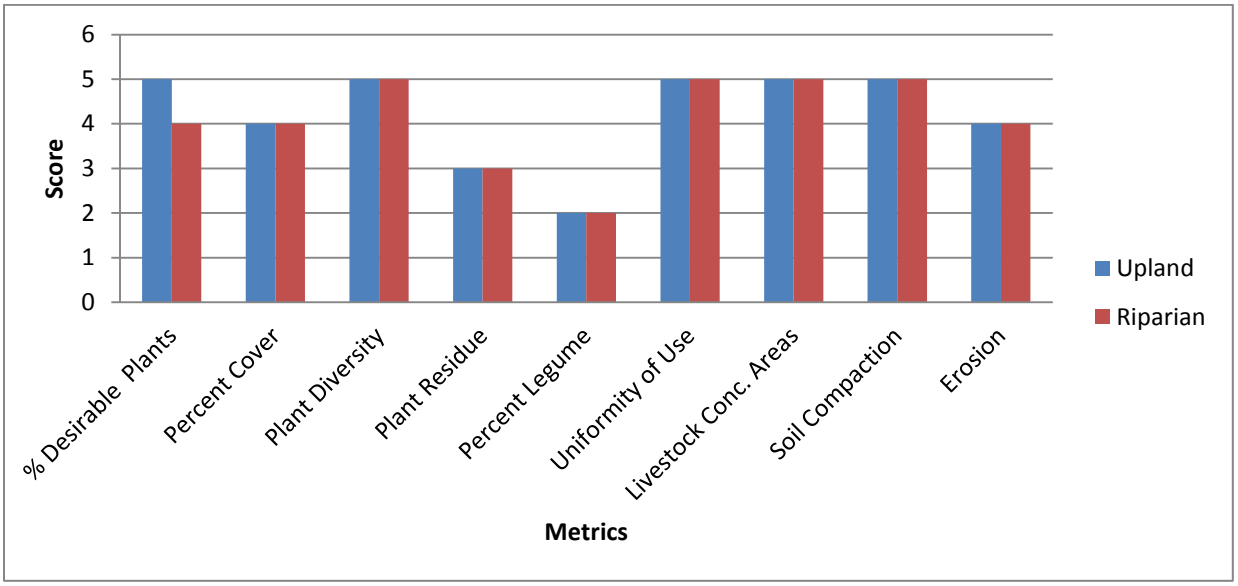

Figure 8. NRCS Pasture Condition individual metric scores for Pope Canyon.

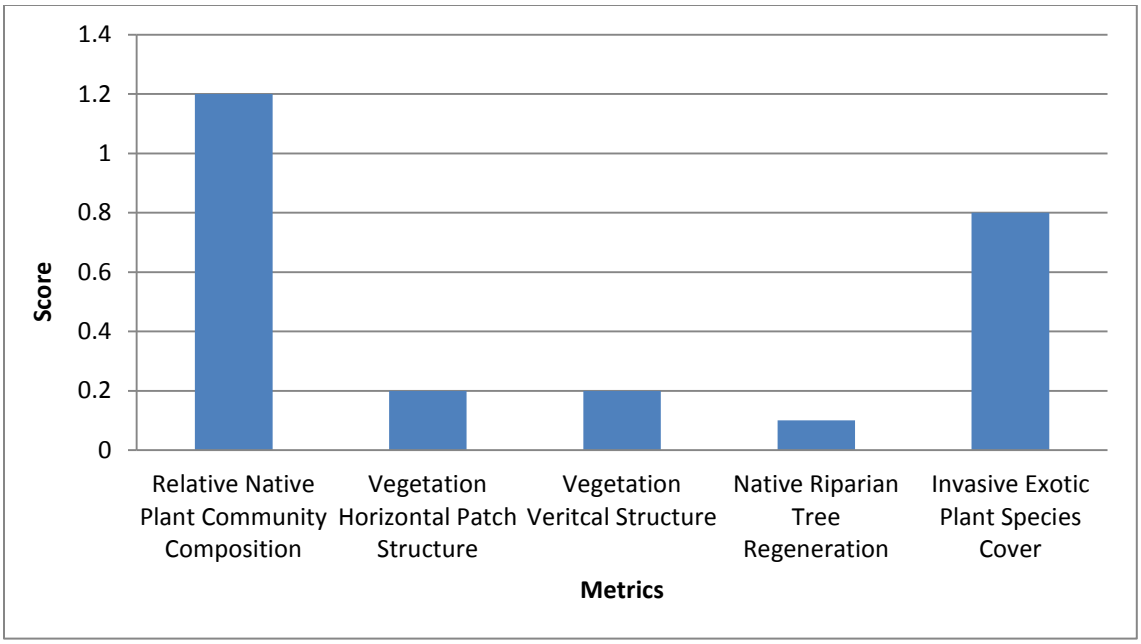

Figure 9. NMRAM individual metric scores for Pope Canyon.

3.7 SCHOOLHOUSE

A field verification survey of a portion of Schoolhouse Canyon was conducted on October 25, 2013. Landowner restrictions on the portion north of the USFS land are still in place prohibiting the completion of the survey. Schoolhouse Canyon is east of the Gila River and occurs on the Cliff 32108-H5 USGS 7.5-minute topographic map. The project area in Schoolhouse Canyon is approximately 146.76 acres and is located on USFS land (25.08 acres) and private land (121.68 acres). The elevational range of the project area is 1,354 to 1,432 m (4,442–4,698 feet) and is approximately 1.40 km (0.87 mile) to the Gila River. SWReGAP revealed that four vegetation habitat types exist within Schoolhouse Canyon and these were modified during the desktop analysis to three vegetation habitat types: North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), and Madrean Juniper Savanna (S115). During the field analysis, one other habitat was identified in Schoolhouse Canyon within USFS land in addition to the three other habitats identified during the desktop analysis (see Appendix A): North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), Madrean Pinyon-Juniper Woodland (S112), and Madrean Juniper Savanna (S115). Acreages for these habitat types are 105.68, 8.05, 17.31, and 15.71 acres, respectively. Although no springs, wetlands, or riparian areas were identified during the field surveys in the portion of Schoolhouse Canyon that is owned by the USFS, desktop evaluation of NWI data revealed that one riverine wetland totaling 20.38 acres and forested/shrub riparian habitat areas (totaling 3.40 acres) exist within the privately held portions of Schoolhouse Canyon. NHD data revealed that Schoolhouse Canyon is an ephemeral drainage within the project area. SWCA confirmed that an ephemeral drainage exists within in the portion of Schoolhouse Canyon that is owned by the USFS.

Special status plant species identified as potentially occurring in Schoolhouse Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New

Mexico gumweed, Maguire's beardtongue, and Piños Altos fame flower. Special status invertebrate species identified as potentially occurring in Schoolhouse Canyon include desert viceroy butterfly, bearded mountainsnail, blunt ambersnail, mayfly, four-spotted skipper skipperling, notodontid moth, and Arizona snaketail.

Special status avian species potentially occurring in Schoolhouse Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, and Abert's towhee. The nearest critical habitat for flycatcher is 706 m (2,316 feet) to the west along the Gila River riparian forest. No special status fish species are anticipated to occur in Schoolhouse Canyon. The nearest critical habitat for loach minnow and spikedace is 251 m (823 feet) to the northwest in the Gila River.

Special status reptiles identified as potentially occurring in Schoolhouse Canyon include reticulate Gila monster and desert kingsnake. Special status mammal species identified as potentially occurring in Schoolhouse Canyon include red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

Partial NMRAM data and NRCS Pasture Condition scores for Schoolhouse Canyon are listed below in Table 12 and Table 13 and Figure 10 and Figure 11. Rangeland condition for the upland portions of Schoolhouse Canyon were 47% of the highest possible score for excellent condition (score of 21 vs. score of 45), and the riparian zone scored slightly higher with a score of 49% of the highest possible score for excellent condition (score of 22 vs. score of 45). In summary, the rangeland conditions for Schoolhouse Canyon were found to be marginal, not excellent, but not poor. In particular, percent desirable plant species, plant species diversity, and amount of soil erosion all scored low, total percent plant cover and uniformity of livestock grazing scored relatively high. The upland area differed from the riparian area primarily relative to soil compaction, which was low in the riparian zone, but high in the upland areas.

The NMRAM wetland health score of 3.1 was 78% of the highest possible score (4.0); therefore, riparian environmental health was relatively high for Schoolhouse Canyon. This canyon scored high on the relative composition of native plant species, vegetation vertical structure, and a low amount of exotic invasive plant species, but scored low on vegetation horizontal structural diversity (e.g., habitat patches), and native riparian tree regeneration.

Table 12. NRCS Pasture Condition Individual Metric and Total Scores for Schoolhouse Canyon

Indicator	Score	
	Upland	Riparian
Percent desirable plants	1	1
Percent cover	3	3
Plant diversity	1	1
Plant residue	3	2
Percent legume	2	3
Uniformity of use	4	2
Livestock concentration areas	3	4
Soil compaction	2	4
Erosion	2	2
Total	**21 (47%)**	**22 (49%)***

*Percentage represents the % of the total possible score if all subcovers were 5.

Table 13. NMRAM Individual Metric and Total Scores for Schoolhouse Canyon

Indicator	Raw	Multiplier	Total
Relative native plant community composition	4	0.3	1.2
Vegetation horizontal patch structure	2	0.2	0.4
Vegetation vertical structure	3	0.2	0.6
Native riparian tree regeneration	1	0.1	0.1
Invasive exotic plant species cover	4	0.2	0.8
Total			**3.1 (78%)***

*Percentage represents the % of the total possible score if all subcovers were 4.

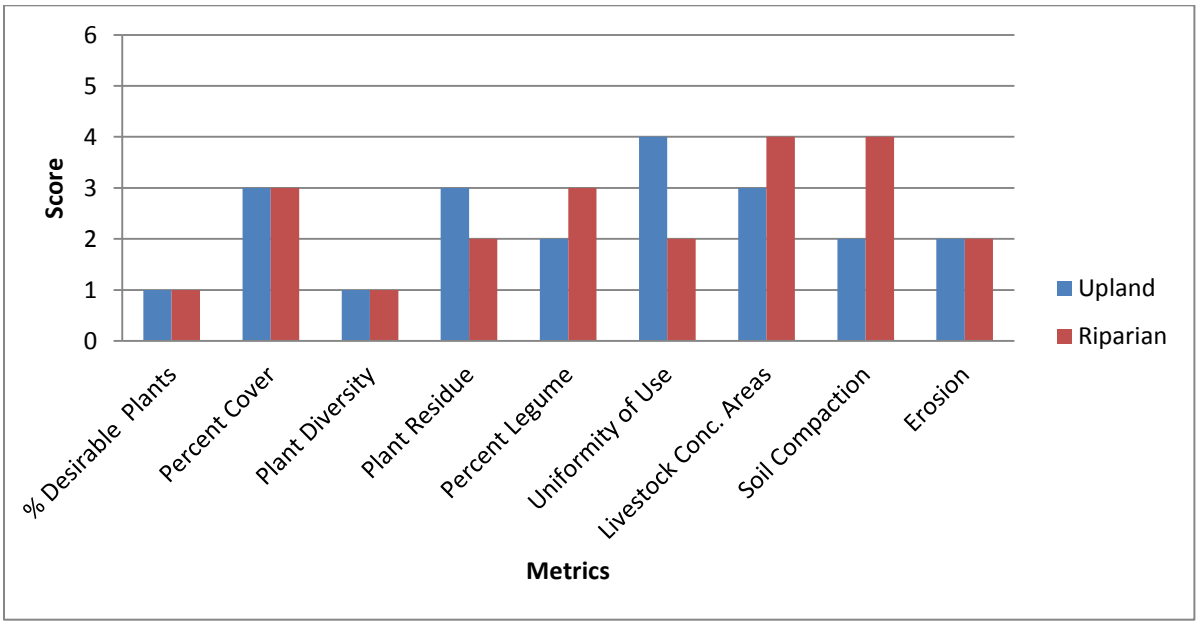

Figure 10. NRCS Pasture Condition individual metric scores for Schoolhouse Canyon.

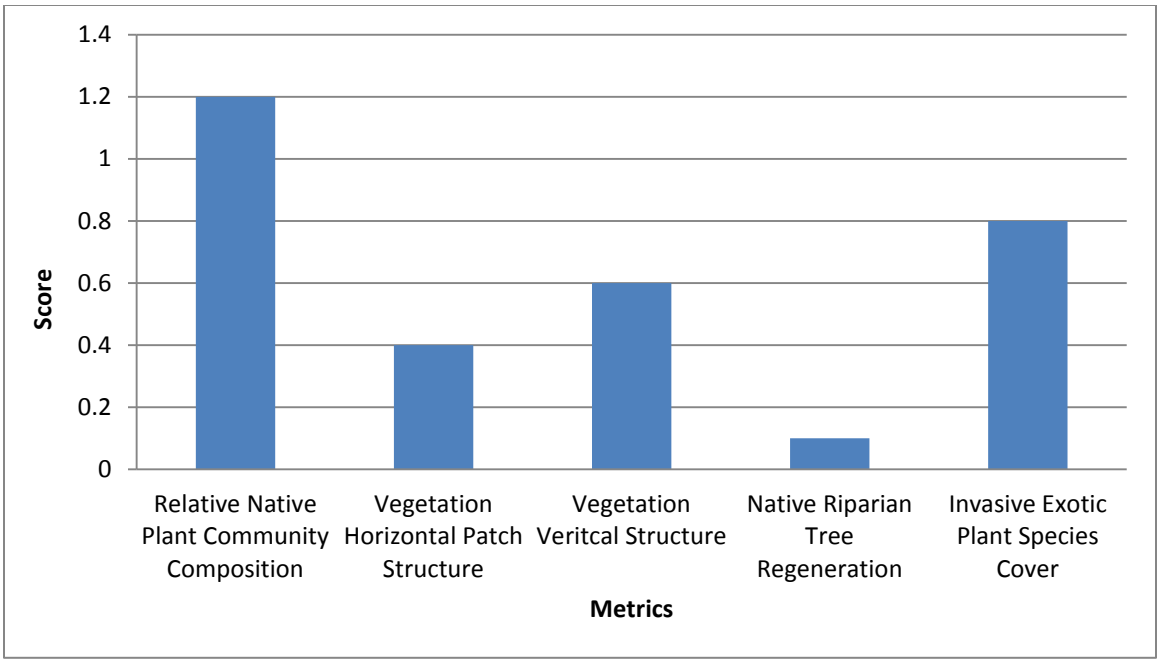

Figure 11. NMRAM individual metric scores for Schoolhouse Canyon.

3.8 SPAR

A field verification survey of Spar Canyon was conducted on October 25, 2013. Spar Canyon is east of the Gila River and occurs on the Canteen Canyon 33108-A5 USGS 7.5-minute topographic map. The project area in Spar Canyon is approximately 67.53 acres and is entirely on USFS land. The elevational range of the project area is 1,424 to 1,459 m (4,672–4,787 feet) and is approximately 0.82 km (0.51 mile) to the Gila River. SWReGAP revealed four vegetation habitat types exist within Spar Canyon and these were modified during the desktop analysis to three vegetation habitat types: North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), and Madrean Juniper Savanna (S115). During the field analysis, four habitats were identified in Spar Canyon (see Appendix A): Disturbed/Nonspecific habitat (D01), North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), and Madrean Juniper Savanna (S115). Acreages for these habitat types are 38.61, 1.61, 11.94, and 15.37 acres, respectively. Field verification of NWI data revealed that no wetlands exist in Spar Canyon, but one water body totaling 0.05 acre (human-made cattle tank) does exist within Spar Canyon. The cattle tank did not contain water during the field survey. No springs were identified during the desktop analysis of Spar Canyon and none were identified during the field survey. Field verification of NHD data revealed that Spar Canyon has both intermittent and ephemeral drainages within the project area.

Special status plant species identified as potentially occurring in Spar Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New Mexico gumweed, Maguire's beardtongue, and Piños Altos fame flower. Special status invertebrate species identified as potentially occurring in Spar Canyon include bearded mountainsnail and notodontid moth.

Special status avian species potentially occurring in Spar Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, and Abert's towhee. The nearest critical habitat for flycatcher is 439 m (1,441 feet) to the northwest along the Gila River riparian forest. No special status fish species are anticipated to occur in Spar Canyon. The nearest critical habitat for loach minnow and spikedace is 613 m (2,012 feet) to the northwest in the Gila River.

Special status reptiles identified as potentially occurring in Spar Canyon include reticulate Gila monster and desert kingsnake. Special status mammal species identified as potentially occurring in Spar Canyon include red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

NMRAM data and NRCS Pasture Condition scores for Spar Canyon are listed below in Table 14 and Table 15 and Figure 12 and Figure 13. Rangeland condition for the upland portions of Spar Canyon were 53% of the highest possible score for excellent condition (score of 24 vs. score of 45), and the riparian zone scored slightly lower with a score of 51% of the highest possible score for excellent condition (score of 23 vs. score of 45). In summary, the rangeland conditions for Spar Canyon were found to be moderate, not excellent, but not very poor. In particular, total percent plant cover, uniformity of livestock use, and amount of livestock concentration areas all scored low, and percent desirable plant species, plant species diversity, amount of plant residue, percent legumes, soil compaction and soil erosion scored relatively high. The upland area differed little from the riparian area.

The NMRAM wetland health score of 2.7 was 68% of the highest possible score (4.0); therefore, riparian environmental health was moderate for Spar Canyon. This canyon scored high on the relative composition of native plant species and a low amount of exotic invasive plant species, but scored low on vegetation horizontal and vertical structural diversity (e.g., habitat patches), and native riparian tree regeneration.

Table 14. NRCS Pasture Condition Individual Metric and Total Scores for Spar Canyon

Indicator	Score	
	Upland	Riparian
Percent desirable plants	3	3
Percent cover	2	1
Plant diversity	3	3
Plant residue	3	3
Percent legume	3	3
Uniformity of use	1	1
Livestock concentration areas	1	1
Soil compaction	5	5
Erosion	3	3
Total	**24 (53%)**	**23 (51%)***

*Percentage represents the % of the total possible score if all subcovers were 5.

Table 15. NMRAM Individual Metric and Total Scores for Spar Canyon

Indicator	Raw	Multiplier	Total
Relative native plant community composition	4	0.3	1.2
Vegetation horizontal patch structure	1	0.2	0.2
Vegetation vertical structure	2	0.2	0.4
Native riparian tree regeneration	1	0.1	0.1
Invasive exotic plant species cover	4	0.2	0.8
Total			**2.7 (68%)***

*Percentage represents the % of the total possible score if all subcovers were 4.

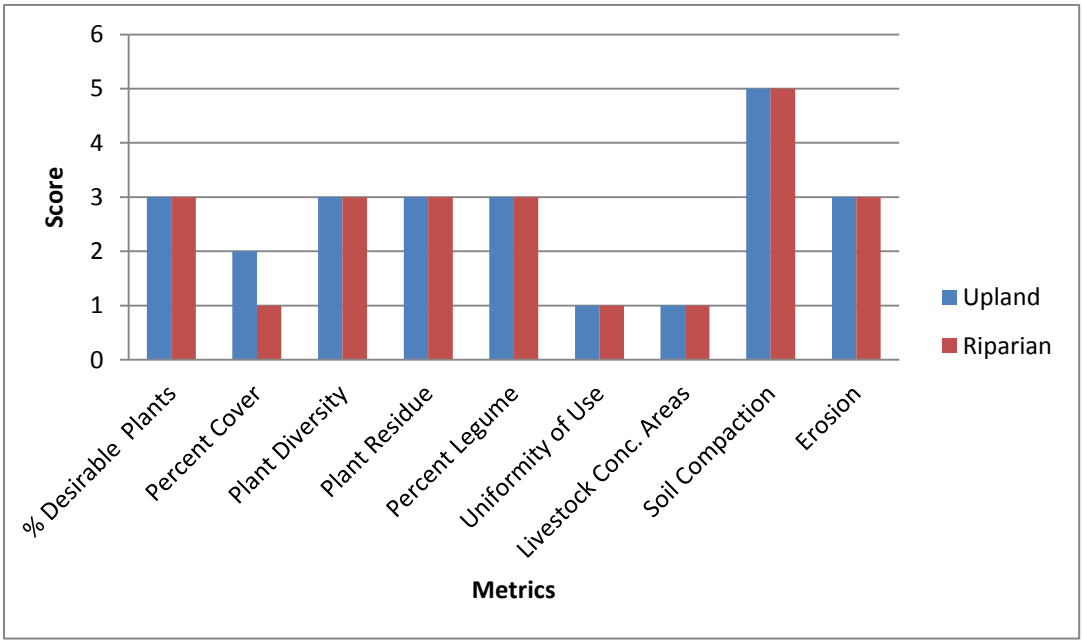

Figure 12. NRCS Pasture Condition individual metric scores for Spar Canyon.

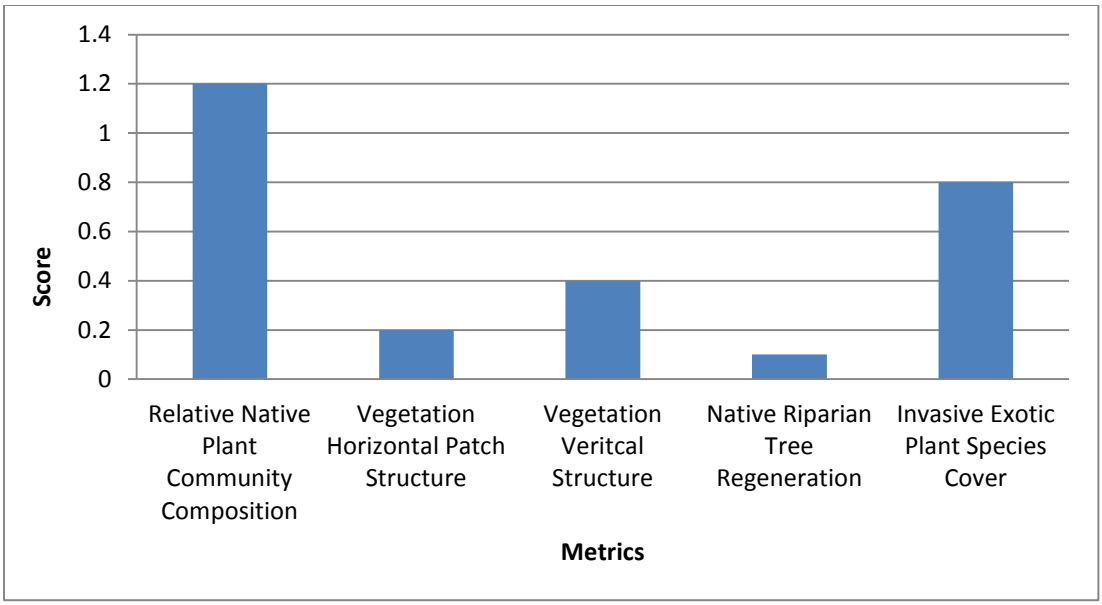

Figure 13. NMRAM individual metric scores for Spar Canyon.

3.9 SYCAMORE

A field verification survey of Sycamore Canyon was conducted on October 23, 2013. Sycamore Canyon is west of the Gila River and occurs on the Antelope Ridge 32108-H6 and Cliff 32108-H5 USGS 7.5-minute topographic maps. The project area in Sycamore Canyon is approximately 567.66 acres and is located on BLM (81.50), State of New Mexico land (140.15), and private land (346.02). The elevational range of the project area is 1,353 to 1,419 m (4,439–4,656 feet) and is approximately 0.62 km (0.39 mile) to the Gila River. SWReGAP revealed eight vegetation habitat types exist within Sycamore Canyon and these were modified during the desktop analysis to five vegetation habitat types: Disturbed/Nonspecific (D01), North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), North American Warm Desert Lower Montane Riparian Woodland and Shrubland (S094), and Madrean Juniper Savanna (S115). During the field analysis, six habitats were identified in Sycamore Canyon (see Appendix A): Disturbed/Nonspecific (D01), North American Warm Desert Wash (S020), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077), North American Warm Desert Lower Montane Riparian Woodland and Shrubland (S094), Madrean Pinyon-Juniper Woodland (S112), and Madrean Juniper Savanna (S115). Acreages for these habitat types are 81.64, 110.87, 213.81, 106.10, 2.47, and 52.78 acres, respectively. Desktop analysis and evaluation of NWI data revealed that four riverine/forested shrub wetlands (totaling 15.99 acres) exist within Sycamore Canyon. Riparian habitat identified during the desktop analysis revealed that 47.83 acres exist within Sycamore Canyon. Field verification of NWI data revealed one riverine wetland (totaling 0.61 acre) and forested/shrub riparian habitat areas (totaling 106.10 acres) exist within Sycamore Canyon. During the field survey, at least one species of frogs (*Lithobates* sp.) were observed in the wetland. Desktop analysis and field verification of NHD data revealed that Sycamore Canyon is an intermittent drainage within the project area. Although one spring and one water body were identified during the desktop analysis of Sycamore Canyon, only a 0.51-acre pond (human-made cattle tank) was

identified within the project area. This pond was within the landowner's corral for cattle. No springs were identified during the field surveys.

Special status plant species identified as potentially occurring in Sycamore Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New Mexico gumweed, Maguire's beardtongue, slender spiderflower, Parish's alkali grass, and Piños Altos fame flower. Special status invertebrate species identified as potentially occurring in Sycamore Canyon include desert viceroy butterfly, bearded mountainsnail, blunt ambersnail, mayfly, four-spotted skipper skipperling, notodontid moth, and Arizona snaketail.

Special status avian species potentially occurring in Sycamore Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, Abert's towhee, yellow-billed cuckoo, and flycatcher. The nearest critical habitat for flycatcher is 131 m (431 feet) to the east along the Gila River riparian forest.

Although Sycamore Canyon is considered an intermittent stream, special status fish species have the potential to occur in Sycamore Canyon. These include headwater chub, roundtail chub, Gila chub, Gila topminnow, loach minnow, spikedace, desert sucker, Sonora sucker, longfin dace, speckled dace, and black bullhead. The nearest critical habitat for loach minnow and spikedace is 769 m (2,523 feet) to the southwest in the Gila River.

Special status amphibians and reptiles identified as potentially occurring in Sycamore Canyon include Chiricahua leopard frog, lowland leopard frog, Arizona toad, Mexican gartersnake, narrow-headed gartersnake, Texas horned lizard, reticulate Gila monster, and desert kingsnake. Special status mammals identified as potentially occurring in Sycamore Canyon include red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

NMRAM data and NRCS Pasture Condition scores for Sycamore Canyon are listed below in Table 16 and Table 17 and Figure 14 through Figure 17. For NMRAM at Sycamore Canyon, three separate assessment areas were evaluated. Rangeland condition for the upland portions of Sycamore Canyon were 42% of the highest possible score for excellent condition (score of 19 vs. score of 45), and the riparian zone scored higher with a score of 56% of the highest possible score for excellent condition (score of 25 vs. score of 45). In summary, the rangeland conditions for Sycamore Canyon were found to be moderate, not excellent, but not poor. In particular, amount of livestock concentration areas, soil compaction, and soil erosion all scored low, and total percent plant cover and uniformity of livestock grazing use and soil surface erosion scored relatively high. The upland area differed from the riparian area primarily relative to percent desirable plants, overall plant species diversity, and amount of plant residue, which were better in the riparian areas than the upland areas.

The NMRAM wetland health average score of 2.6 across three AAs was 65% of the highest possible score (4.0); therefore, riparian environmental health was moderate for Sycamore

Canyon. This canyon scored consistently high on the relative composition of native plant species, but scored consistently low on vegetation horizontal and native riparian tree regeneration. The ranges of scores among the three different AAs may be viewed in Table 17 and Figure 15, Figure 16, and Figure 17.

Table 16. NRCS Pasture Condition Individual Metric and Total Scores for Sycamore Canyon

Indicator	Score	
	Upland	Riparian
Percent desirable plants	1	3
Percent cover	3	3
Plant diversity	1	3
Plant residue	2	4
Percent legume	3	3
Uniformity of use	5	5
Livestock concentration areas	1	1
Soil compaction	2	2
Erosion	1	1
Total	**19 (42%)**	**25 (56%)***

*Percentage represents the % of the total possible score if all subcovers were 5.

Table 17. NMRAM Individual Metric and Total Scores for Sycamore Canyon

Indicator	AA #1			AA #2			AA #3		
	Raw	Multiplier	Total	Raw	Multiplier	Total	Raw	Multiplier	Total
Relative native plant community composition	4	0.3	1.2	3	0.3	0.9	3	0.3	0.9
Vegetation horizontal patch structure	2	0.2	0.4	3	0.2	0.6	2	0.2	0.4
Vegetation vertical structure	3	0.2	0.6	3	0.2	0.6	2	0.2	0.4
Native riparian tree regeneration	1	0.1	0.1	3	0.1	0.3	1	0.1	0.1
Invasive exotic plant species cover	4	0.2	0.8	2	0.2	0.4	1	0.2	0.2
Totals:	**3.1 (78%)***			**2.8 (70%)***			**2.0(50%)***		
Grand Total Averaged over 3 AAs:	**2.6 (65%)***								

*Percentage represents the % of the total possible score if all subcovers were 4.

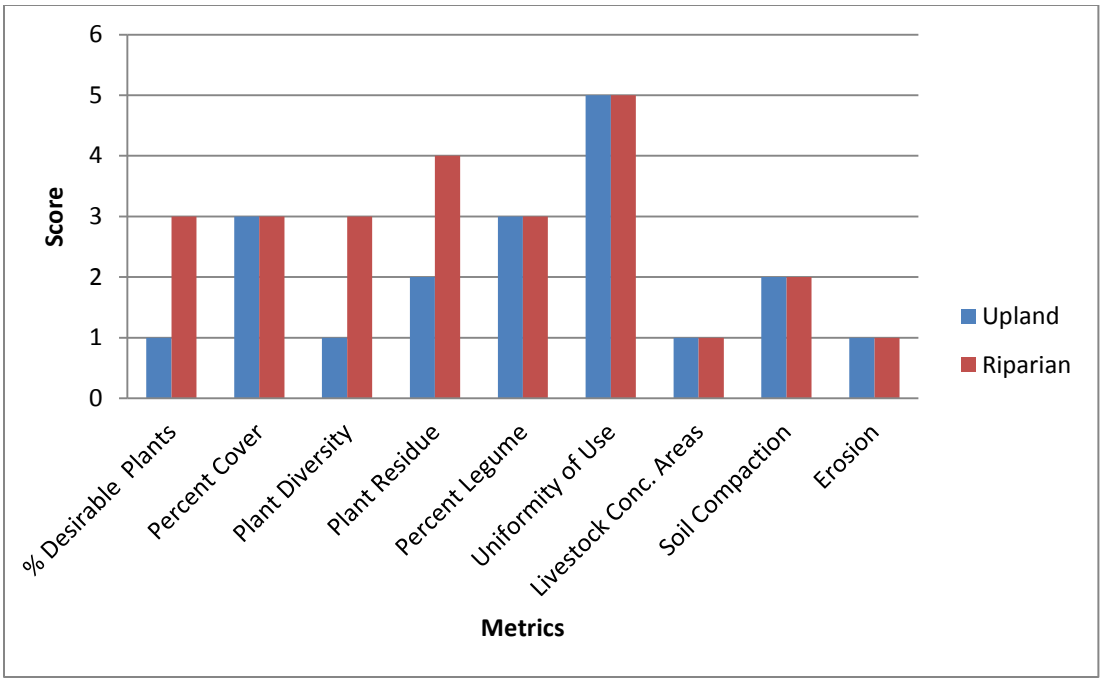

Figure 14. NRCS Pasture Condition individual metric scores for Sycamore Canyon.

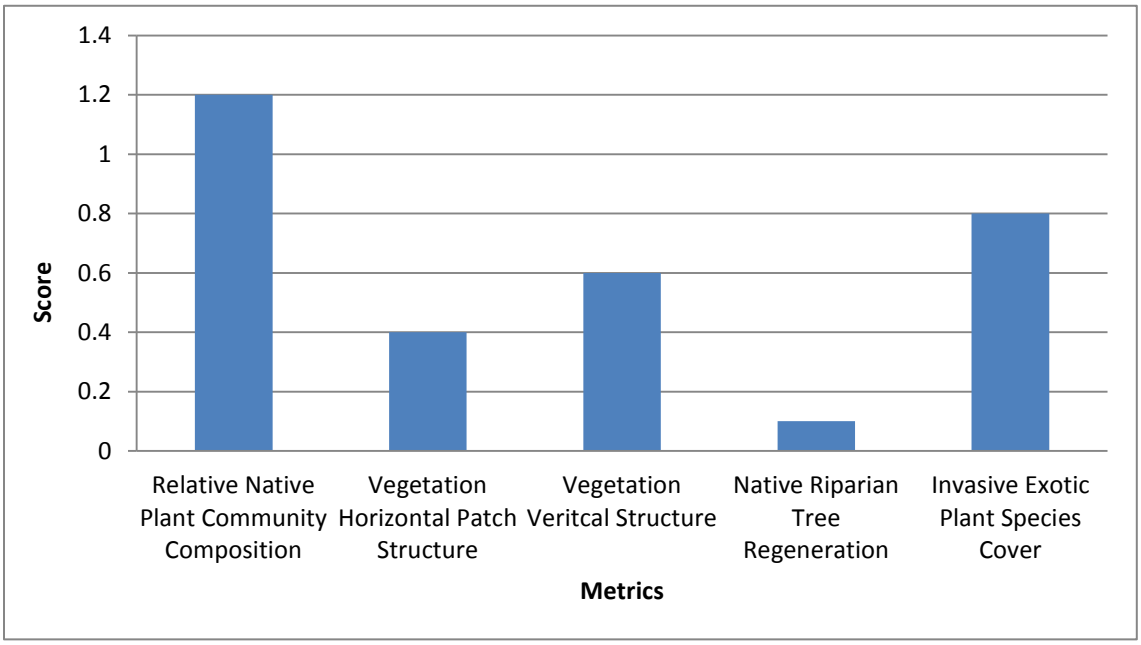

Figure 15. NMRAM individual scores for Sycamore Canyon, AA 1.

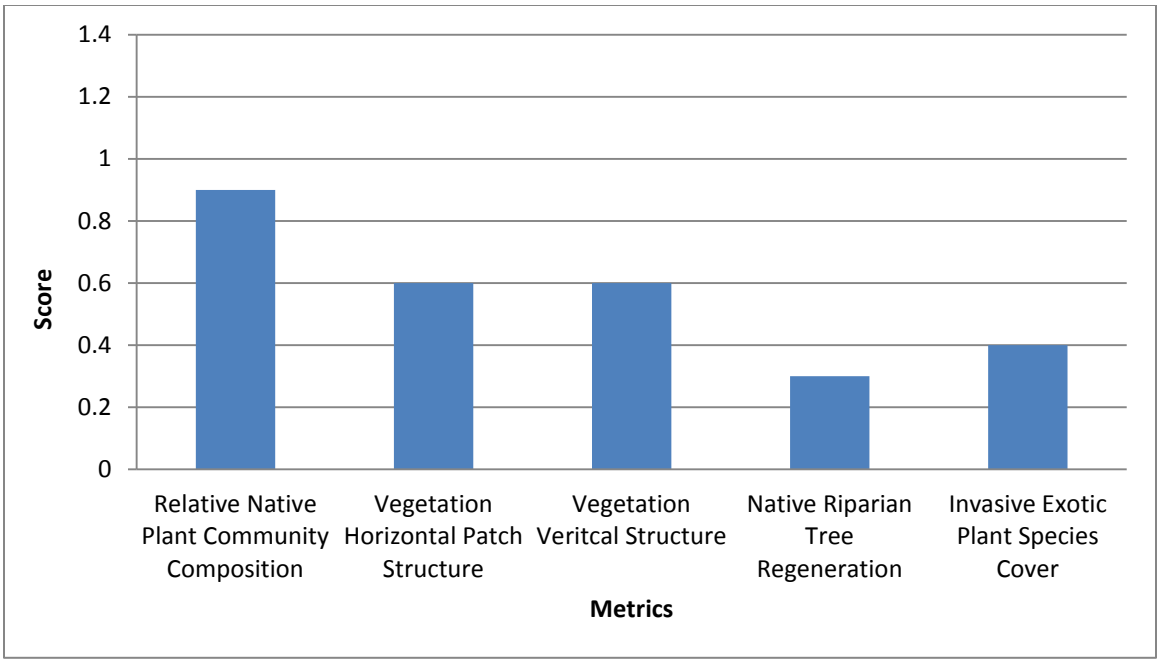

Figure 16. NMRAM individual metric scores for Sycamore Canyon, AA 2.

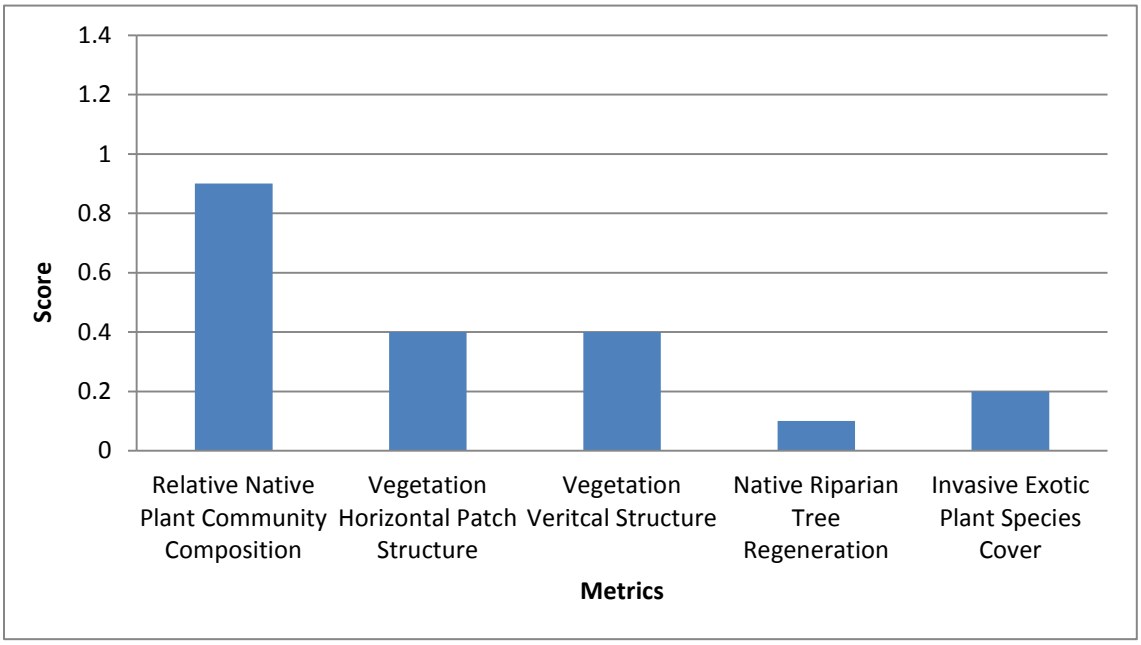

Figure 17. NMRAM individual metric scores for Sycamore Canyon, AA 3.

3.10 WINN

A field verification survey of Winn Canyon was conducted on December 17, 2013. Winn Canyon is west of the Gila River and occurs on the Canteen Canyon 33108-A5 USGS 7.5-minute topographic map. The project area in Winn Canyon is approximately 277.16 acres and is entirely on private land. The elevational range of the project area is 1,401 to 1,439 m (4,596–4,721 feet) and is approximately 1.52 km (0.94 mile) to the Gila River. SWReGAP revealed seven vegetation habitat types exist within Winn Canyon and these were modified during the desktop analysis to three vegetation habitat types: Disturbed/Nonspecific (D01), North American Warm Desert Wash (S020), and Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077). During the field analysis, these three habitats were identified and verified in Winn Canyon (see Appendix A): Disturbed/Nonspecific habitat (D01), North American Warm Desert Wash (S020), and Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (S077). Acreages for these habitat types are 29.88, 136.05, 11.94, and 111.23 acres, respectively. Although desktop analysis and evaluation of NWI data revealed that one riverine wetland totaling 38.01 acres exists within Winn Canyon, field verification of NWI data revealed that no wetlands exist in Winn Canyon. No springs were identified during the desktop analysis of Winn Canyon and none were identified during the field survey. Field verification of NHD data revealed that Winn Canyon has both intermittent and ephemeral drainages within the project area.

Special status plant species identified as potentially occurring in Winn Canyon include Gila brickellbush, Davidson's cliff carrot, Metcalfe's ticktrefoil, Mogollon whitlowgrass, New Mexico gumweed, Maguire's beardtongue, and Piños Altos fame flower. Special status invertebrate species identified as potentially occurring in Winn Canyon include desert viceroy butterfly, bearded mountainsnail, blunt ambersnail, and notodontid moth.

Special status avian species potentially occurring in Winn Canyon include Swainson's hawk, northern gray hawk, osprey, Baird's sparrow, varied bunting, burrowing owl, elf owl, gray vireo, Bell's vireo, common ground-dove, Sprague's pipit, Costa's hummingbird, lucifer hummingbird, loggerhead shrike, gray catbird, thick-billed kingbird, belted kingfisher, buff-collared nightjar, Gila woodpecker, black swift, and Abert's towhee. The nearest critical habitat for flycatcher is 799 m (2,623 feet) to the southeast along the Gila River riparian forest. No special status fish species are anticipated to occur in Winn Canyon. The nearest critical habitat for loach minnow and spikedace is 1,058 m (3,470 feet) to the southeast in the Gila River.

Special status reptiles identified as potentially occurring in Winn Canyon include reticulate Gila monster and desert kingsnake. Special status mammal species identified as potentially occurring in Winn Canyon include red western bat, spotted bat, Yuma myotis bat, Townsend's pale big-eared bat, cave myotis bat, fringed myotis bat, long-legged myotis bat, western small-footed myotis bat, Arizona gray squirrel, Botta's pocket gopher, yellow nosed cotton rat, western spotted skunk, common hog nosed skunk, hooded skunk, ringtail, and Rocky Mountain bighorn sheep.

NMRAM data and NRCS Pasture Condition scores for Winn Canyon are listed below in Table 18 and Table 19 and Figure 18 and Figure 19. Rangeland condition for the upland portions of Winn Canyon were 84% of the highest possible score for excellent condition (score of 38 vs. score of 45), and the riparian zone scored slightly lower with a score of 82% of the highest possible score for excellent condition (score of 37 vs. score of 45). In summary, the rangeland

conditions for Winn Canyon were found to be high. In particular, total percent legumes and plant residue scored low, while percent desirable plant species, plant species diversity, soil compaction, livestock concentration areas, and soil compaction scored relatively high. The upland area differed little from the riparian area.

The NMRAM wetland health score of 2.7 was 62% of the highest possible score (4.0); therefore, riparian environmental health was moderate for Winn Canyon. This canyon scored high on the relative composition of native plant species and a low amount of exotic invasive plant species, but scored low on vegetation horizontal and vertical structural diversity (e.g., habitat patches), and native riparian tree regeneration.

Table 18. NRCS Pasture Condition and Individual Metric and Total Scores for Winn Canyon

Indicator	Score	
	Upland	Riparian
Percent desirable plants	5	4
Percent cover	4	4
Plant diversity	5	5
Plant residue	3	3
Percent legume	2	2
Uniformity of use	5	5
Livestock concentration areas	5	5
Soil compaction	5	5
Erosion	4	4
Total	**38 (84%)**	**37 (82%)***

*Percentage represents the % of the total possible score if all subcovers were 5.

Table 19. NMRAM Individual Metric and Total Scores for Winn Canyon

Indicator	Raw	Multiplier	Total
Relative native plant community composition	4	0.3	1.2
Vegetation horizontal patch structure	1	0.2	0.2
Vegetation vertical structure	1	0.2	0.2
Native riparian tree regeneration	1	0.1	0.1
Invasive exotic plant species cover	4	0.2	0.8
Total			**2.5 (62%)***

*Percentage represents the % of the total possible score if all subcovers were 4.

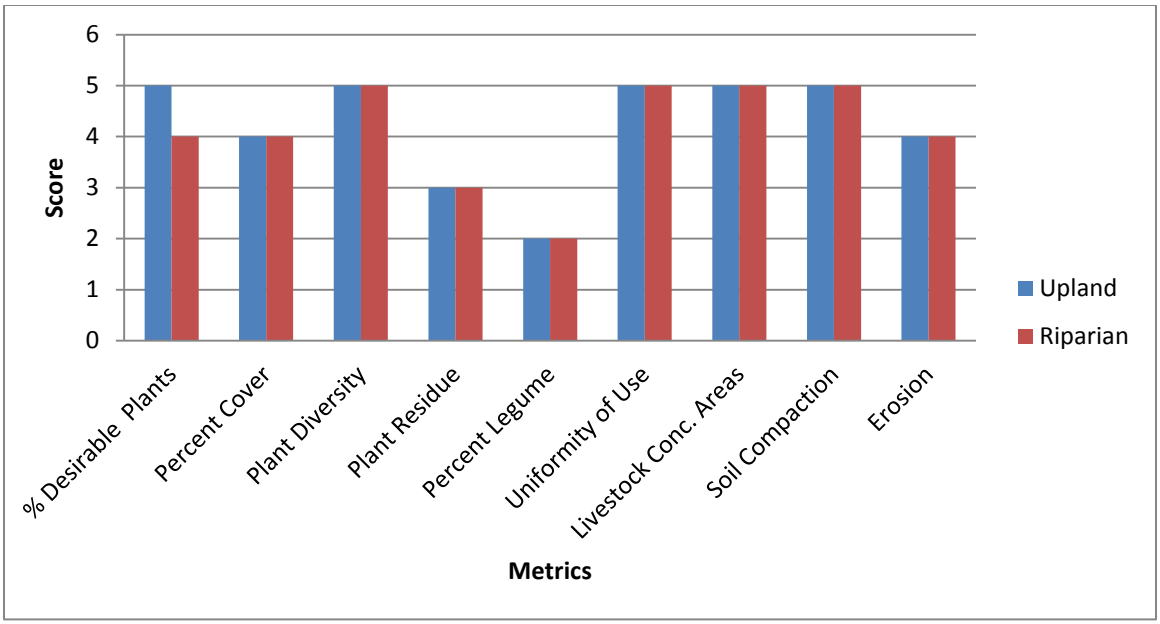

Figure 18. NRCS Pasture Condition individual metric scores for Winn Canyon.

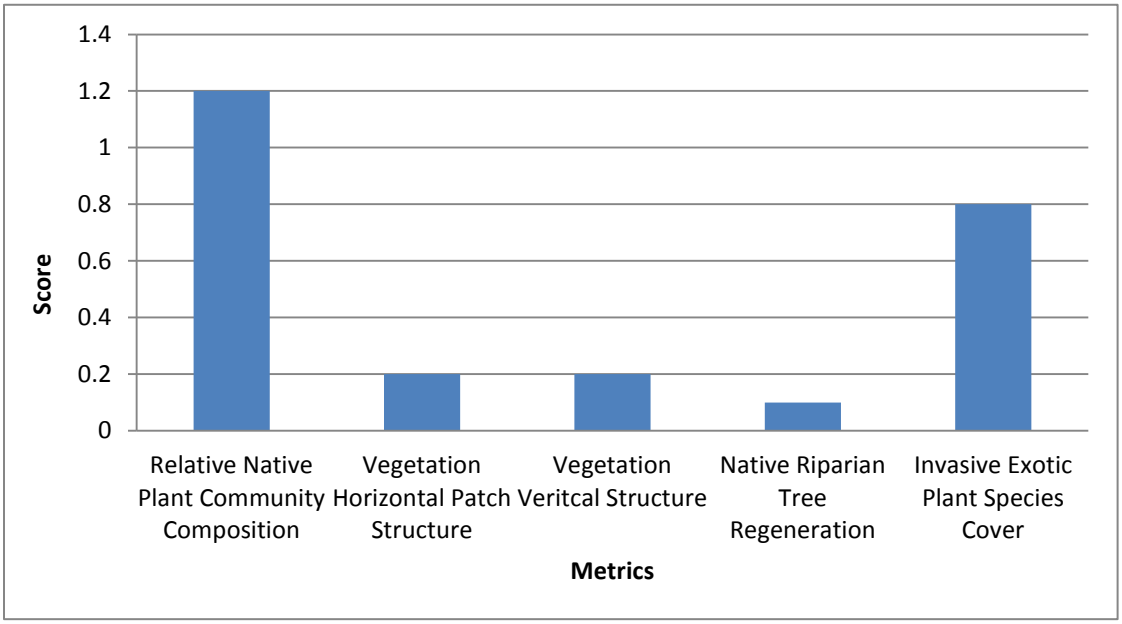

Figure 19. NMRAM individual scores for Winn Canyon.

3.11 Comparative NRCS Summary Scores across All Canyons

Comparative total NRCS rangeland condition summary scores for each of the canyons that were field surveyed are presented in Table 20 and Figure 20. Subscores for each metric used to tabulate the total scores are presented above for each canyon. The upland areas of Pope and Winn Canyons had much better rangeland/environmental conditions than any of the other canyons. This was due to the fact that domestic livestock grazing in Pope Canyon has been well managed and native vegetation was in very good condition. Maldonado Canyon had the next highest upland rangeland condition scores, followed by Davis and Spar Canyons. Dix, Schoolhouse, and Sycamore Canyons all received the lowest scores, primarily due to intensive livestock grazing impacts to native vegetation and soils. Riparian zone rangeland/environmental condition scores followed similar patterns for the same reasons, and in all cases except at Sycamore and Schoolhouse Canyons, the riparian zones scored lower than the upland zones, due to livestock concentrations along the riparian zones.

Table 20. NRCS Total Scores for All Canyons

Canyon	Total Score for Each Canyon	
	Upland	Riparian
Cherokee	–	–
Davis	24	22
Dix	23	21
Maldonado	28	25
Mangas	–	–
Pope	38	37
Schoolhouse*	21	22
Spar	24	23
Sycamore	19	25
Winn	38	37
Average**	**26.88**	**26.50**

* Partial survey
**Only based on eight canyons
Note: Subscores for each metric used to tabulate the total scores are presented above for each canyon.

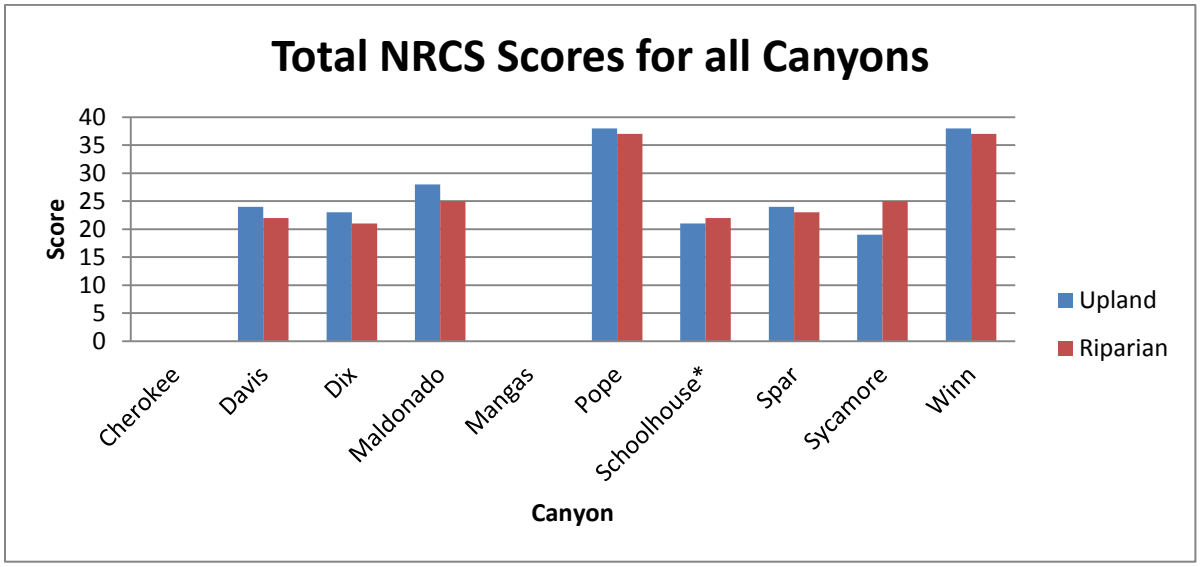

Figure 20. Total NRCS rangeland condition scores for all canyons surveyed. Subscores for each metric used to tabulate the total scores are presented above for each canyon.

3.12 Comparative NMRAM Summary Scores across All Canyons

Table 21 and Figure 21 provide comparative summary NMRAM riparian health scores for all canyons that were verified with a field survey. Note that field verification surveys and NMRAM evaluations have not yet been conducted at Cherokee or Mangas Canyons. Schoolhouse and Dix Canyons received above average overall NMRAM biotic metric summary scores, Pope, Sycamore, and Winn Canyons received the lowest and below average scores, while Davis, Maldonado, and Spar Canyons received near average scores. Relative scores for each of the individual biotic metrics across all canyons are presented above.

Table 21. NMRAM Total Summed Scores for All Canyons

Canyon	Total Score for each Canyon			Total Summed Score**
	AA #1	AA #2	AA #3	
Cherokee	–	–	–	0
Davis	2.7	–	–	2.7
Dix	2.9	–	–	2.9
Maldonado	2.7	–	–	2.7
Mangas	–	–	–	–
Pope	2.5	–	–	2.5
Schoolhouse*	3.1	–	–	3.1
Spar	2.7	–	–	2.7
Sycamore	3.1	2.8	2.0	2.6
Winn	2.5	–	–	2.5
Average**	**2.78**	**0.35**	**0.25**	**2.72**

* Partial survey
**Only based on eight canyons

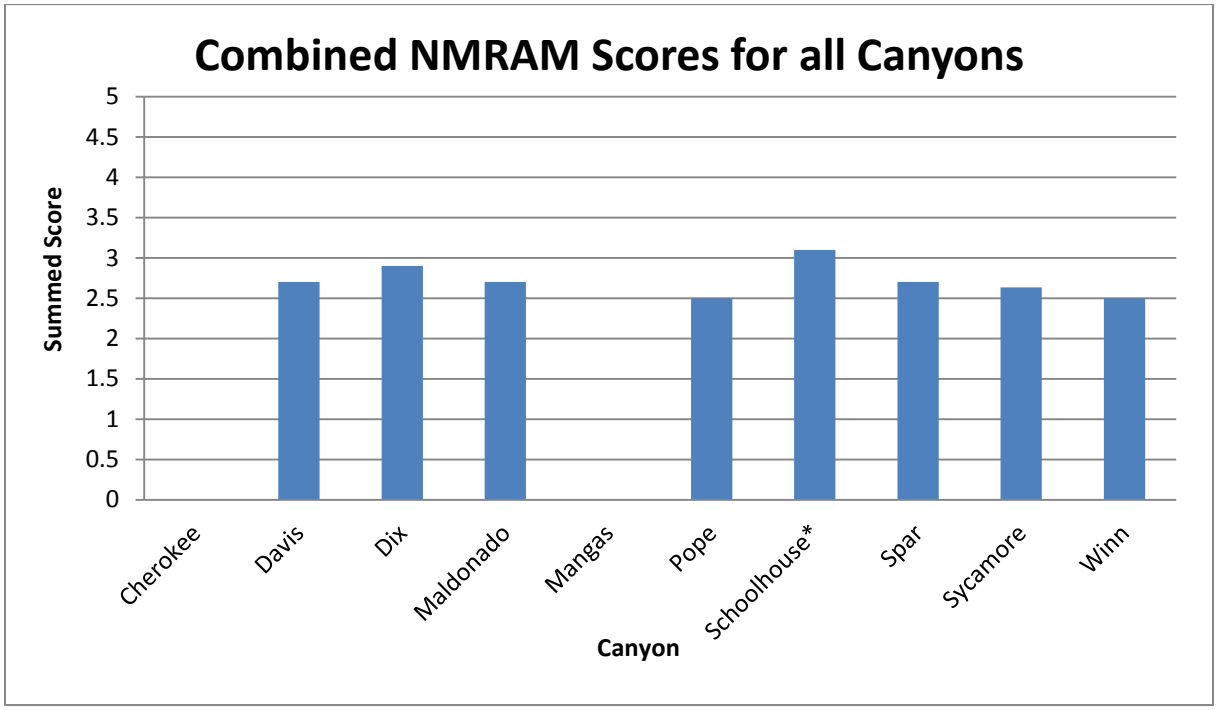

Figure 21. NMRAM total summed scores for all canyons. * = partial survey.

4 DISCUSSION

The results presented above provide standardized environmental parameter information for the NMISC to comparatively rate all of the canyons based on the status of natural resources, environmental conditions, vegetation community and habitat diversity, and the potential presence of special status species. Table 2 above provides a complete comparative matrix of field verified environmental parameter values among all of the canyons except two (Cherokee and Mangas Canyons), from which a ratings analysis may be performed. Table 1 above provides the same information from the preliminary desktop analysis and may ultimately provide the only comparative environmental information for all canyons, including the two that were not field verified. Given that field verification for all canyons resulted in significant changes to vegetation community maps and habitat evaluations, directly comparing field verified to non-field verified data may be problematic.

Seventy-three federal and state special status species have the potential to occur within all or some of the canyons and were analyzed in further detail. Seven out of the 73 species are designated as threatened or endangered by the USFWS with an additional three listed as proposed species and three listed as candidate species. Twenty-six of the 73 species are designated as threatened or endangered by the NMDGF. Twelve USFWS special status species have the potential to occur within the canyons surveyed. Known or potential habitat for three of the 12 species exists within two canyons (Mangas and Sycamore). These three species are flycatcher, loach minnow, and spikedace. The flycatcher occurs within the Gila River riparian area and has designated critical habitat throughout the Gila River riparian forest. The loach minnow and spikedace both occur within the Gila River and Mangas Creek and have designated critical habitat in both streams.

A 0.16-acre wetland was identified in Sycamore Canyon during the field surveys. Two springs were identified in Davis Canyon; one flowed into the main channel within the canyon, whereas the other flowed into a human-made cattle tank. Both springs eventually dissipate underground downstream of their origin. Three water bodies in three separate canyons (Davis, Spar, and Sycamore) were identified during the field surveys. These water bodies total approximately 0.81 acre. Riparian habitat (North American Warm Desert Lower Montane Riparian Woodland and Shrubland [S094]) was identified during the field surveys in Sycamore Canyon. However, no other canyons surveyed contained riparian habitats characterized by phreatophytic riparian obligate plant species, within their respective project areas.

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APPENDIX A
VEGETATION HABITAT MAPS FOR PROPOSED WATER IMPOUNDMENT CANYONS IN GRANT COUNTY, NEW MEXICO

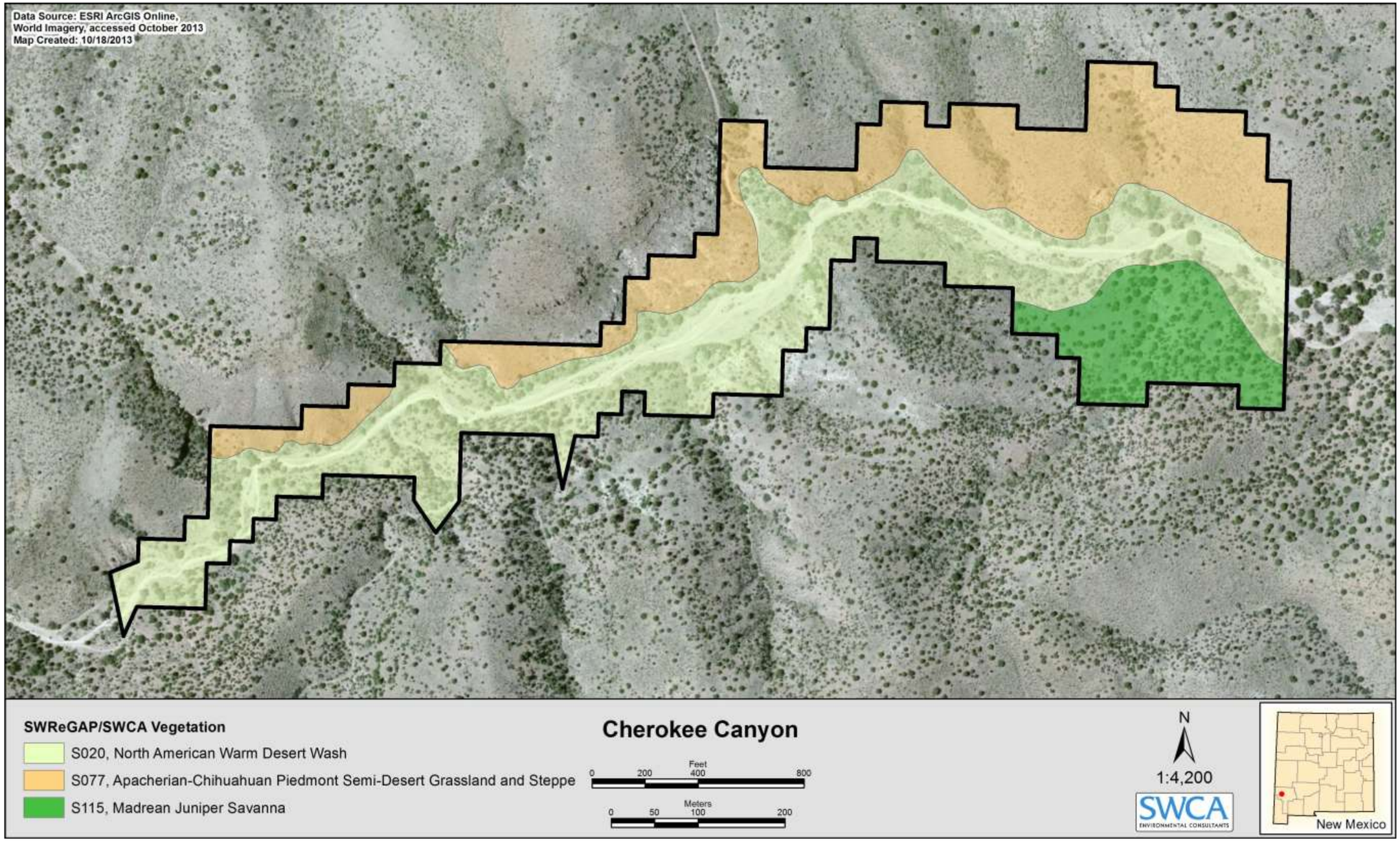

Figure A.1. Modified SWReGAP vegetation map of Cherokee Canyon.

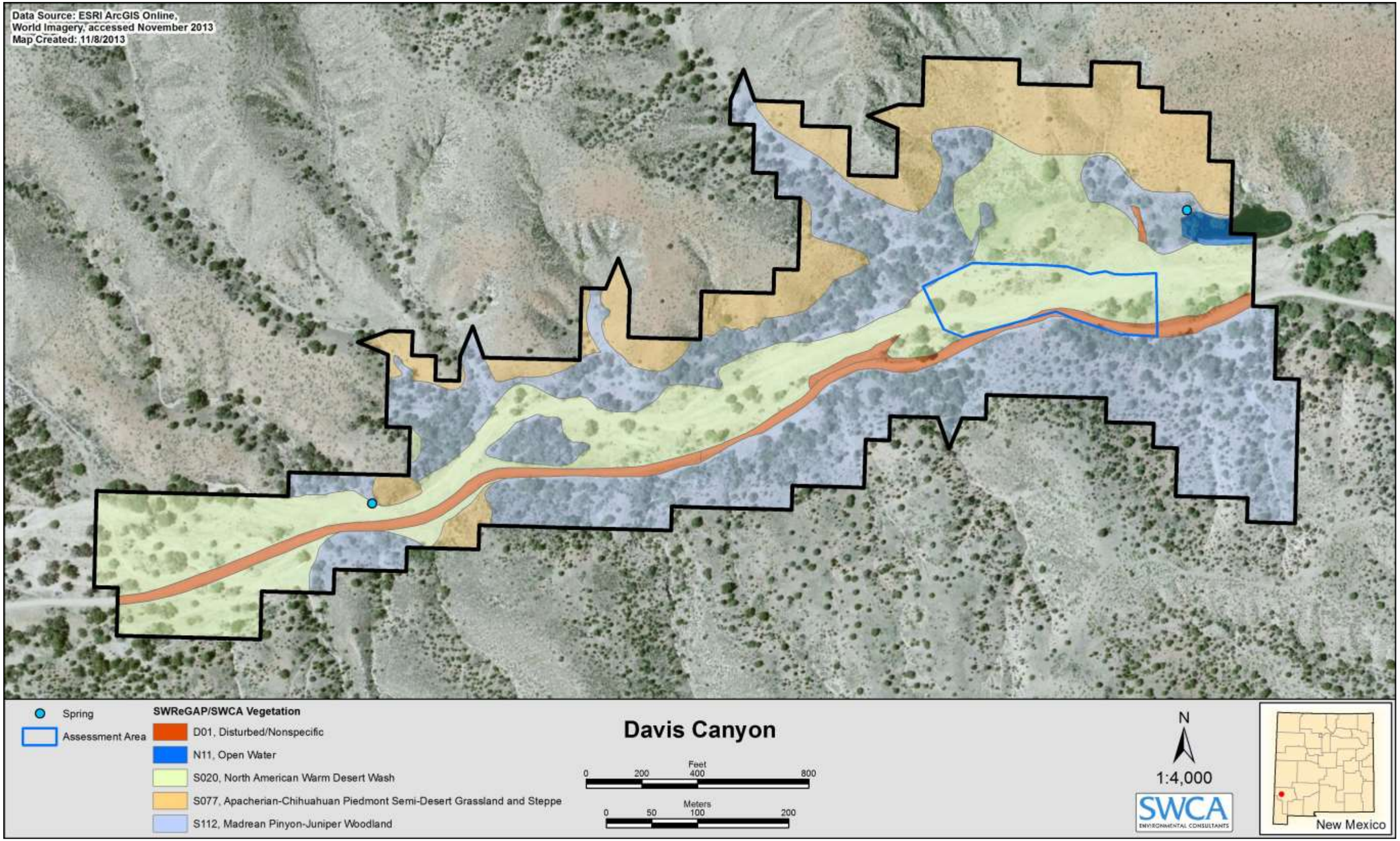

Figure A.2. Field verified SWReGAP vegetation map of Davis Canyon.

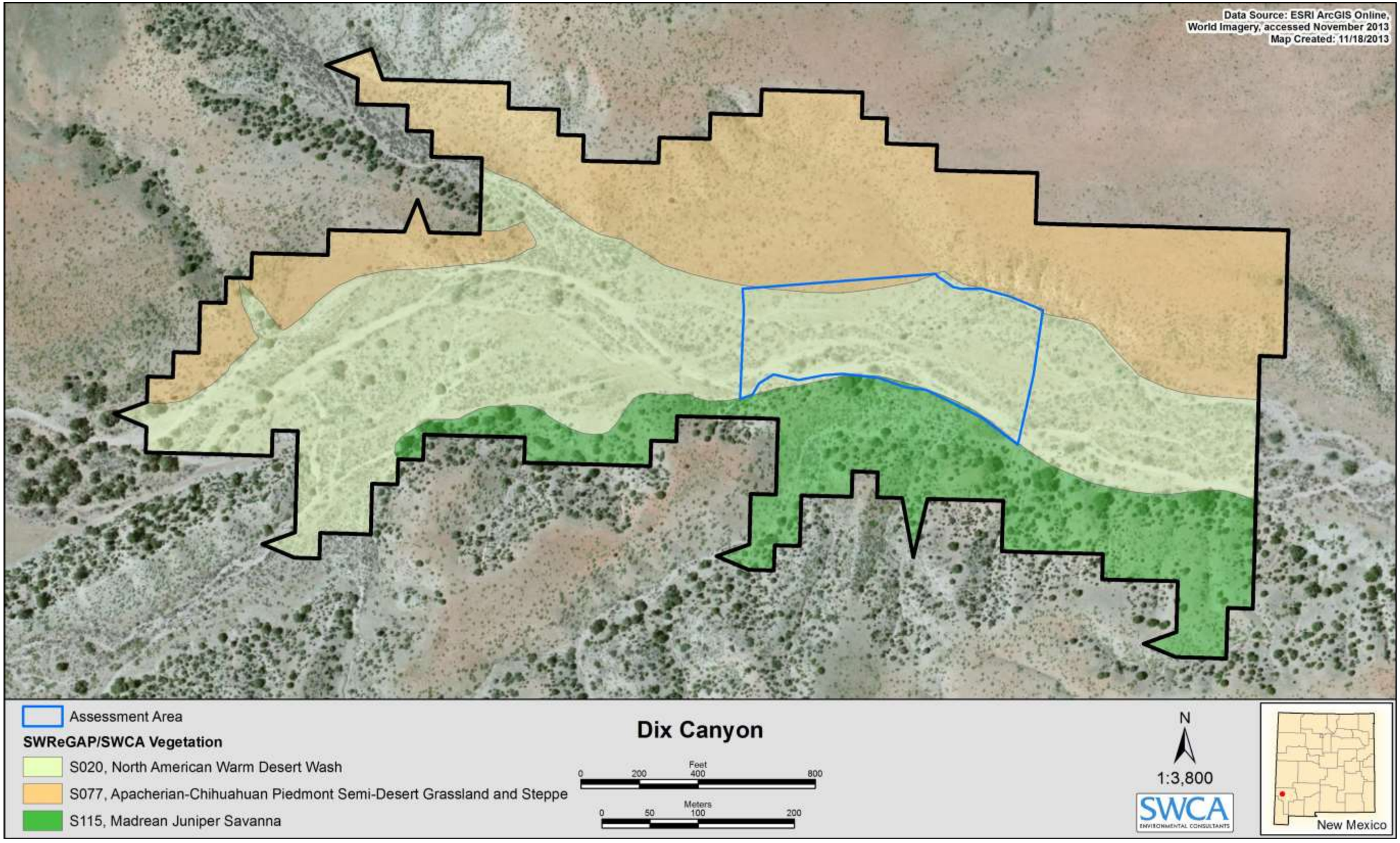

Figure A.3. Field verified SWReGAP vegetation map of Dix Canyon.

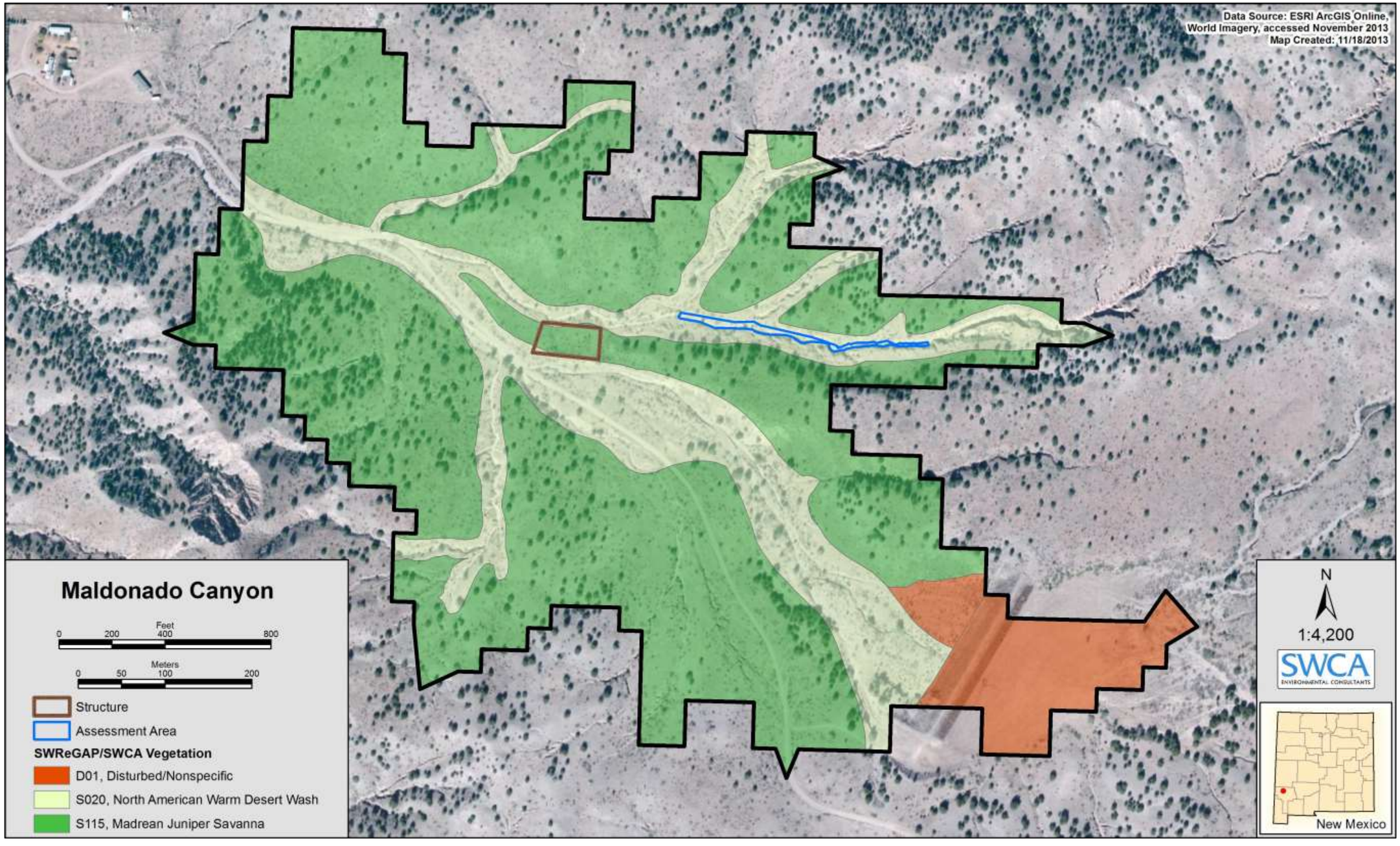

Figure A.4. Field verified SWReGAP vegetation map of Maldonado Canyon.

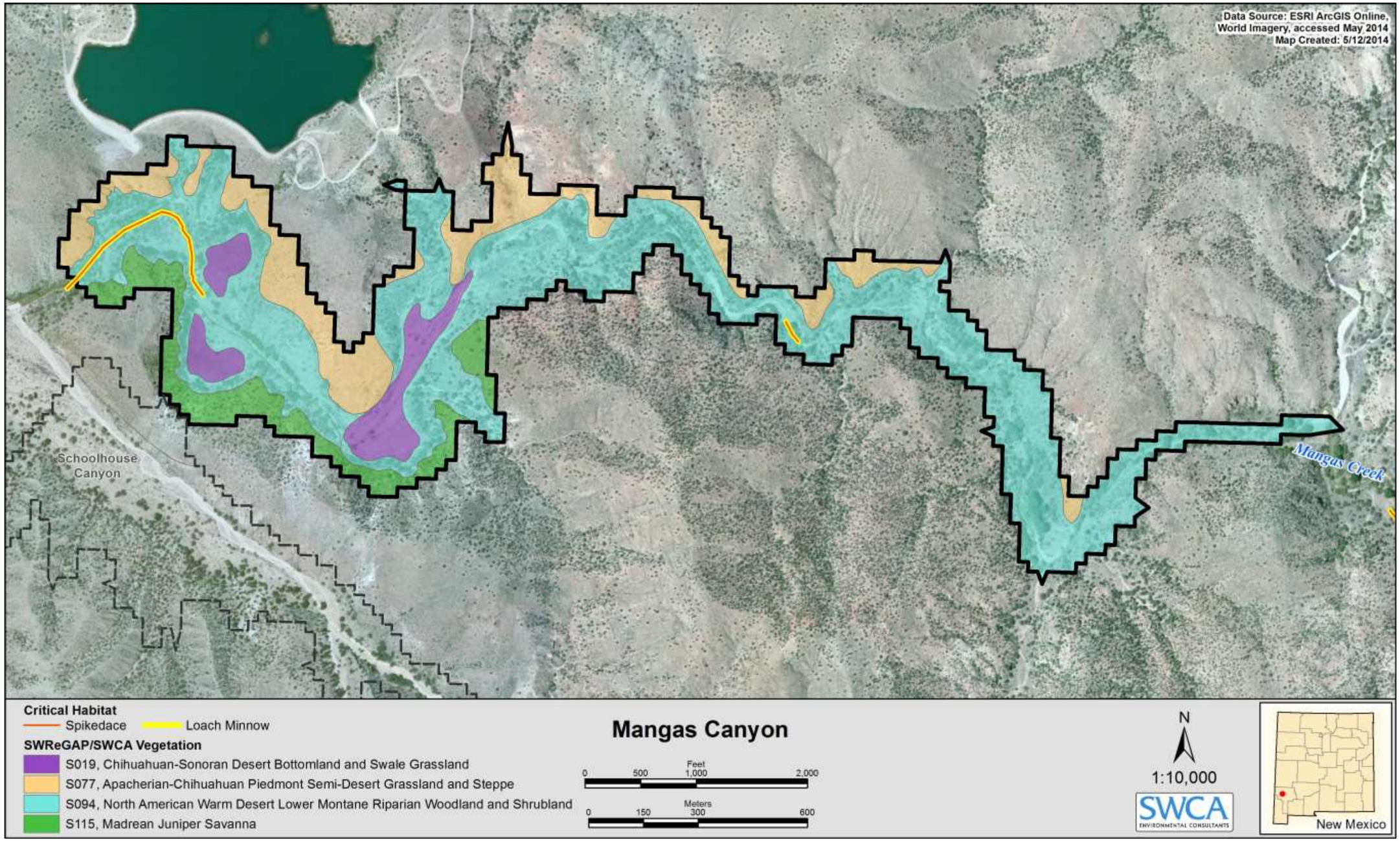

Figure A.5. Modified SWReGAP vegetation map of Mangas Canyon.

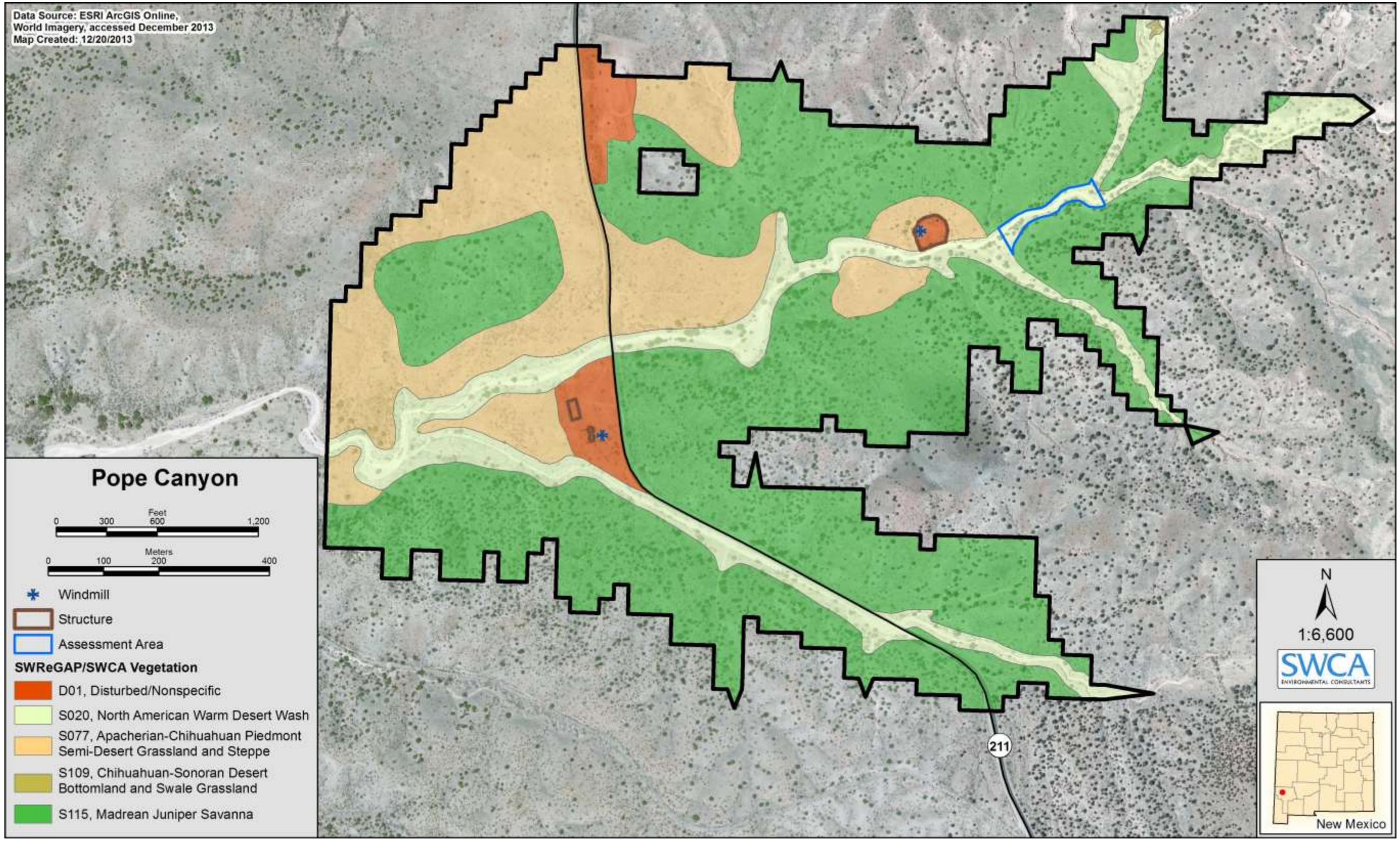

Figure A.6. Field verified SWReGAP vegetation map of Pope Canyon.

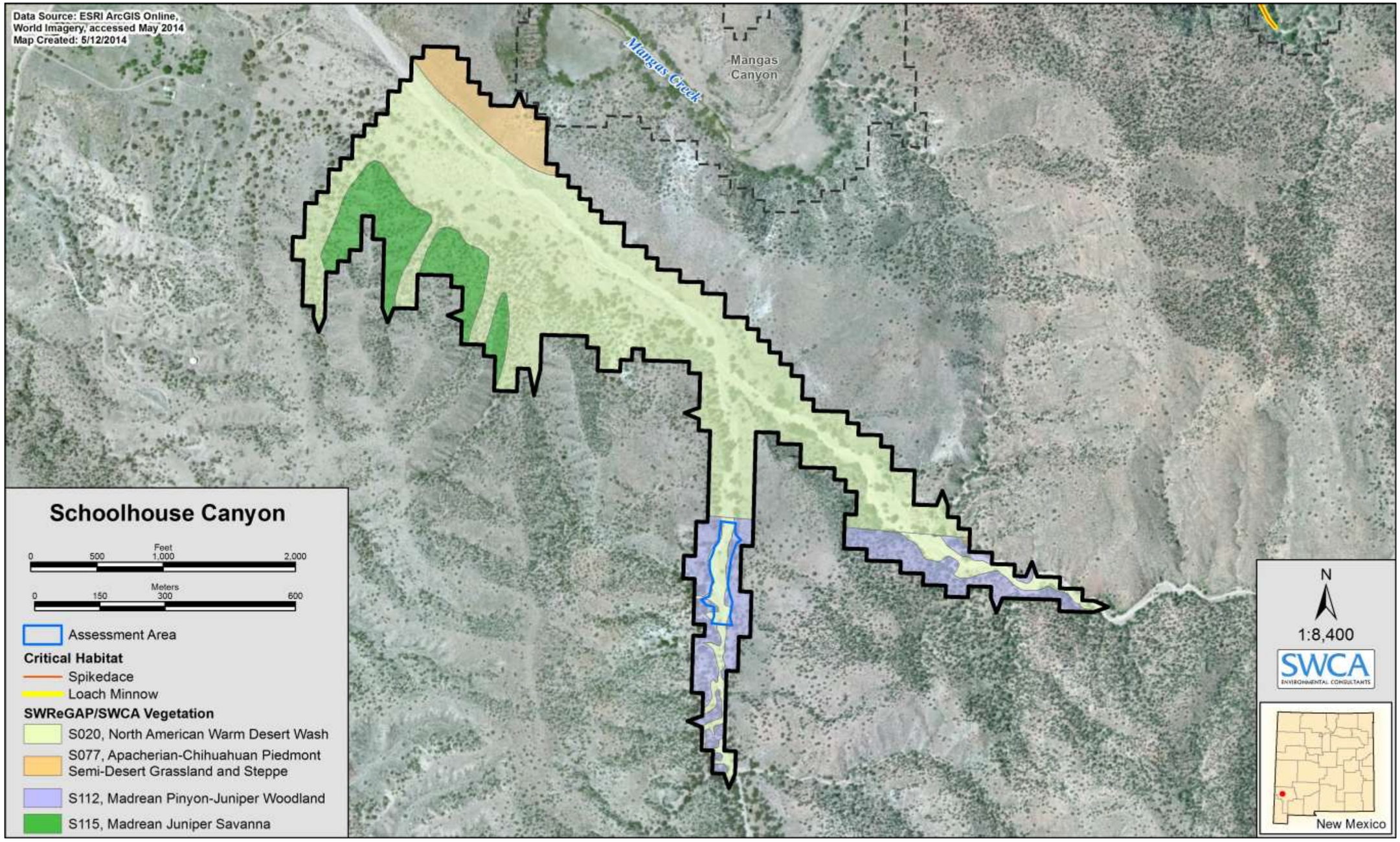

Figure A.7. Partial field verified SWReGAP vegetation map of Schoolhouse Canyon.

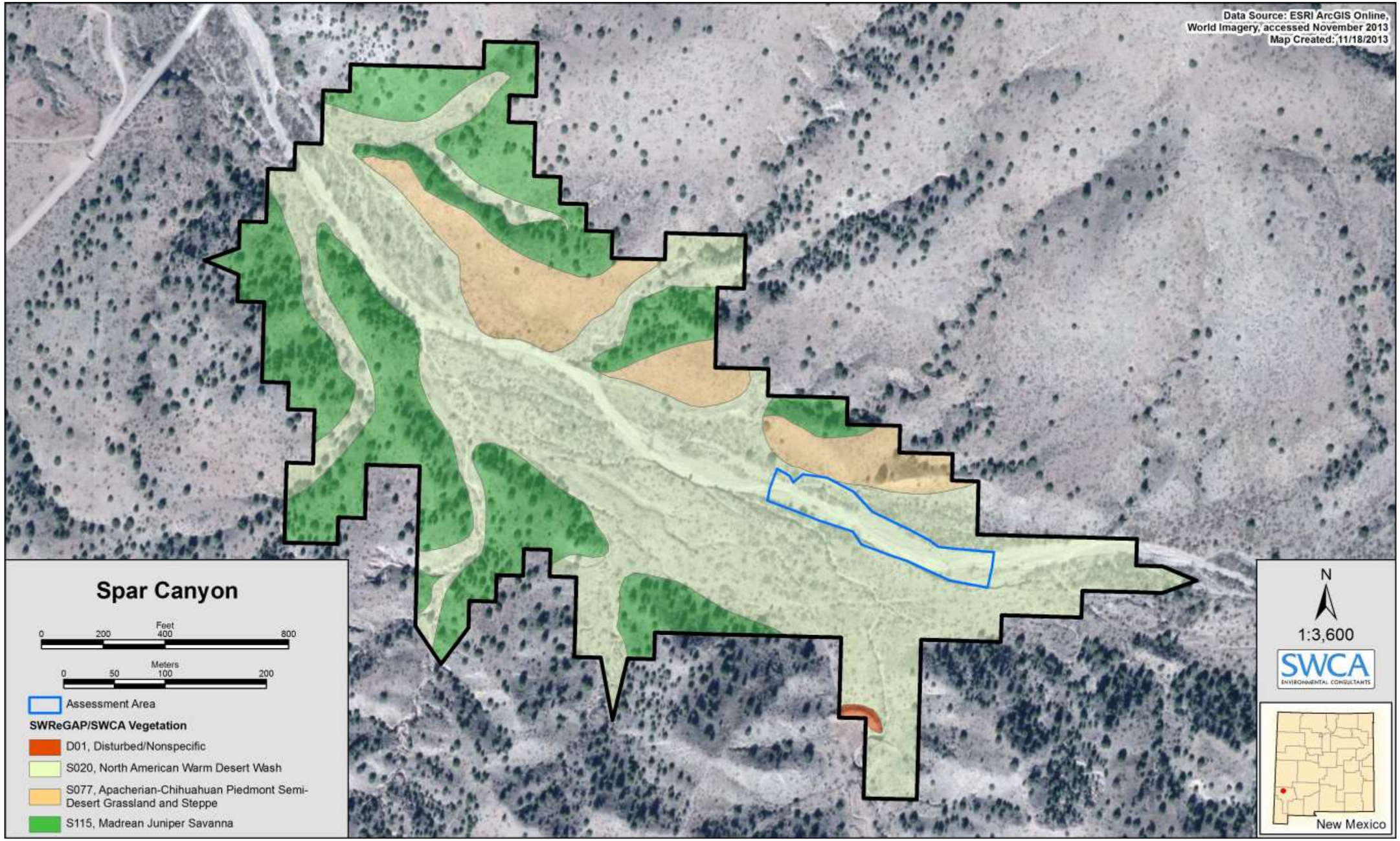

Figure A.8. Field verified SWReGAP vegetation map of Spar Canyon.

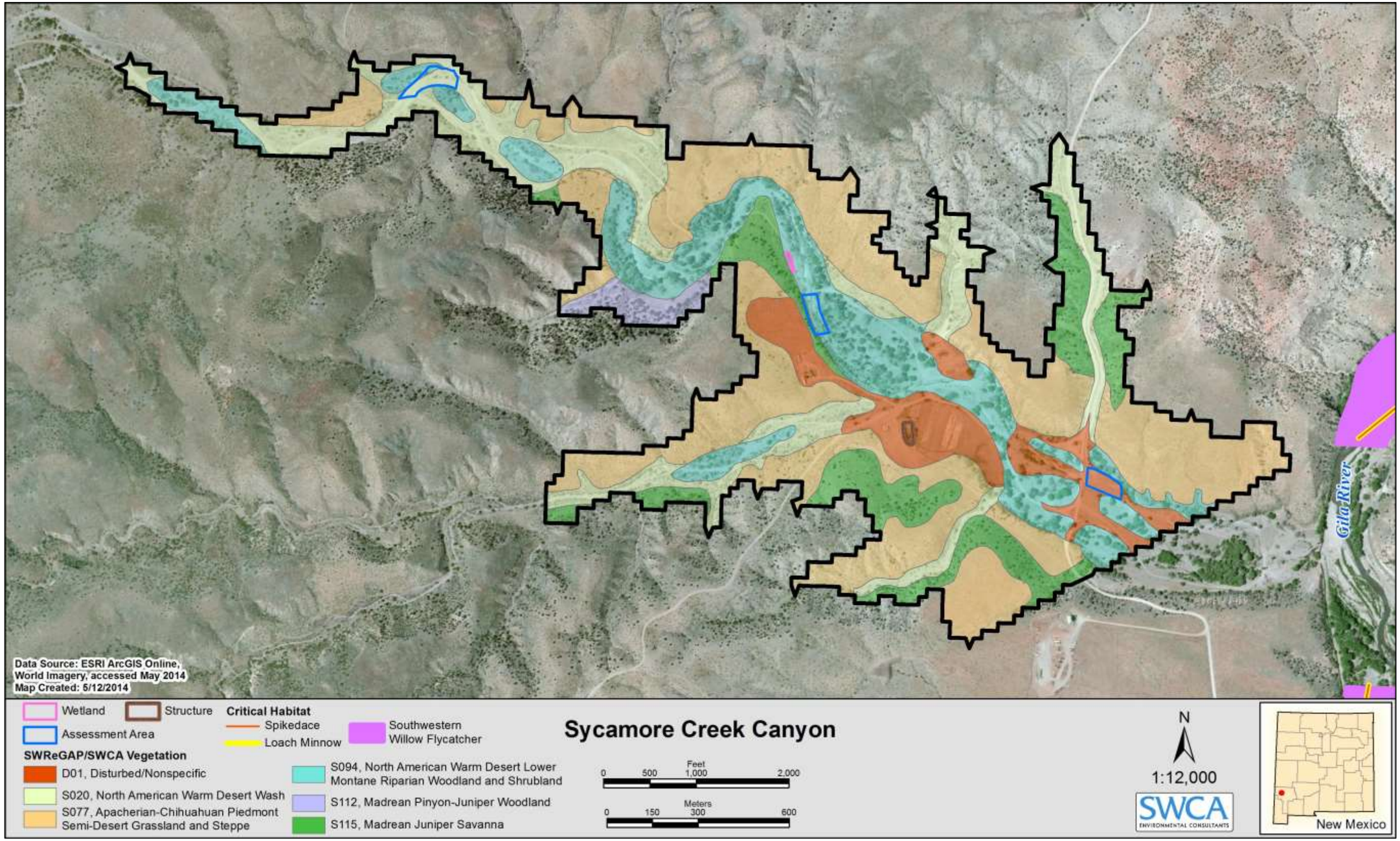

Figure A.9. Field verified SWReGAP vegetation map of Sycamore Canyon.

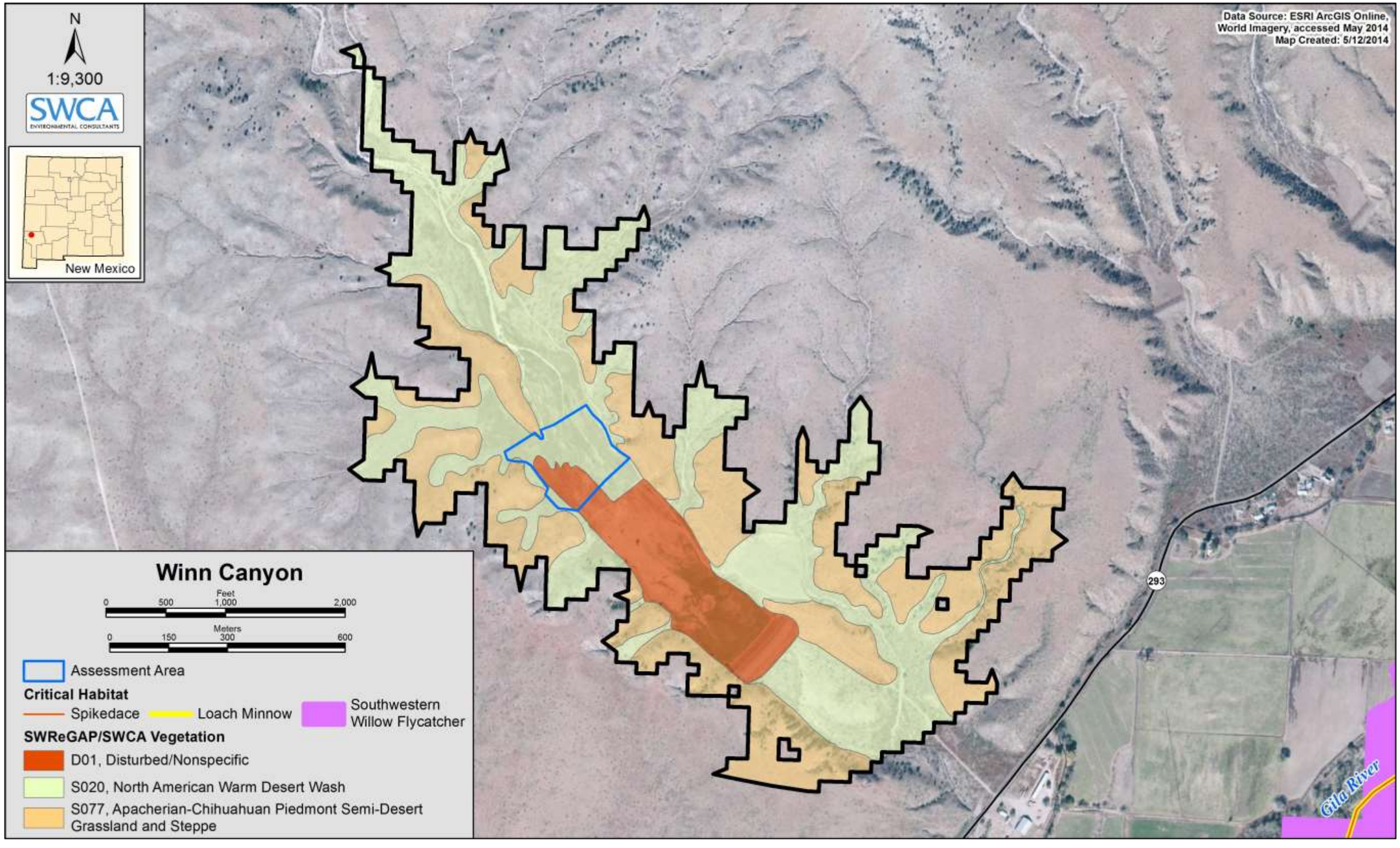

Figure A.10. Field verified SWReGAP vegetation map of Winn Canyon.

APPENDIX B
NRCS PASTURE CONDITION SCORING FOR RANGELAND HEALTH CRITERIA

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USDA NRCS
Natural Resources Conservation Service

Grazing Lands Technology Institute

May 2001

Pasture Condition Score Sheet

Purposes

- Evaluate current pasture productivity and the stability of its plant community, soil, and water resources.
- Identify what treatment needs, if any, are required to improve a pasture's productivity and protect soil, water, and air quality.

Suggested uses

This score sheet may be used to rate different pastures in a single growing season or the same pasture over a period of years. Rating a pasture yearly can track trends, either improvement or decline, in its condition. Some indicators change slowly in response to stresses caused by management or climate. Also, some indicators may change as each season progresses. An indicator or causative factor may rank high at one time and low another. Uniformity of use, plant residue, percent legume, severity of use, weather, and insect or disease pressure can vary widely on the same pasture depending on when they are scored during the year and the degree of management the pasture receives. Therefore, it is often wise to score a pasture at different, key times during the year before deciding to make changes in management. Indicate on the form the date the scoring occurred.

Procedure

Step 1—Rate each pasture one by one that is occupied all at the same time by a herd or flock and separated from other pasture areas by portable or fixed fencing. Paddocks in rotational pastures may be rated separately or as a combined unit. It depends on how alike they are. If any indicator looks markedly different from paddock to paddock, it may pay to rate each one separately.

Step 2—Score all 10 indicators regardless of your feelings of their relative worth. To learn or recall how each indicator reflects on how well a pasture is being managed, see *Guide to Pasture Condition Scoring*.

Step 3—Using the attached score sheet and indicator criteria, read the scoring criteria for each of the 10 pasture condition indicators one at a time and rate before moving onto the next. Use the 1 to 5 scale provided. Estimate by eye or measure as precisely as you feel is needed to rate the indicator reliably.

Step 4—When scoring plant vigor, enter a score based on the general criteria given on page 2 using the most limiting trait listed. Use this number to determine the overall pasture score. If the plant vigor score is less than 4, refer to the plant vigor causative factors' criteria on page 6 to identify the plant stress(es) causing reduced vigor. Rate each causative factor independently on the score sheet provided on page 5. Do not average to adjust the original vigor score.

Step 5—When scoring erosion, rate sheet and rill erosion every time. Rate other types of erosion only if present. When present, indicate which one(s) by identifying the erosion type with a unique symbol next to its score. Divide the box as needed to score them separately. Erosion is rated by averaging the individual scores. A need remains to prioritize which erosion problem is controlled first and how.

Step 6—Total the score for each pasture and compare to the following chart. Also, focus on any low scoring individual indicators or causative factors.

Pasture condition score Overall	Individual	Management change suggested
45–50	5	No changes in management needed at this time.
35–45	4	Minor changes would enhance, do most beneficial first.
25–35	3	Improvements benefit productivity and/or environment.
15–25	2	Needs immediate management changes, high return likely.
10–15	1	Major effort required in time, management, and expense.

Step 7—When an individual indicator's score falls below a 5, determine its worth to your operation. Then, decide whether to correct the cause or causes for the low rating. If you choose to correct, apply the most suitable management options for your area and operation.

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Pasture Condition Score Sheet

Indicator	Score 1	2	3	4	5
Percent desirable plants	Desirable species < 20% of stand. Annual weeds and/or woody species dominant.	Desirable species 20–40% of stand. Mostly weedy annuals and/or woody species present and expanding. Shade a factor.	40–60% desirable forage species. Undesirable broadleaf weeds and annual weedy grasses invading. Some woodies.	60–80% of plant community are desirable species. Remainder mostly intermediates and a few undesirables present.	Desirable species exceed 80% of plant community. Scattered intermediates.
Plant cover (Live stems and green leaf cover of all desirable and intermediate species.)	Canopy: < 50% Basal area: < 15% Photosynthetic area very low. Very little plant cover to slow or stop runoff.	Canopy: 50–70% Basal area: 15–25% Photosynthetic area low. Vegetal retardance to runoff low.	Canopy: 70–90% Basal area: 25–35% Most forages grazed close, little leaf area to intercept sunlight. Moderate vegetal retardance.	Canopy: 90–95% Basal area: 35–50% Spot grazed low and high so some loss of photosynthetic potential. Vegetal retardance still high.	Canopy: 95–100% Basal area: >50% Forages maintained in leafy condition for best photosynthetic activity. Very thick stand, slow or no runoff flows.
Plant diversity	One dominant (> 75% of DM wt.) forage species. Or, over 5 forage species (all <20%) from one dominant functional group, not evenly grazed - poorly distributed.	Two to five forage species from one dominant functional (>75% of DM wt.) group. At least one avoided by livestock permitting presence of mature seed stalks. Species in patches.	Three forage species (each ≥ 20% of DM wt.) from one functional group. None avoided. Or, one forage species each from two functional groups, both supply 25–50% of DM wt.	Three to four forage species (each ≥ 20% of DM wt.) with at least one being a legume. Well intermixed, compatible growth habit, and comparable palatability.	Four to five forage species representing three functional groups (each ≥ 20% of DM wt.) with at least one being a legume. Intermixed well, compatible growth habit, and comparable palatability.
Plant residue (Rate ground cover and standing dead forage separately and average score.)	**Ground cover:** No identifiable residue present on soil surface. Or, heavy thatch evident (> 1 inch). **Standing dead forage:** >25% of air dry weight.	**Ground cover:** 1–10% covered with dead leaves or stems. Or, thatch 0.5 inch to 1 inch thick. **Standing dead forage:** 15–25% of air dry weight.	**Ground cover:** 10–20% covered with dead residue. Or, slight thatch buildup but < 0.5 inch. **Standing dead forage:** 5–15% of air dry weight.	**Ground cover:** 20–30% covered with dead residue. No thatch present. **Standing dead forage:** some, but < 5% of air dry weight.	**Ground cover:** 30–70% covered with dead residue, but no thatch buildup. **Standing dead forage:** none available to grazing animal.
Plant vigor *If plant vigor rating is less than 4, determine cause by rating 6 possible causes listed on page 5.*	No recovery after grazing or pale yellow or brown, or permanent wilting, or plant loss due to insects or disease, exercise lot only. Or, lodged, dark green overly lush forage. Often avoided by grazers.	Recovery after grazing takes 2 or more weeks longer than normal, or yellowish green leaves, or major insect or disease yield loss, or plants wilted most of day. Productivity very low.	Recovery after grazing takes 1 week longer than normal, or urine/dung patches dark green in contrast to rest of plants, or minor insect or disease loss or mid-day plant wilting. Yields regularly below site potential.	Recovery after grazing takes 1 to 2 days longer than normal, or light green plants among greener urine and dung patches, or minor insect or disease damage. No plant wilting. Yields near site potential.	Rapid recovery after grazing. Healthy green color. No signs of insect or disease damage. No leaf wilting. Yields at site potential for the species adapted to the site's soil and climate.
Percent legume (Cool season stands. See footnote 3 of score sheet for warm season)	< 10% by wt. Or, greater than 60% of bloating legumes.	10–19% legumes. Or, losing grass, 40–60% spreading legume.	20–29% legumes.	30–39% legumes.	40–60% legumes. No grass loss; grass may be increasing.
Uniformity of use	Little-grazed patches cover over 50% of the pasture. Mosaic pattern throughout or identifiable areas of pasture avoided.	Little-grazed patches cover 25–50% of the pasture either in a mosaic pattern or obvious portion is not frequented.	Little-grazed patches cover 10–25% of the pasture either in a mosaic pattern or obvious portion is not frequented.	Little-grazed patches minor spots where isolated forage species is rejected. Urine and dung patches avoided.	Rejected areas only at urine and dung patches. No forage species rejection.

Pasture Condition Score Sheet

Indicator	Score 1	2	3	4	5
Livestock concentration areas	Cover >10% of the pasture; or all convey contaminated runoff directly into water channels.	Livestock conc. areas and trails cover 5–10% of pasture; most close to water channels and drain into them unbuffered.	Isolated livestock conc. areas and trails <5% of area; one close to water channel and drains into it unbuffered.	Some livestock trails and one or two small concentration areas. Buffer areas between them and water channels.	No presence of livestock concentration areas or heavy use areas sited or treated to minimize contaminated runoff.
Soil compaction	Infiltration capacity and surface runoff severely affected by heavy compaction. Excessive livestock traffic killing plants over wide areas. Very hard to push probe into soil without damaging the probe.	Infiltration capacity lowered and surface runoff increased due to large areas of bare ground and dense compaction layer at surface. Livestock trails common throughout. Off-trail hoof prints common. Hard to push probe past compacted layers.	Infiltration capacity lowered and surface runoff increased due to plant cover loss and soil compaction by livestock hooves. Soil resistant to soil probe entry at one or more depths within plow depth.	Infiltration capacity lowered and surface runoff increased due to reduced vegetal cover/retardance. Probe enters soil easily except at rocks. Scattered signs of livestock trails and hoof prints, confined to lanes or small, wet areas.	Infiltration capacity and surface runoff are equal to that expected for an ungrazed meadow; not affected by livestock traffic.
Erosion					
Sheet and rill	Sheet and rill erosion is active throughout pasture; rills 3–8 inches deep at close intervals and/or grazing terracettes are close-spaced with some slope slippage.	Most sheet and rill erosion confined to steepest terrain of unit; well defined rills 0.5–3 inches deep at close intervals and/or grazing terracettes present.	Most sheet and rill erosion confined to heavy use areas, especially in loafing areas and water sites; rills 0.5–3 inches deep. Debris fans at downslope edge.	No current formation of rills; some evidence of past rill formation, but are grassed. Scattered debris dams of litter present occasionally.	No evidence of current or past formation of sheet flow or rills.
Rate additional erosion categories below only if present					
Wind	Blowouts or dunes forming or present.	Soil swept from the established pasture being rated causing plant death by burial or abrasion.	Soil swept from adjacent fields or pasture during seedbed prep. and seedling growth to cause pasture plant death by burial or abrasion.	Some vegetative debris windrowed. Some dust deposition from offsite source. Minor wind damage to foliage.	No visible signs of windblown soil or trash. No wind related leaf damage.
Streambank or shoreline	Banks mostly bare and sloughing. No native streambank or shoreline vegetation remaining.	Banks are heavily grazed and trampled all over. Many are actively eroding laterally. Little native streambank or shoreline vegetation. Bank sloughing common.	Banks are close grazed, but few are unstable. Some native streambank or shoreline vegetation remaining. Livestock enter only at specific points, but use heavy. Remote alternative water site present.	Banks are grazed but stable. Mix of pasture plants and native water's edge species. Muddy livestock stream crossing(s) or pond entrance(s) not used heavily. Alternative water sites present.	Banks ungrazed or grazed infrequently. Abundant streambank or shore loving vegetation. Gravelly or constructed stable livestock stream crossing(s) or watering ramp(s). Or, alternative water sources present and close-by.
Gully	Mass movement of soil, rock, plants, and other debris; occurrence of landslides, debris avalanches, slumps and earthflow, creep and debris torrents. Found in mountainous or very hilly terrain.	Gully(s) advancing upslope cutting longer channel(s). Revegetation difficult without using constructed structures & livestock exclusion; continuous gully(s) with many finger-like extensions into the hillside.	Gully(s) present with scattered active erosion, vegetation missing at heavy use slopes and/or on bed below overfalls. New eroding channels present and new overfalls appearing along sides and bed of main channel.	One or more existing stable gullies present, vegetation covers gully bottom and slopes well; no visual signs of active cutting at gully head or sides. Some soil moved in channel bottom.	No gullies; natural drainageways are stable grassed channels. Spring or seep fed bare channels are small and stable, often covered with overhanging vegetation.

Plant Vigor Causative Factors

Factor	Score 1	2	3	4	5
Soil fertility (P & K status) 1/	Very low P & K, or very high P & K.	Low P and K; or low P, very high K; low K, very high P; opt. P, very high K; very high P, opt. K.	Low P, optimum K; or low P, high K; or optimum P, low K; high P, low K; or high P, high K.	Optimum P, high K; or high P, optimum K.	Optimum P and K
(Nitrogen status) 2/	N deficient or excessive.		N marginal or high.		Adequate N.
Upper 4-inch root zone pH 3/	< 4.5 or > 9.0	4.5-5.0 or, 8.5-9.0	5.1-5.5 or, 7.9-8.4	5.6-6.0 or, 7.4-7.8	6.0 to 7.3
Severity of use	All desirable species grazed out. Or no grazing, resulting in thatch and/or standing dead accumulation and woody invasion.	All edible plants grazed to lowest level feasible by the livestock type (mown lawn look). Or, undergrazed - mostly stemmy overgrowth and much dead leaf.	Spot grazing common. Equal amount of close-grazed and little-grazed areas. Close grazed areas are grazed as low as livestock can graze (mown lawn look.)	Some spot grazing, avoided areas primarily at dung and urine spots. Closer grazed areas are not grazed below proper height needed for plant vigor.	Forage species grazed within height ranges that promote dense sward and near maximum production.
Site adaptation of desired species	Properly planted and established (desired) species are no longer present.	Properly planted and established (desired) species are nearly gone. Volunteer unwanted species dominate.	One or more properly planted and established, or recruited desired species are missing. Unwanted species invading.	Properly planted and established, or recruited desired species still represented, but not in the desired proportions.	Properly planted and established, or recruited desired species are present in the desired proportions.
Climatic stresses	Brownout from drought. Or, frost heaved plants, most with severed roots and dying. Or, major loss due to submergence or ice sheets.	Wilted plants, little recovery during night. Or, some frost heaved plants, recovery slow. Some spotty stand loss due to submergence or ice sheets.	Wilting during heat of the day. Or, weak plants from winter damage or short-term submergence. Or, freezing damage to foliage.	Dry conditions, but no wilting. Or, above or below normal temperatures slowing growth. Or, slight leaf yellowing due to cold, wet conditions.	No climatic stress.
Insect and/or disease pressure	Severe insect attack, mortality high. Or, disease caused mortality high.	Insect or disease outbreak at economic threshold, treat now.	Insect or disease outbreak near economic threshold, continue watch and weigh options for treatment.	Some insect and/or disease present, but little impact on forage quality or quantity.	No visible damage.

1/ Names used to describe P & K levels not consistent nationwide; Very high referred to as excessive, and optimum as moderate or medium. Determined by approved soil testing procedures and comparing soil test results for exchangeable P and K with this table.

2/ Determined using chlorophyll meter or plant tissue test and comparing those results with this table.

3/ pH ratings may need to be regionalized to account for soil chemistry differences that influence range of acceptability as soils become more highly weathered or excess salts, exchangeable aluminum, or sodium begin to interfere with forage production. Establish exchangeable aluminum, electrical conductivity, and sodium absorption ratio criteria where their levels in the soil interfere with forage production.

APPENDIX C
FEDERAL AND STATE SPECIAL STATUS SPECIES LIST FOR GRANT COUNTY, NEW MEXICO

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Common Name	Scientific Name	Federal	State
Plants			
Rayish-white giant hyssop	*Agastache cana*	S	s
Gila brickellbush	*Brickellia chenopodina*	S	s
Wooton's hawthorn	*Crataegus wootoniana*	S; USFS:S	s
Davidson's cliff carrot	*Cymopterus davidsonii*	S; USFS:S	s
Metcalfe's ticktrefoil	*Desmodium metcalfei*	S; USFS:S	s
Mogollon whitlowgrass	*Draba mogollonica*	S	s
New Mexico gumweed	*Grindelia arizonica* var. *neomexicana*	S	s
Night-blooming cereus	*Peniocereus greggii* var. *greggii*	S; BLM: S	E
Maguire's beardtongue	*Penstemon linarioides maguirei*	S	s
Slender spiderflower	*Peritoma multicaulis*	S	E
Pinos Altos fame flower	*Phemeranthus humilis*	S	s
Parish's alkali grass	*Puccinellia parishii*	S; BLM: S	E
Mimbres figwort	*Scrophularia macrantha*	S; BLM: S	s
Thurber's campion	*Silene thurberi*	S	s
Wright's campion	*Silene wrightii*	S	s
Porsild's starwort	*Stellaria porsildii*	S	s
Invertebrates			
Arizona snaketail	*Ophiogomphus arizonicus*	FS: S	–
Bearded mountainsnail	*Oreohelix barbata*	FS: S	–
Black Range mountainsnail	*Oreohelix metcalfei concentrica*	FS: S	–
Black Range mountainsnail	*Oreohelix metcalfei radiata*	FS: S	–
Black Range woodlandsnail	*Ashmunella cockerelli cockerelli*	FS: S	–
Black Range woodlandsnail	*Ashmunella cockerelli argenticola*	FS: S	–
Black Range woodlandsnail	*Ashmunella cockerelli perobtusa*	FS: S	–
Blunt ambersnail	*Oxyloma retusum*	FS: S	–
Subalpine mountainsnail	*Oreohelix subrudis*	FS: S	–
Dashed ringtail	*Erpetogomphus heterodon*	FS: S	–
Four-spotted skipperling skipper	*Piruna polingii*	FS: S	–
Gila springsnail	*Pyrgulopsis gilae*	FS: S	T
Iron Creek woodlandsnail	*Ashmunella mendax*	FS: S	–
Mayfly	*Lachlania dencyannae*	FS: S	–
Morgan Creek mountainsnail	*Oreohelix swopei*	FS: S	–
New Mexico (Mountain) silverspot butterfly	*Speyeria nokomis nitocris*	S; FS: S	–
New Mexico hot springsnail	*Pyrgulopsis thermalis*	FS: S	T
Notodontid moth	*Euhyparpax rosea*	FS: S	–
Obsolete viceroy butterfly	*Limenitis archippus obsoleta*	S; FS: S	–
Silver Creek woodlandsnail	*Ashmunella binneyi*	FS: S	–

Common Name	Scientific Name	Federal	State
Socorro mountainsnail	*Oreohelix neomexicana*	–	s
Fish			
Beautiful shiner[3]	*Cyprinella formosa*	T; FS: S	Ext
Chihuahua chub	*Gila nigrescens*	T; FS: S	E
Desert sucker	*Catostomus clarkii*	S; FS: S; BLM: S	s
Gila chub (CH)	*Gila intermedia*	E; FS: S; BLM: S	E
Gila topminnow	*Poeciliopsis occidentalis*	E; FS: S	T
Gila trout	*Oncorhynchus gilae*	T; FS: S	T
Headwater chub	*Gila nigra*	C; FS: S	E
Loach minnow	*Tiaroga cobitis*	E; FS: S	E
Longfin dace	*Agosia chrysogaster*	FS: S; BLM: S	–
Rio Grande sucker	*Catostomus plebeius*	FS: S	–
Roundtail chub	*Gila robusta*	C; FS: S; BLM: S	E
Sonora sucker	*Catostomus insignis*	S; FS: S; BLM: S	s
Speckled dace	*Rhinichthys osculus*	BLM: S	–
Spikedace	*Meda fulgida*	E; FS: S	E
Birds			
Abert's towhee	*Melozone aberti aberti*	FS: S	T
American bittern	*Botaurus lentiginosus*	FS: S	–
Aplomado falcon	*Falco femoralis septentrionalis*	E (ENEP); FS: S	E
Baird's sparrow	*Ammodramus bairdii*	FS: S; BLM: S	T
Bald eagle	*Haliaeetus leucocephalus alascanus*	FS: S	T
Beardless tyrannulet	*Camptostoma imberbe ridgwayi*	FS: S	E
Bell's vireo	*Vireo bellii arizonae*	FS: S	T
Belted kingbird	*Megaceryle alcyon*	FS: S	–
Black swift	*Cypseloides niger borealis*	–	s
Blue-throated hummingbird	*Lampornis clemenciae bessophilus*	FS: S	–
Botteri's sparrow	*Peucaea botterii arizonae*	–	s
Broad-billed hummingbird	*Cynanthus latirostris magicus*	FS: S	T
Brown pelican	*Pelecanus occidentalis carolinensis*	FS: S	E
Buff-collared nightjar	*Caprimulgus ridgwayi ridgwayi*	FS: S	E
Burrowing owl	*Athene cunicularia hypugaea*	FS: S; BLM: S	–
Common black-hawk	*Buteogallus anthracinus anthracinus*	FS: S	T
Common ground-dove	*Columbina passerina pallescens*	FS: S	E
Costa's hummingbird	*Calypte costae*	FS: S	T
Elegant trogon	*Trogon elegans canescens*	USFS: S	E
Elf owl	*Micrathene whitneyi whitneyi*	USFS: S	–
Ferruginous hawk	*Buteo regalis*	USFS: S; BLM: S	–

Common Name	Scientific Name	Federal	State
Flammulated owl	*Otus flammeolus*	USFS: S	–
Gila woodpecker	*Melanerpes uropygialis uropygialis*	USFS: S	T
Gray catbird	*Dumetella carolinensis ruficrissa*	USFS: S	–
Gray hawk	*Buteo nitidus maxima*	S; USFS: S; BLM: S	–
Gray vireo	*Vireo vicinior*	USFS: S	T
Great egret	*Ardea alba egretta*	USFS: S	–
Loggerhead shrike	*Lanius ludovicianus excubitorides*	USFS: S; BLM: S	s
Long-billed curlew	*Numenius americanus americanus*	USFS: S	–
Lucifer hummingbird	*Calothorax lucifer*	USFS: S	T
Mexican spotted owl (CH)	*Strix occidentalis lucida*	T; USFS: S	s
Mississippi kite	*Ictinia mississippiensis*	USFS: S	–
Mountain plover	*Charadrius montanus*	USFS: S	s
Neotropic cormorant	*Phalacrocorax brasilianus*	USFS: S	T
Northern goshawk	*Accipiter gentilis atricapillus*	S; USFS: S; BLM: S	s
Osprey	*Pandion haliaetus carolinensis*	USFS: S	–
Peregrine falcon	*Falco peregrinus*	USFS: S	T
Sora	*Porzana carolina*	USFS: S	–
Southwestern willow flycatcher	*Empidonax traillii extimus*	E; USFS: S	E
Sprague's pipit	*Anthus spragueii*	C; USFS: S; BLM: S	–
Swainson's hawk	*Buteo swainsoni*	USFS: S	–
Thick-billed kingbird	*Tyrannus crassirostris*	USFS: S	E
Varied bunting	*Passerina versicolor versicolor*	USFS: S	T
White-eared hummingbird	*Hylocharis leucotis borealis*	USFS: S	T
White-faced ibis	*Plegadis chihi*	USFS: S; BLM: S	–
Whooping crane	*Grus americana*	ENEP; USFS: S	E
Yellow-billed cuckoo	*Coccyzus americanus*	PT; USFS: S	s
Yellow-eyed junco	*Junco phaeonotus palliatus*	USFS: S	T
Zone-tailed hawk	*Buteo albonotatus*	USFS: S	–
Amphibians			
Arizona toad	*Anaxyrus microscaphus microscaphus*	USFS: S; BLM: S	–
Chiricahua leopard frog (CH)	*Lithobates chiricahuensis*	T; USFS: S	s
Lowland leopard frog	*Lithobates yavapaiensis*	S; USFS: S; BLM: S	E
Reptiles			
Desert kingsnake	*Lampropeltis getula splendida*	USFS: S	–
Mexican gartersnake	*Thamnophis eques megalops*	C; USFS: S; BLM: S	E
Narrow-headed gartersnake	*Thamnophis rufipunctatus*	C; USFS: S; BLM: S	T
Reticulate Gila monster	*Heloderma suspectum suspectum*	USFS: S	E

Common Name	Scientific Name	Federal	State
Texas horned lizard	*Phrynosoma cornutum*	USFS: S; BLM: S	–
Mammals			
Allen's big-eared bat	*Idionycteris phyllotis*	USFS: S; BLM: S	–
Arizona gray squirrel	*Sciurus arizonensis arizonensis*	USFS: S	–
Arizona myotis bat	*Myotis occultus*	USFS: S; BLM: S	–
Black-footed ferret	*Mustela nigripes*	E	–
Botta's pocket gopher	*Thomomys bottae*	USFS: S	–
Cave myotis bat	*Myotis velifer incautus*	USFS: S; BLM: S	s
Chihuahuan pronghorn	*Antilocapra americana mexicana*	USFS: S	–
Common hog-nosed skunk	*Conepatus leuconotus mearnsi*	–	s
Desert bighorn sheep	*Ovis canadensis mexicana*	USFS: S	–
Fringed myotis bat	*Myotis thysanodes thysanodes*	BLM: S	s
Hooded skunk	*Mephitis macroura milleri*	USFS: S	s
Long-eared myotis bat	*Myotis evotis evotis*	BLM: S	s
Long-legged myotis bat	*Myotis volans interior*	BLM: S	s
long-tailed vole	*Microtus longicaudus longicaudus*	USFS: S	–
Mexican gray wolf	*Canis lupus baileyi*	ENEP; USFS: S	E
Mexican long-nosed bat	*Leptonycteris nivalis*	E	E
Red fox	*Vulpes vulpes fulva*	–	s
Ringtail	*Bassariscus astutus arizonensis*	USFS: S	s
Rocky Mountain bighorn sheep	*Ovis canadensis canadensis*	USFS: S	–
Small-footed myotis bat	*Myotis ciliolabrum melanorhinus*	BLM: S	s
Spotted bat	*Euderma maculatum*	USFS: S; BLM: S	T
Townsend's pale big-eared bat	*Corynorhinus townsendii pallescens*	USFS: S; BLM: S	s
Western red bat	*Lasiurus blossevillii*	S; USFS: S	s
Western spotted skunk	*Spilogale gracilis*	–	s
white-nosed coati	*Nasua narica*	USFS: S	s
Yellow-nosed cotton rat	*Sigmodon ochrognathus*	USFS: S; BLM: S	–
Yuma myotis bat	*Myotis yumanensis yumanensis*	BLM: S	s

APPENDIX D
NRCS SOILS DEFINITIONS

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Lonti-Manzano association, 1 to 25 percent slopes

The Lonti component makes up 65 percent of the map unit. Slopes are 3 to 25 percent. This component is on hillslopes, uplands. The parent material consists of mixed alluvium and/or colluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 4 percent. The Manzano component makes up 20 percent of the map unit. Slopes are 1 to 5 percent. This component is on valley floors, valleys. The parent material consists of mixed alluvium and/or residuum weathered from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 4 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Lonti-Ustorthents association, 5 to 60 percent slopes

The Lonti component makes up 70 percent of the map unit. Slopes are 5 to 35 percent. This component is on breaks, uplands. The parent material consists of mixed alluvium and/or colluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 4 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface. The Ustorthents component makes up 20 percent of the map unit. Slopes are 15 to 60 percent. This component is on breaks, uplands. The parent material consists of mixed alluvium and/or colluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Luzena-Rock outcrop association, 10 to 35 percent slopes

The Luzena component makes up 65 percent of the map unit. Slopes are 10 to 35 percent. This component is on escarpments, uplands. The parent material consists of mixed alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer, bedrock (lithic), is 8 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is

high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent.

Muzzler-Rock outcrop association, 25 to 45 percent slopes

The Muzzler component makes up 60 percent of the map unit. Slopes are 25 to 45 percent. This component is on mountains, hills. The parent material consists of mixed alluvium and/or colluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer, bedrock (lithic), is 8 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent.

Orthents, 25 to 60 percent slopes

The Orthents component makes up 100 percent of the map unit. Slopes are 25 to 60 percent. This component is on breaks, uplands. The parent material consists of mixed alluvium and/or colluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent.

Paymaster-Ellicott complex, 1 to 3 percent slopes

The Paymaster component makes up 50 percent of the map unit. Slopes are 1 to 3 percent. This component is on alluvial fans, valleys. The parent material consists of mixed alluvium and/or residuum weathered from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface. The Ellicott component makes up 35 percent of the map unit. Slopes are 1 to 3 percent. This component is on alluvial fans, uplands. The parent material consists of mixed alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Paymaster-Ellicott-Manzano association, 0 to 5 percent slopes

The Paymaster component makes up 40 percent of the map unit. Slopes are 1 to 3 percent. This component is on alluvial fans, valleys. The parent material consists of mixed alluvium and/or residuum weathered from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface. The Ellicott component makes up 30 percent of the map unit. Slopes are 1 to 3 percent. This component is on alluvial fans, uplands. The parent material consists of mixed alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface. The Manzano component makes up 20 percent of the map unit. Slopes are 1 to 5 percent. This component is on valley floors, valleys. The parent material consists of mixed alluvium and/or residuum weathered from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 4 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Tesajo-Manzano complex, 1 to 3 percent slopes

The Tesajo component makes up 55 percent of the map unit. Slopes are 1 to 3 percent. This component is on valleys, valley floors. The parent material consists of mixed alluvium and/or residuum weathered from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. The Manzano component makes up 15 percent of the map unit. Slopes are 1 to 3 percent. This component is on valley floors, valleys. The parent material consists of mixed alluvium and/or residuum weathered from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent.

Lithic Haplustalfs, dry-Lithic Ustorthents, moist association, 40 to 80 percent slopes

The Lithic Haplustalfs component makes up 40 percent of the map unit. Slopes are 40 to 80 percent. This component is on mountain systems, mountain slopes. The parent material consists of mixed alluvium and/or colluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer, bedrock (lithic), is 4 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. The Lithic Ustorthents component makes up 40 percent of the map unit. Slopes are 40 to 80 percent. This component is on mountain slopes, mountain systems. The parent material consists of mixed alluvium and/or colluvium derived from igneous, metamorphic and sedimentary rock. Depth to a root restrictive layer, bedrock (lithic), is 4 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

APPENDIX E
DATA SHEETS FOR PROPOSED WATER IMPOUNDMENT CANYONS IN GRANT COUNTY, NEW MEXICO

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Environmental Survey of Gila Watershed Potential Impoundment Canyons

Canyon Name: Davis
Survey Date(s): 10-23-2013
Personnel: Joanna Franks and Matt McMillian

*VERIFY THAT **THIS FORM** AND **BOTH MAPS** AND **NMRAM ASSESSMENT** ARE COMPLETED AND LEGIBLE PRIOR TO LEAVING EACH CANYON SITE: Yes X (check here)*

Procedures: Systematically fill out each page of this field survey data form. Write clearly so that another person can easily ready what is written. Also, fill out each data sheet for NRCS pasture condition, and NMRAM. Draw on each map as described in the protocols document. Each Canyon Folder includes: 1) this field survey data form document, 2) four maps, 3) NRCS Pasture Condition score sheet, and 4) NMRAM field data forms for biotic metrics and stressor check-list. Please keep all materials together.

Maps (4): 1) blank aerial image map to draw features on, 2) original SWReGAP vegetation community map to verify, 3) modified SWReGAP vegetation community map for final vegetation community verification and to draw any vegetation community changes on, and 4) a soils map. Use each appropriate map while completing this form. Adjust plant communities on the modified SWReGAP plant community map, and draw all other habitats, etc. on the blank aerial image map.

Photographs: Write image numbers as displayed from camera card after "Photo No(s)" below. Number multiple cards sequentially 1, 2, etc., change cards as needed. Record each photograph as: *card number-image number* (e.g.: 1-23). Provide a brief description of each (general location, view direction, GPS if appropriate). Put a comma after each photo number/respective description. Data sheets for additional photos are included in each folder.

NRCS Pasture Condition Score sheets for riparian and upland portions of each canyon are included. Use those score sheets and place overall score for each on the last page of this document.

NMRAM data forms for each canyon are also included in this folder, but keep those separate.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Vegetation communities present (SWReGAP) circle Y or N for each. Provide at least one representative photograph of each showing dominant plant species.

1. North American Warm Desert Wash S020 Verified and/or redrawn on map? Y N
Dominant Species: QUGR3, QUAR, JUMO,CHEVE2,ARAD,PRGL2,BOCU
PhotoNo.(s) 1-24-584(S),1-25-585(W), 1-32-592(N),1-33-593(E),1-34-594(S),1-35-595(W)

2. Apacherican- Chihuahuan Semi-Desert Grassland and Steppe S077 Verified and/or redrawn on map? Y N
Dominant Species: BOCU, QUGR3,PRGL2,AMPA10
PhotoNo.(s): 1-29-589(64°), 1-30-590(163°),1-31-591(247°)

3. Madrean Pinyon-Juniper Woodland S112 Verified and/or redrawn on map? Y N
Dominant Species:QUAR,QUGR3,JUMO,BOCU
PhotoNo.(s): 1-40-600(270°),1-41-601(310°), 1-42-602(344°), 1-43-603(25°)

4. D01 Verified and/or redrawn on map? Y N
Dominant Species: Berm
PhotoNo.(s):_____

5. N11 Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

Additional comments/information regarding vegetation communities:

See Matt's I phone: 1-36-596(NW),1-37-597(NE),1-38-598(SE),1-39-599(SW)

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

2. Soils present (NRCS soils) circle Y or N for each. Provide at least one representative photograph of each showing soil surfaces.

1 Lonti-Manzano association Verified and/or redrawn on map? Y N
Description: 1 to 25% slopes
PhotoNo.(s):_____

2 Lonti-Ustorthents association Verified and/or redrawn on map? Y N
Description: 5 to 60% slopes
PhotoNo.(s):_____

3 Paymaster-Ellicot-Manzano association Verified and/or redrawn on map? Y N
Description: 0 to 5% slopes
PhotoNo.(s):_____

Additional comments/information regarding soils:

3. Other Habitats present (>1 ha) other than *SWReGAP vegetation communities, springs, wetlands, stream type, water bodies, riparian vegetation*, and draw on map. (e.g., cliff face, rock outcrop, cave, etc.). Write NONE for habitat 1 if none present.

1. Spring # 1 Verified and/or redrawn on map? Y N
Photo No(s).: 1-26-586,1-27-587,1-28-588
Description(s): Spring is coming up from underground a rocky outcrop and flows into main stream channel. No riparian vegetation around spring.

2. Spring # 2 Verified and/or redrawn on map? Y N
Photo No(s).: 1-44-604 through 1-46-606
Description(s): Spring is coming up from underground and feeds into the cattle tank (water body) on the eastern boundary of the project area. No riparian vegetation around spring.

3._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____ Description(s):_____
_____

4._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____ Description(s):_____
_____

Additional habitat information, comments:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

4. Sensitive plant or animal species/habitats
Write NONE for species 1 if none present and draw habitats on map:

1. Species: Mexican Garter Snake Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Dwells in aquatic habitats. Typically lives in and around free standing water

2. Species: Leopard Frogs Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Leopard frogs have been found in the Gila River, and any form of water is a suitable aquatic habitat for these frogs if they are close enough to the Gila River.

3. Species: New Mexico Gumweed Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Habitat: Rocky slopes and ledges in pinyon –juniper woodlands.

4. Species: Metcalfe's trickterfoil Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Habitat: Rocky slopes and canyons in pinyon-junipers(4,000 to 6,500ft).

5. Species: Gila Brickellbush Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Habitat: Alluvial soils near the Gila River.

6. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

7. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

8. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on sensitive species habitats:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

5. Springs present/GPS coordinates and draw on map. Write NONE for spring 1 if none.

1. Description: Yes, Spring #1
GPS N_____W_____ Mapped: Y N
Photo No(s): 1-26 to 1-28 (See spring types in Other Habitats section) Description(s): Spring is coming up from underground a rocky outcrop and flows into main stream channel. No riparian vegetation around spring.

2. Description: Yes, Spring #2
GPS N_____W_____ Mapped: Y N
Photo No(s).: 1-44-604 through 1-46-606 (See spring types in Other Habitats section)
Description(s): Spring is coming up from underground and feeds into the cattle tank (water body) on the eastern boundary of the project area. No riparian vegetation around spring.

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____

Additional information on springs:

6. Wetlands present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: should also be on vegetation map.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____

Additional information on wetlands:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

7. Riparian Vegetation present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: Should also be on vegetation map and veg above.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on riparian vegetation:

8. Stream types present/GPS coordinates and draw on map.
Stream types = 1) permanent, 2) intermittent, 3) ephemeral.

1. Description (stream type, extent of canyon, aquatic habitats): Ephemeral
GPS N_____W_____ Mapped: Y N
Photo No(s).:See habitat types-SWeGAP

2. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

3. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

Additional information on stream types:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

9. Water body (lentic) present/GPS coordinates and draw on map. Write NONE for water body 1 if none present.

1. Description: Water body #1
GPS N_____W_____ Mapped: Y N
Photo No(s).:1-44-604 Description(s):Body of water is a cattle tank that is flowing from a dripping spring.

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on lentic water bodies:

10. NRCS Rangeland (Pasture) Condition Score (use separate NRSC scoring sheets, report final score here, partition by landscape units below):

1. Riparian/stream Zone: Score = 22 Comments:_____
_____

2. Upland Zone: Score = 24 Comments:_____
_____

3. Other (describe): Score = ___ Comments:_____
_____

Any additional information on Rangeland Conditions:
Pasture of upper and RIP are heavily impacted by cattle foraging and grazing. No desired plants are found in this pasture.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

10. NMRAM Biotic Metric Scores (use separate NMRAM scoring sheets, report final scores here for each AA. Number of AAs will vary, usually one per canyon):

AA-1

1. Relative Native Plant Community Composition: Score =1.2
Comments:

2. Vegetation Horizontal Patch Structure : Score =0.4
Comments:

3. Vegetation Vertical Structure: Score = 0.4
Comments:

4. Native Riparian Tree Regeneration: Score =0.1
Comments:

5. Invasive Exotic Plant Species Cover: Score = 0.6
Comments:

6. Total Biotic Metrics Score: 2.7

Any additional information on NMRAM Biotic Metrics: No desired plants were available in AA#1 due to cattle grazing and little invasive or exotic plants were found in this area.

1-44-604(244°), 1-45-605(75°), 1-46-606(64°), 1-47-607(242°)
1-48-608, 1-49-609, 1-50-610

AA-2

1. Relative Native Plant Community Composition: Score = ___
Comments:

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:

3. Vegetation Vertical Structure: Score = ___
Comments:

4. Native Riparian Tree Regeneration: Score = ___
Comments:

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:
6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

AA-3

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-4

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

11. Other Additional General Comments or Information about canyon:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Canyon Name: Dix
Survey Date(s):10-25-2013 **Personnel**: Matt McMillan and Joanna Franks

*VERIFY THAT **THIS FORM** AND **BOTH MAPS** AND **NMRAM ASSESSMENT** ARE COMPLETED AND LEGIBLE*
PRIOR TO LEAVING EACH CANYON SITE: Yes X (check here)

Procedures: Systematically fill out each page of this field survey data form. Write clearly so that another person can easily ready what is written. Also, fill out each data sheet for NRCS pasture condition, and NMRAM. Draw on each map as described in the protocols document. Each Canyon Folder includes: 1) this field survey data form document, 2) four maps, 3) NRCS Pasture Condition score sheet, and 4) NMRAM field data forms for biotic metrics and stressor check-list. Please keep all materials together.

Maps (4): 1) blank aerial image map to draw features on, 2) original SWReGAP vegetation community map to verify, 3) modified SWReGAP vegetation community map for final vegetation community verification and to draw any vegetation community changes on, and 4) a soils map. Use each appropriate map while completing this form. Adjust plant communities on the modified SWReGAP plant community map, and draw all other habitats, etc. on the blank aerial image map.

Photographs: Write image numbers as displayed from camera card after "Photo No(s)" below. Number multiple cards sequentially 1, 2, etc., change cards as needed. Record each photograph as: *card number-image number* (e.g.: 1-23). Provide a brief description of each (general location, view direction, GPS if appropriate). Put a comma after each photo number/respective description. Data sheets for additional photos are included in each folder.

NRCS Pasture Condition Score sheets for riparian and upland portions of each canyon are included. Use those score sheets and place overall score for each on the last page of this document.

NMRAM data forms for each canyon are also included in this folder, but keep those separate.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Vegetation communities present (SWReGAP) circle Y or N for each. Provide at least one representative photograph of each showing dominant plant species.

1.North American Warm Desert Wash S020 Verified and/or redrawn on map? Y N
Dominant Species:SEGR4, JUMO, PRGL2,CHILI2,FRCU, QURG3,BOCU,ARAD,BOBA
PhotoNo.(s):1-4-615(28°), 1-5-616(74°),1-6-617(156°),1-7-618(318°),1-8-619(90°), 1-9-620(200°),1-10-621(224°), 1-11-622(242°), 1-12-623(358°),1-13-624(75°),1-14-625(182°)

2. Apacherian- Chihuahuan Semi- Desert Grassland and Steppe S077 Verified and/or redrawn on map? Y N
Dominant Species:PRGL2,JUMO,ARAD,BOCU,BOBA2
PhotoNo.(s):_____

3. Madrean Juniper Savana S115 Verified and/or redrawn on map? Y N
Dominant Species: JUMO,QUGR3,PRGL2,RHTR
PhotoNo.(s):1-1-611(180°), 1-2-613(70°), 1-3-614(34°)

4._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

5._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

6._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

Additional comments/information regarding vegetation communities:
Additional photos from S020: 1-23-635(258°), 1-24-636(0°), 1-25-637(90°), 1-26-638 (180°) 1-27-639(225°), 1-28-640 (304°), 1-29-641(354°), 1-30-642(60°)

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

2. Soils present (NRCS soils) circle Y or N for each. Provide at least one representative photograph of each showing soil surfaces.

1 Lonti-Manzano association Verified and/or redrawn on map? Y N
Description: 1 to 25%
PhotoNo.(s):_____

2. Lonit-Ustorthents association Verified and/or redrawn on map? Y N
Description: 5 to 60%
PhotoNo.(s):_____

3. Lozena-Rock outcrop association Verified and/or redrawn on map? Y N
Description: 10 to 35%
PhotoNo.(s):_____

4. Paymaster-Ellicott Manzano association Verified and/or redrawn on map? Y N
Description: 0 to 5 %
PhotoNo.(s):_____

Additional comments/information regarding soils:

3. Other Habitats present (>1 ha) other than *SWReGAP vegetation communities, springs, wetlands, stream type, water bodies, riparian vegetation*, and draw on map. (e.g., cliff face, rock outcrop, cave, etc.). Write NONE for habitat 1 if none present.

1. None Verified and/or redrawn on map? Y N
Photo No(s).:_____ Description(s):_____
_____

2._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____ Description(s):_____
_____

3._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____ Description(s):_____
_____

4._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____ Description(s):_____
_____

Additional habitat information, comments:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

4. Sensitive plant or animal species/habitats
Write NONE for species 1 if none present and draw habitats on map:

1. Species: Gila Monster Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s) Habitat: Rocky slopes, canyons, and washes.

2. Species :Gila Brickellbush Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Habitat: Restricted to alluvial soils near the Gila River.

3. Species:Metcalfe's tricktrefoil Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Habitat: Rocky slopes an canyons in grasslands and pinyon-juniper.

4. Species: New Mexico Gumweed Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Habitat: Rocky slopes and edges in pinyon-juniper.

5. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

6. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

7. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

8. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on sensitive species habitats:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

5. Springs present/GPS coordinates and draw on map. Write NONE for spring 1 if none.

1. Description: NONE
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on springs:

6. Wetlands present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: should also be on vegetation map.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on wetlands:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

7. Riparian Vegetation present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: Should also be on vegetation map and veg above.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on riparian vegetation:

8. Stream types present/GPS coordinates and draw on map.
Stream types = 1) permanent, 2) intermittent, 3) ephemeral.

1. Description (stream type, extent of canyon, aquatic habitats): Ephemeral dry wash bed
GPS N_____W_____ Mapped: Y N
Photo No(s).See habitat types and SWReGAP

2. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

3. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

Additional information on stream types:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

9. Water body (lentic) present/GPS coordinates and draw on map. Write NONE for water body 1 if none present.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on lentic water bodies:

10. NRCS Rangeland (Pasture) Condition Score (use separate NRSC scoring sheets, report final score here, partition by landscape units below):

1. Riparian/stream Zone: Score = 21 Comments:_____
_____

2. Upland Zone: Score = 23
Comments:_____
_____

3. Other (describe): Score = Comments:_____
_____

Any additional information on Rangeland Conditions:

Cattle occupy the up land and the riparian area. Bothe pasture areas have been grazed by the cattle and have impacted the vegetation.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

10. NMRAM Biotic Metric Scores (use separate NMRAM scoring sheets, report final scores here for each AA. Number of AAs will vary, usually one per canyon):

AA-1

1. Relative Native Plant Community Composition: Score =1.2
Comments:

2. Vegetation Horizontal Patch Structure : Score =0.4
Comments:

3. Vegetation Vertical Structure: Score = 0.6
Comments:

4. Native Riparian Tree Regeneration: Score =0.1
Comments:

5. Invasive Exotic Plant Species Cover: Score =0.6
Comments:

6. Total Biotic Metrics Score: 2.9

Any additional information on NMRAM Biotic Metrics:
Vegetation is weak in wash areas due to cattle grazing. One desired plant has been seen and little invasive and exotic plants occur in AA#1.

1-15-627(257°), 1-16-258(350°), 1-17-259(83°),1-18-260(18°), 1-19-631(278°), 1-20-632(6°),1-21-633(94°), 1-22-634(191°)

AA-2

1. Relative Native Plant Community Composition: Score = ___
Comments:

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:

3. Vegetation Vertical Structure: Score = ___
Comments:

4. Native Riparian Tree Regeneration: Score = ___
Comments:

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-3

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-4

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

11. Other Additional General Comments or Information about canyon:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Canyon Name: Maldonado
Survey Date(s):10-25-13 **Personnel**: Matt McMillan and Joanna Franks

*VERIFY THAT **THIS FORM** AND **BOTH MAPS** AND **NMRAM ASSESSMENT** ARE COMPLETED AND LEGIBLE*
PRIOR TO LEAVING EACH CANYON SITE: Yes X (check here)

Procedures: Systematically fill out each page of this field survey data form. Write clearly so that another person can easily ready what is written. Also, fill out each data sheet for NRCS pasture condition, and NMRAM. Draw on each map as described in the protocols document. Each Canyon Folder includes: 1) this field survey data form document, 2) four maps, 3) NRCS Pasture Condition score sheet, and 4) NMRAM field data forms for biotic metrics and stressor check-list. Please keep all materials together.

Maps (4): 1) blank aerial image map to draw features on, 2) original SWReGAP vegetation community map to verify, 3) modified SWReGAP vegetation community map for final vegetation community verification and to draw any vegetation community changes on, and 4) a soils map. Use each appropriate map while completing this form. Adjust plant communities on the modified SWReGAP plant community map, and draw all other habitats, etc. on the blank aerial image map.

Photographs: Write image numbers as displayed from camera card after "Photo No(s)" below. Number multiple cards sequentially 1, 2, etc., change cards as needed. Record each photograph as: *card number-image number* (e.g.: 1-23). Provide a brief description of each (general location, view direction, GPS if appropriate). Put a comma after each photo number/respective description. Data sheets for additional photos are included in each folder.

NRCS Pasture Condition Score sheets for riparian and upland portions of each canyon are included. Use those score sheets and place overall score for each on the last page of this document.

NMRAM data forms for each canyon are also included in this folder, but keep those separate.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Vegetation communities present (SWReGAP) circle Y or N for each. Provide at least one representative photograph of each showing dominant plant species.

1 Madrean Juniper Savanna Verified and/or redrawn on map? Y N
Dominant Species: JUMO,PRGL2,BOGR2,BOBA2,BOCU,PIED
PhotoNo.(s): 1-42-654(90°), 1-43-655(155°), 1-44-656(212°),1-45-657(250°), 1-47-659(130°), 1-48-660(217°),1-49-661(284°),1-50-662(14°), 1-51-663(314°),1-52-664(11°),1-53-665(76°)

2. North American Warm Desert Wash S020 Verified and/or redrawn on map? Y N
Dominant Species: JUMO,PRGL2,ARAD,BOGR2,BOBA2,BOCU
PhotoNo.(s): 1-35-647(62°), 1-36-648(330°),1-37-649(259°),1-54-666(60°),1-55-667(120°), 1-56-668(208°), 1-57-669(282°)

3 Disturbed Area D01 Verified and/or redrawn on map? Y N
Dominant Species:
PhotoNo.(s): 1-31-643(264°),1-32-644(308°),1-33-645(15°),1-34-646(62°)

4._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

5._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

6._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

Additional comments/information regarding vegetation communities:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

2. Soils present (NRCS soils) circle Y or N for each. Provide at least one representative photograph of each showing soil surfaces.

1.Lonit-Manzano associations Verified and/or redrawn on map? Y N
Description: 1 to 25%
PhotoNo.(s):_____

2.Lonti-Ustorthents association Verified and/or redrawn on map? Y N
Description: 5 to 60%
PhotoNo.(s):_____

3._____ Verified and/or redrawn on map? Y N
Description:_____
_____
PhotoNo.(s):_____

Additional comments/information regarding soils:

3. Other Habitats present (>1 ha) other than *SWReGAP vegetation communities, springs, wetlands, stream type, water bodies, riparian vegetation*, and draw on map. (e.g., cliff face, rock outcrop, cave, etc.). Write NONE for habitat 1 if none present.

1. None Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

2._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

3._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

4._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional habitat information, comments:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

4. Sensitive plant or animal species/habitats
Write NONE for species 1 if none present and draw habitats on map:

1. Species: Gila Monster Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s) Habitat: Rocky slopes, canyons, and washes.

2. Species :Gila Brickellbush Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Restricted to alluvial soils near the Gila River.

3. Species: New Mexico Gumweed Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Rocky slopes and edges in pinyon-juniper.

4. Species:Metcalfe's tricktrefoil Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Rocky slopes an canyons in grasslands and pinyon-juniper.

5. Species: Burrowing Owl Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Habitat: Grasslands with canyons or slopes to build nests and burrow in.

6. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

7. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

8. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on sensitive species habitats:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

5. Springs present/GPS coordinates and draw on map. Write NONE for spring 1 if none.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on springs:

6. Wetlands present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: should also be on vegetation map.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on wetlands:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

7. Riparian Vegetation present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: Should also be on vegetation map and veg above.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on riparian vegetation:

8. Stream types present/GPS coordinates and draw on map.
Stream types = 1) permanent, 2) intermittent, 3) ephemeral.

1. Description (stream type, extent of canyon, aquatic habitats): Ephemeral dry wash bed
GPS N_____W_____ Mapped: Y N
Photo No(s).See habitat types and SWReGAP

2. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

3. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

Additional information on stream types:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

9. Water body (lentic) present/GPS coordinates and draw on map. Write NONE for water body 1 if none present.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on lentic water bodies:

10. NRCS Rangeland (Pasture) Condition Score (use separate NRSC scoring sheets, report final score here, partition by landscape units below):

1. Riparian/stream Zone: Score =25 Comments:_____
_____

2. Upland Zone: Score = 28 Comments:_____
_____

3. Other (describe): Score = ___ Comments:_____
_____

Any additional information on Rangeland Conditions:
Cattle are currently being grazed in pasture area, however, desired species still occur within the pasture.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

10. NMRAM Biotic Metric Scores (use separate NMRAM scoring sheets, report final scores here for each AA. Number of AAs will vary, usually one per canyon):

AA-1

1. Relative Native Plant Community Composition: Score = 1.2
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = 0.2
Comments:_____

3. Vegetation Vertical Structure: Score = 0.4
Comments:_____

4. Native Riparian Tree Regeneration: Score = 0.1
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = 0.8
Comments:_____

6. Total Biotic Metrics Score: 2.7

Any additional information on NMRAM Biotic Metrics:

AA#1 is being grazed by cattle and impacted by them. However, the impact has still allowed for desired species to be seen in patches throughout the AA.

AA-2

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Any additional information on NMRAM Biotic Metrics:

AA-3

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-4

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

11. Other Additional General Comments or Information about canyon:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Canyon Name: Schoolhouse
Survey Date(s):10-23-13 **Personnel**: Matt McMillan and Joanna Franks

*VERIFY THAT **THIS FORM** AND **BOTH MAPS** AND **NMRAM ASSESSMENT** ARE COMPLETED AND LEGIBLE*
PRIOR TO LEAVING EACH CANYON SITE: Yes X(check here)

Procedures: Systematically fill out each page of this field survey data form. Write clearly so that another person can easily ready what is written. Also, fill out each data sheet for NRCS pasture condition, and NMRAM. Draw on each map as described in the protocols document. Each Canyon Folder includes: 1) this field survey data form document, 2) four maps, 3) NRCS Pasture Condition score sheet, and 4) NMRAM field data forms for biotic metrics and stressor check-list. Please keep all materials together.

Maps (4): 1) blank aerial image map to draw features on, 2) original SWReGAP vegetation community map to verify, 3) modified SWReGAP vegetation community map for final vegetation community verification and to draw any vegetation community changes on, and 4) a soils map. Use each appropriate map while completing this form. Adjust plant communities on the modified SWReGAP plant community map, and draw all other habitats, etc. on the blank aerial image map.

Photographs: Write image numbers as displayed from camera card after "Photo No(s)" below. Number multiple cards sequentially 1, 2, etc., change cards as needed. Record each photograph as: *card number-image number* (e.g.: 1-23). Provide a brief description of each (general location, view direction, GPS if appropriate). Put a comma after each photo number/respective description. Data sheets for additional photos are included in each folder.

NRCS Pasture Condition Score sheets for riparian and upland portions of each canyon are included. Use those score sheets and place overall score for each on the last page of this document.

NMRAM data forms for each canyon are also included in this folder, but keep those separate.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Vegetation communities present (SWReGAP) circle Y or N for each. Provide at least one representative photograph of each showing dominant plant species.

1.North American Warm Desert Wash S020 Verified and/or redrawn on map? Y N
Dominant Species:ERNA10,ARAD,CHVE2,BUCO
PhotoNo.(s):1-1-561(184°),1-2-562(352°),1-3-563(330°),1-4-564(156°),1-10-574(286°),1-11-575(96°),1-12-576(377°),1-13-577(106°)

2. Apacherian-Chihuahuan Semi-Desert Grassland and Steppe S077 Verified and/or redrawn on map? Y N
Dominant Species: Could not survey this land because it was on private land.
PhotoNo.(s):_____

3. Madrean Pinyon-Juniper Woodland Verified and/or redrawn on map? Y N
Dominant Species: QUGR3,PRGL2,PICE,JUMO,QUAR
PhotoNo.(s):_____

4._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

5._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

6._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

Additional comments/information regarding vegetation communities:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

2. Soils present (NRCS soils) circle Y or N for each. Provide at least one representative photograph of each showing soil surfaces.

1 Lithic Haplustalfs,dry-Lithic Ustorthents moist association Verified and/or redrawn on map? Y N
Description: 40 to 80%slopes
PhotoNo.(s):_____

2._____ Verified and/or redrawn on map? Y N
Description:_____
_____
PhotoNo.(s):_____

3._____ Verified and/or redrawn on map? Y N
Description:_____
_____
PhotoNo.(s):_____

Additional comments/information regarding soils:

3. Other Habitats present (>1 ha) other than *SWReGAP vegetation communities, springs, wetlands, stream type, water bodies, riparian vegetation*, and draw on map. (e.g., cliff face, rock outcrop, cave, etc.). Write NONE for habitat 1 if none present.

1. None Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

2._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

3._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

4._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional habitat information, comments:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

4. Sensitive plant or animal species/habitats
Write NONE for species 1 if none present and draw habitats on map:

1 Species: Gila Monster Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s) Habitat: Rocky slopes, canyons, and washes.

2. Species:Metcalfe's tricktrefoil Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Rocky slopes an canyons in grasslands and pinyon-juniper.

3. Species: New Mexico Gumweed Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Rocky slopes and edges in pinyon-juniper.

4. Species: Desert King snake Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Rocky cliffs and sunny banks in pinyon-juniper canyons and washes.

5. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

6. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

7. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

8. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on sensitive species habitats:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

5. Springs present/GPS coordinates and draw on map. Write NONE for spring 1 if none.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on springs:

6. Wetlands present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: should also be on vegetation map.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on wetlands:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

7. Riparian Vegetation present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: Should also be on vegetation map and veg above.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on riparian vegetation:

8. Stream types present/GPS coordinates and draw on map.
Stream types = 1) permanent, 2) intermittent, 3) ephemeral.

1. Description (stream type, extent of canyon, aquatic habitats): Ephemeral dry wash bed
GPS N_____W_____ Mapped: Y N
Photo No(s).See habitat types and SWReGAP

2. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

3. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

Additional information on stream types:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

9. Water body (lentic) present/GPS coordinates and draw on map. Write NONE for water body 1 if none present.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on lentic water bodies:

10. NRCS Rangeland (Pasture) Condition Score (use separate NRSC scoring sheets, report final score here, partition by landscape units below):

1. Riparian/stream Zone: Score =22 Comments: Was grazed in the recent past and no desired plants are present.

2. Upland Zone: Score = 21 Comments: Grazing is current, but is restricted to a confined fenced in area or the north side or the arroyo. No desired plants seen.

3. Other (describe): Score = ___ Comments:_____
_____

Any additional information on Rangeland Conditions:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

10. NMRAM Biotic Metric Scores (use separate NMRAM scoring sheets, report final scores here for each AA. Number of AAs will vary, usually one per canyon):

AA-1

1. Relative Native Plant Community Composition: Score = 1.2
Comments:

2. Vegetation Horizontal Patch Structure : Score = 0.4
Comments:

3. Vegetation Vertical Structure: Score = 0.6
Comments:

4. Native Riparian Tree Regeneration: Score =0.1
Comments:

5. Invasive Exotic Plant Species Cover: Score =0.8
Comments:

6. Total Biotic Metrics Score: 3.1

Any additional information on NMRAM Biotic Metrics: This AA scored a 3.1 due to it not being grazed and lack of invasive species. See pictures 1-1-561 through 1-4-564.

AA-2

1. Relative Native Plant Community Composition: Score = ___
Comments:

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:

3. Vegetation Vertical Structure: Score = ___
Comments:

4. Native Riparian Tree Regeneration: Score = ___
Comments:

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:

6. Total Biotic Metrics Score: _____

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Any additional information on NMRAM Biotic Metrics:

AA-3

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-4

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

11. Other Additional General Comments or Information about canyon:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Canyon Name: Spar
Survey Date(s):10-25-13 **Personnel**: Matt McMillan and Joanna Franks

*VERIFY THAT **THIS FORM** AND **BOTH MAPS** AND **NMRAM ASSESSMENT** ARE COMPLETED AND LEGIBLE PRIOR TO LEAVING EACH CANYON SITE: Yes X (check here)*

Procedures: Systematically fill out each page of this field survey data form. Write clearly so that another person can easily ready what is written. Also, fill out each data sheet for NRCS pasture condition, and NMRAM. Draw on each map as described in the protocols document. Each Canyon Folder includes: 1) this field survey data form document, 2) four maps, 3) NRCS Pasture Condition score sheet, and 4) NMRAM field data forms for biotic metrics and stressor check-list. Please keep all materials together.

Maps (4): 1) blank aerial image map to draw features on, 2) original SWReGAP vegetation community map to verify, 3) modified SWReGAP vegetation community map for final vegetation community verification and to draw any vegetation community changes on, and 4) a soils map. Use each appropriate map while completing this form. Adjust plant communities on the modified SWReGAP plant community map, and draw all other habitats, etc. on the blank aerial image map.

Photographs: Write image numbers as displayed from camera card after "Photo No(s)" below. Number multiple cards sequentially 1, 2, etc., change cards as needed. Record each photograph as: *card number-image number* (e.g.: 1-23). Provide a brief description of each (general location, view direction, GPS if appropriate). Put a comma after each photo number/respective description. Data sheets for additional photos are included in each folder.

NRCS Pasture Condition Score sheets for riparian and upland portions of each canyon are included. Use those score sheets and place overall score for each on the last page of this document.

NMRAM data forms for each canyon are also included in this folder, but keep those separate.

1. Vegetation communities present (SWReGAP) circle Y or N for each. Provide at least one representative photograph of each showing dominant plant species.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1.Madrean Juniper Savanna S115 Verified and/or redrawn on map? Y N
Dominant Species:JUMO,PRGL2,BUCO,BOGR2,BOBA2
PhotoNo.(s):1-58-670(157°), 1-59-671(325°),1-60-672(6°),1-61-673(65°),1-62-674(100°),1-63-675(153°),1-84-696(21°),1-85-697(103°),1-86-698(160°),1-87-699(232°),1-88-700(305°)

2. North American Warm Desert Wash S020 Verified and/or redrawn on map? Y N
Dominant Species:JUMO,PRGL2,CHIL12,AMPA10,BOCU

PhotoNo.(s):1-64-676(160°),1-65-677(336°),1-66-678(156°),1-67-679(82°),1-72-684(273°),1-73-685(7°),1-70-682(221°),1-71-683(294°),1-74-686(86°),1-75-687(190°),1-80-692(44°),1-81-693(121°),1-82-694(204°),1-83-695(294°)

3. Apacherian-Chihuahuan Semi-Desert Grassland and Steppe S077 Verified and/or redrawn on map? Y N
Dominant Species:JUMO,BOCU,PRGL2,BOGR2,BOBA2
PhotoNo.(s):_____

4. Disturbed Area D01 Verified and/or redrawn on map? Y N
Dominant Species: Berm
PhotoNo.(s):1-68-680(160°),1-69-681(356°)

5._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

6._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____

Additional comments/information regarding vegetation communities:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

2. Soils present (NRCS soils) circle Y or N for each. Provide at least one representative photograph of each showing soil surfaces.

1.Lonti-Usthorents association Verified and/or redrawn on map? Y N
Description:5 to 60% slopes
PhotoNo.(s):_____

2.Muzzler- Rock Outcrop association Verified and/or redrawn on map? Y N
Description:25 to 45% slopes
PhotoNo.(s):_____

3.Paymaster Ellicot Manzano association Verified and/or redrawn on map? Y N
Description:0 to 5%
PhotoNo.(s):_____

Additional comments/information regarding soils:

3. Other Habitats present (>1 ha) other than *SWReGAP vegetation communities, springs, wetlands, stream type, water bodies, riparian vegetation*, and draw on map. (e.g., cliff face, rock outcrop, cave, etc.). Write NONE for habitat 1 if none present.

1. None Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

2._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

3._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

4._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional habitat information, comments:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

4. Sensitive plant or animal species/habitats
Write NONE for species 1 if none present and draw habitats on map:

1. Species: Gila Monster Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s) Habitat: Rocky slopes, canyons, and washes.

2. Species :Gila Brickellbush Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Restricted to alluvial soils near the Gila River.

3. Species: New Mexico Gumweed Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Rocky slopes and edges in pinyon-juniper.

4. Species:Metcalfe's tricktrefoil Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Rocky slopes an canyons in grasslands and pinyon-juniper.

5. Species: Burrowing Owl Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Habitat: Grasslands with canyons or slopes to build nests and burrow in.

6. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

7. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

8. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on sensitive species habitats:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

5. Springs present/GPS coordinates and draw on map. Write NONE for spring 1 if none.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on springs:

6. Wetlands present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: should also be on vegetation map.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on wetlands:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

7. Riparian Vegetation present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: Should also be on vegetation map and veg above.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on riparian vegetation:

8. Stream types present/GPS coordinates and draw on map.
Stream types = 1) permanent, 2) intermittent, 3) ephemeral.

1. Description (stream type, extent of canyon, aquatic habitats): Ephemeral dry wash bed
GPS N_____W_____ Mapped: Y N
Photo No(s).See habitat types and SWReGAP

2. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

3. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

Additional information on stream types:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

9. Water body (lentic) present/GPS coordinates and draw on map. Write NONE for water body 1 if none present.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on lentic water bodies:

10. NRCS Rangeland (Pasture) Condition Score (use separate NRSC scoring sheets, report final score here, partition by landscape units below):

1. Riparian/stream Zone: Score =23 Comments:_____
_____

2. Upland Zone: Score = 24Comments:_____
_____

3. Other (describe): Score = ___ Comments:_____
_____

Any additional information on Rangeland Conditions: Spar has no sign of current livestock grazing. A few desired species found on spar and very few invasive or exotic species.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

10. NMRAM Biotic Metric Scores (use separate NMRAM scoring sheets, report final scores here for each AA. Number of AAs will vary, usually one per canyon):

AA-1

1. Relative Native Plant Community Composition: Score =1.2
Comments:

2. Vegetation Horizontal Patch Structure : Score = 0.2
Comments:

3. Vegetation Vertical Structure: Score = 0.4
Comments:

4. Native Riparian Tree Regeneration: Score =0.1
Comments:

5. Invasive Exotic Plant Species Cover: Score = 0.8
Comments:

6. Total Biotic Metrics Score: 2.7

Any additional information on NMRAM Biotic Metrics:
1-76-688(276°), 1-77-689(84°),1-78-690(102°),1-79-691(284°)
This AA seems to be in good condition. Not disturbed by cattle grazing and little to no invasive species found in the AA.

AA-2

1. Relative Native Plant Community Composition: Score = ___
Comments:

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:

3. Vegetation Vertical Structure: Score = ___
Comments:

4. Native Riparian Tree Regeneration: Score = ___
Comments:

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:

6. Total Biotic Metrics Score: _____

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Any additional information on NMRAM Biotic Metrics:

AA-3

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-4

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

11. Other Additional General Comments or Information about canyon:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Canyon Name: Sycamore
Survey Date(s):10-23-13 **Personnel**: Matt McMillan, Joanna Franks, David Lightfoot

*VERIFY THAT **THIS FORM** AND **BOTH MAPS** AND **NMRAM ASSESSMENT** ARE COMPLETED AND LEGIBLE PRIOR TO LEAVING EACH CANYON SITE: Yes X (check here)*

Procedures: Systematically fill out each page of this field survey data form. Write clearly so that another person can easily ready what is written. Also, fill out each data sheet for NRCS pasture condition, and NMRAM. Draw on each map as described in the protocols document. Each Canyon Folder includes: 1) this field survey data form document, 2) four maps, 3) NRCS Pasture Condition score sheet, and 4) NMRAM field data forms for biotic metrics and stressor check-list. Please keep all materials together.

Maps (4): 1) blank aerial image map to draw features on, 2) original SWReGAP vegetation community map to verify, 3) modified SWReGAP vegetation community map for final vegetation community verification and to draw any vegetation community changes on, and 4) a soils map. Use each appropriate map while completing this form. Adjust plant communities on the modified SWReGAP plant community map, and draw all other habitats, etc. on the blank aerial image map.

Photographs: Write image numbers as displayed from camera card after "Photo No(s)" below. Number multiple cards sequentially 1, 2, etc., change cards as needed. Record each photograph as: *card number-image number* (e.g.: 1-23). Provide a brief description of each (general location, view direction, GPS if appropriate). Put a comma after each photo number/respective description. Data sheets for additional photos are included in each folder.

NRCS Pasture Condition Score sheets for riparian and upland portions of each canyon are included. Use those score sheets and place overall score for each on the last page of this document.

NMRAM data forms for each canyon are also included in this folder, but keep those separate.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Vegetation communities present (SWReGAP) circle Y or N for each. Provide at least one representative photograph of each showing dominant plant species.

1.North American Warm Desert Lower Montane Riparian Woodland and Shrubland S094 Verified and/or redrawn on map? Y N
Dominant Species:PLWR,CERE2,QUAR,QUGR3,ARWA,FRCU,RHTR,POFR,SAGO
PhotoNo.(s):1-1-502(500°),1-2-503(300°),1-3-504(118°),1-4-505(288°)

2. North American Warm Desert Wash S020 Verified and/or redrawn on map? Y N
Dominant Species:
SEGR4,BASA,CHLI12,CERE2,ANGE,BOCU,RHTR,ARAD,PRGL2,AMMO2
PhotoNo.(s): 1-5-506(108°),1-7-508(273°),1-8-509(98°),1-25-525(307°),1-26-526(110°)1-47-547(163°)

3.Apacherian-Chihuhuan Semi-Desert Grassland and Steppe S077 Verified and/or redrawn on map? Y N
Dominant Species:PRGL2,ARAR
PhotoNo.(s):1-6-507(316°),1-34-534(80°),1-35-535(270°),1-36-536(342),1-37-537(34°),1-9-510(N°),1-10-511(E°),1-11-512(S°),1-12-513(W°),1-13-514(306°),1-14-515(131°)

4.Madrean Pinyon-Juniper Woodlands S112 Verified and/or redrawn on map? Y N
Dominant Species: JUMO,PIED,QUGR3
PhotoNo.(s):_____

5.Madrean Juniper Savanna S115 Verified and/or redrawn on map? Y N
Dominant Species: JUMO
PhotoNo.(s):_____

6. Disturbed Area D01 Verified and/or redrawn on map? Y N
Dominant Species:AMPA10, ERNA10
PhotoNo.(s):1-27-527(320°),1-28-528(95°),1-30-530(213°),1-31-531(272°),1-32-532(240°),1-33-533(65°),1-38-538(308°),1-39-539(18°),1-40-540(110°),1-41-541(270°),1-42-542(90°),1-43-543(282°),1-44-544(106°),1-45-545(283°),1-46-546(106°)

Additional comments/information regarding vegetation communities:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

2. Soils present (NRCS soils) circle Y or N for each. Provide at least one representative photograph of each showing soil surfaces.

1. Lonti-Manzano association Verified and/or redrawn on map? Y N
Description: 1 to 25% slopes
PhotoNo.(s):_____

2. Lozena-Rock Outcrop association Verified and/or redrawn on map? Y N
Description: 10 to 35% slopes
PhotoNo.(s):_____

3. Paymaster-Ellicot Manzano association Verified and/or redrawn on map? Y N
Description: 0 to 5 % slopes
PhotoNo.(s):_____

Additional comments/information regarding soils:

3. Other Habitats present (>1 ha) other than *SWReGAP vegetation communities, springs, wetlands, stream type, water bodies, riparian vegetation*, and draw on map. (e.g., cliff face, rock outcrop, cave, etc.). Write NONE for habitat 1 if none present.

1. Wetland #1 Verified and/or redrawn on map? Y N
Photo No(s): See Matt's iphone Description(s): Riparian vegetation and potential habitat for garter snakes and leopard frogs.

2._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

3._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

4._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional habitat information, comments:

4. Sensitive plant or animal species/habitats
Write NONE for species 1 if none present and draw habitats on map:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Species: Chiricahua Leopard Frog Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Aquatic habitat and riparian habitats needed to reproduce.

2. Species: Lowlands Leopard Frog Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Riparian wetlands along Gila River

3. Species: Mexican Garter Snake Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Needs free standing of slow moving large bodies of water that are vegetated.

4. Species: Narrow headed garter snake Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Highly aquatic species of snake and is restricted to montane riparian areas.

5. Species: Gila Brickellbush Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s): Restricted to alluvial soils along the Gila River

6. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

7. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

8. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on sensitive species habitats:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

5. Springs present/GPS coordinates and draw on map. Write NONE for spring 1 if none.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on springs:

6. Wetlands present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: should also be on vegetation map.

1. Description: Wetland #1
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s): Intermittent throughout the whole wetland. See special habitat.

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on wetlands:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

7. Riparian Vegetation present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: Should also be on vegetation map and veg above.

1. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):See habitat types and SWReGAP

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on riparian vegetation:

8. Stream types present/GPS coordinates and draw on map.
Stream types = 1) permanent, 2) intermittent, 3) ephemeral.

1. Description (stream type, extent of canyon, aquatic habitats): Intermittent
GPS N_____W_____ Mapped: Y N
Photo No(s).:See habitiat types and SWReGAP

2. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

3. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

Additional information on stream types:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

9. Water body (lentic) present/GPS coordinates and draw on map. Write NONE for water body 1 if none present.

1. Description: Sycamore Creek
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s): See habitat types and SWReGAP

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on lentic water bodies:

10. NRCS Rangeland (Pasture) Condition Score (use separate NRSC scoring sheets, report final score here, partition by landscape units below):

1. Riparian/stream Zone: Score = 25 Comments: Livestock concentrating in the riparian zone.

2. Upland Zone: Score = 19 Comments: Perennial grasses are grazed out. No BOGR2. Annual grasses and weeds prevail.

3. Other (describe): Score = ___ Comments:_____
_____

Any additional information on Rangeland Conditions:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

10. NMRAM Biotic Metric Scores (use separate NMRAM scoring sheets, report final scores here for each AA. Number of AAs will vary, usually one per canyon):

AA-1

1. Relative Native Plant Community Composition: Score = 1.2
Comments:

2. Vegetation Horizontal Patch Structure : Score = 0.4
Comments:

3. Vegetation Vertical Structure: Score =0.6
Comments:

4. Native Riparian Tree Regeneration: Score = 0.1
Comments:

5. Invasive Exotic Plant Species Cover: Score = 0.8
Comments:

6. Total Biotic Metrics Score:3.1

Any additional information on NMRAM Biotic Metrics:
Little vegetation complexity but no exotic plants. 1-48-548(270°)1-49-549(91°)1-50-550(25°)1-51-551(205°)

AA-2

1. Relative Native Plant Community Composition: Score = 0.9
Comments:

2. Vegetation Horizontal Patch Structure : Score = 0.6
Comments:

3. Vegetation Vertical Structure: Score = 0.6
Comments:

4. Native Riparian Tree Regeneration: Score = 0.3
Comments:

5. Invasive Exotic Plant Species Cover: Score = 0.4
Comments:

6. Total Biotic Metrics Score: 2.8
Good riparian vegetation complexity, score lowered because of invasive species.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1-52-552(310°),1-53-553(135°),1-54-554(158°),1-55-555(330°)

Any additional information on NMRAM Biotic Metrics:
AA-3

1. Relative Native Plant Community Composition: Score = 0.9
Comments:

2. Vegetation Horizontal Patch Structure : Score = 0.4
Comments:

3. Vegetation Vertical Structure: Score = 0.4
Comments:

4. Native Riparian Tree Regeneration: Score = 0.2
Comments:

5. Invasive Exotic Plant Species Cover: Score = 0.2
Comments:

6. Total Biotic Metrics Score: 2.1

Any additional information on NMRAM Biotic Metrics: AA in human disturbed area, gravel extractions, and riparian trees are sparse.
1-56-556 through 1-60-560

AA-4

1. Relative Native Plant Community Composition: Score = ___
Comments:

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:

3. Vegetation Vertical Structure: Score = ___
Comments:

4. Native Riparian Tree Regeneration: Score = ___
Comments:

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

11. Other Additional General Comments or Information about canyon:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Canyon Name: Pope
Survey Date(s):10-22-13&12-16-13 **Personnel**: Matt McMillan, Joanna Franks, David Lightfoot

*VERIFY THAT **THIS FORM** AND **BOTH MAPS** AND **NMRAM ASSESSMENT** ARE COMPLETED AND LEGIBLE*
PRIOR TO LEAVING EACH CANYON SITE: Yes X (check here)

Procedures: Systematically fill out each page of this field survey data form. Write clearly so that another person can easily ready what is written. Also, fill out each data sheet for NRCS pasture condition, and NMRAM. Draw on each map as described in the protocols document. Each Canyon Folder includes: 1) this field survey data form document, 2) four maps, 3) NRCS Pasture Condition score sheet, and 4) NMRAM field data forms for biotic metrics and stressor check-list. Please keep all materials together.

Maps (4): 1) blank aerial image map to draw features on, 2) original SWReGAP vegetation community map to verify, 3) modified SWReGAP vegetation community map for final vegetation community verification and to draw any vegetation community changes on, and 4) a soils map. Use each appropriate map while completing this form. Adjust plant communities on the modified SWReGAP plant community map, and draw all other habitats, etc. on the blank aerial image map.

Photographs: Write image numbers as displayed from camera card after "Photo No(s)" below. Number multiple cards sequentially 1, 2, etc., change cards as needed. Record each photograph as: *card number-image number* (e.g.: 1-23). Provide a brief description of each (general location, view direction, GPS if appropriate). Put a comma after each photo number/respective description. Data sheets for additional photos are included in each folder.

NRCS Pasture Condition Score sheets for riparian and upland portions of each canyon are included. Use those score sheets and place overall score for each on the last page of this document.

NMRAM data forms for each canyon are also included in this folder, but keep those separate.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Vegetation communities present (SWReGAP) circle Y or N for each. Provide at least one representative photograph of each showing dominant plant species.

1.Apacherian-Chihuahuan Semi-Desert Grassland and Steppe S077 Verified and/or redrawn on map? Y N
Dominant Species:PRGL2,BOGR2,BOER4,YUEL,PLJA
PhotoNo.(s):1-1-472(264°),1-11-482(243°),1-23-494(113°),1-14(181˚),1-15(109˚),1-16(52˚)

2. Madrean Juniper Savanna S115 Verified and/or redrawn on map? Y N
Dominant Species: JUMO,PRGL2,BOGR2,BOER4,YUEL
PhotoNo.(s):1-8-479(264°),1-24-495(102),1-25-496(288°),1-26-497(118°),1-27-498(286°),1-5(305˚),1-6(348˚),1-7(38˚),1-8(101˚),1-19(8˚),1-20(105˚),1-21(157˚),1-22(232˚)

3 North American Warm Desert Wash S020 Verified and/or redrawn on map? Y N
Dominant Species:JUMO,BOCU,BOGR2,PRGL2,FAPA,CHLI2
PhotoNo.(s):1-4-475(198°),1-5-476(23°), 1-6-477(55°), 1-7-478(236°),1-9-480(129°),1-10-481(344°),1-12-483(55°),1-13-484(222°),1-14-485(85°),1-15-486(264°), 1-20-491(68°),1-21-492(242°),1-28-499(61°),1-29-500(250°),1-9(86˚),1-10(55˚),1-11(25˚),

4. Disturbed Area D01 Verified and/or redrawn on map? Y N
Dominant Species: AMPA10
PhotoNo.(s):1-2-473(158°),1-22-493(78°),1-23(61˚),1-24(178˚),1-25(234˚),1-1(208˚),1-2(248˚),1-3(305˚),1-4(332˚)

5Chihuhuan- Sonoran Desert Bottomland and Swale Grassland S109 Verified and/or redrawn on map? Y N
Dominant Species: SCBR, YUEL
PhotoNo.(s):1-3-474(358°)

6._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
_____
PhotoNo.(s):_____

Additional comments/information regarding vegetation communities:
General overview of canyon looking downstream picture:
1-8-499(264°), 1-12(US), 1-13(DS)
Different soil North of Wash within S115 1-17(358˚), 1-18(178˚)

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

2. Soils present (NRCS soils) circle Y or N for each. Provide at least one representative photograph of each showing soil surfaces.

1 Lonti-Ustorthents associations Verified and/or redrawn on map? Y N
Description: 50 to 60% slopes
PhotoNo.(s):_____

2 Orthents Verified and/or redrawn on map? Y N
Description: 25 to 60% slopes
PhotoNo.(s):_____

3._____ Verified and/or redrawn on map? Y N
Description:_____
_____
PhotoNo.(s):_____

Additional comments/information regarding soils:

3. Other Habitats present (>1 ha) other than *SWReGAP vegetation communities, springs, wetlands, stream type, water bodies, riparian vegetation*, and draw on map. (e.g., cliff face, rock outcrop, cave, etc.). Write NONE for habitat 1 if none present.

1 Steep Arroyo Bank Verified and/or redrawn on map? Y N
Photo No(s).:1-7-478(236°) Description(s) Bank is made of soil not rock

2. Pond from overflow of water tank Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Pond is not active. No movement in or around pond. No riparian vegetation around pond.

3._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

4._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional habitat information, comments:

4. Sensitive plant or animal species/habitats
Write NONE for species 1 if none present and draw habitats on map:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Species : Gila Brickellbush Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Restricted to alluvial soils near the Gila River.

2. Species: Gila Monster Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s) Habitat: Rocky slopes, canyons, and washes.

3. Species: Pinos Altos Fame Flower Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Shallow gravely soils usually overlying rhyolite.

4. Species: Baird's Sparrow Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Grassland areas that are not grazed.

5. Species: Sprague's Pipit Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Pipit is in association with grasslands that have not been grazed.

6. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

7. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

8. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on sensitive species habitats:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

5. Springs present/GPS coordinates and draw on map. Write NONE for spring 1 if none.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on springs:

6. Wetlands present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: should also be on vegetation map.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on wetlands:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

7. Riparian Vegetation present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: Should also be on vegetation map and veg above.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on riparian vegetation:

8. Stream types present/GPS coordinates and draw on map.
Stream types = 1) permanent, 2) intermittent, 3) ephemeral.

1. Description (stream type, extent of canyon, aquatic habitats): Ephemeral dry wash bed GPS N_____W_____
Mapped: Y N
Photo No(s).See habitat types and SWReGAP

2. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

3. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

Additional information on stream types:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

9. Water body (lentic) present/GPS coordinates and draw on map. Write NONE for water body 1 if none present.

1. Description: None
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on lentic water bodies:

10. NRCS Rangeland (Pasture) Condition Score (use separate NRSC scoring sheets, report final score here, partition by landscape units below):

1. Riparian/stream Zone: Score =37 Comments:_____
_____

2. Upland Zone: Score = 38Comments:_____
_____

3. Other (describe): Score = ___ Comments:_____
_____

Any additional information on Rangeland Conditions:
The rangeland is in good condition because it is not currently being grazed or has been in the past.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

10. NMRAM Biotic Metric Scores (use separate NMRAM scoring sheets, report final scores here for each AA. Number of AAs will vary, usually one per canyon):

AA-1

1. Relative Native Plant Community Composition: Score = 1.2
Comments:

2. Vegetation Horizontal Patch Structure : Score = 0.2
Comments:

3. Vegetation Vertical Structure: Score = 0.2
Comments:

4. Native Riparian Tree Regeneration: Score = 0.1
Comments:

5. Invasive Exotic Plant Species Cover: Score =0.8
Comments:

6. Total Biotic Metrics Score: 2.5

Any additional information on NMRAM Biotic Metrics: Ephemeral dry wash; no phneatophytic vegetation. See photo # 1-16-487 through 1-19-490.

AA-2

1. Relative Native Plant Community Composition: Score = ___
Comments:

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:

3. Vegetation Vertical Structure: Score = ___
Comments:

4. Native Riparian Tree Regeneration: Score = ___
Comments:

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:

6. Total Biotic Metrics Score: _____

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Any additional information on NMRAM Biotic Metrics:

AA-3

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-4

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

11. Other Additional General Comments or Information about canyon:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Canyon Name: Winn
Survey Date(s): 12-17-2013 **Personnel**: Matt McMillan and Joanna Franks

*VERIFY THAT **THIS FORM** AND **BOTH MAPS** AND **NMRAM ASSESSMENT** ARE COMPLETED AND LEGIBLE PRIOR TO LEAVING EACH CANYON SITE: Yes ×__(check here)*

Procedures: Systematically fill out each page of this field survey data form. Write clearly so that another person can easily ready what is written. Also, fill out each data sheet for NRCS pasture condition, and NMRAM. Draw on each map as described in the protocols document. Each Canyon Folder includes: 1) this field survey data form document, 2) four maps, 3) NRCS Pasture Condition score sheet, and 4) NMRAM field data forms for biotic metrics and stressor check-list. Please keep all materials together.

Maps (4): 1) blank aerial image map to draw features on, 2) original SWReGAP vegetation community map to verify, 3) modified SWReGAP vegetation community map for final vegetation community verification and to draw any vegetation community changes on, and 4) a soils map. Use each appropriate map while completing this form. Adjust plant communities on the modified SWReGAP plant community map, and draw all other habitats, etc. on the blank aerial image map.

Photographs: Write image numbers as displayed from camera card after "Photo No(s)" below. Number multiple cards sequentially 1, 2, etc., change cards as needed. Record each photograph as: *card number-image number* (e.g.: 1-23). Provide a brief description of each (general location, view direction, GPS if appropriate). Put a comma after each photo number/respective description. Data sheets for additional photos are included in each folder.

NRCS Pasture Condition Score sheets for riparian and upland portions of each canyon are included. Use those score sheets and place overall score for each on the last page of this document.

NMRAM data forms for each canyon are also included in this folder, but keep those separate.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

1. Vegetation communities present (SWReGAP) circle Y or N each. Provide at least one representative photograph of each showing dominant plant species.

1. North American Warm Desert Wash S020 Verified and/or redrawn on map? Y N
Dominant Species:ATCA2, RGL2,BOGR2,BOER4,AMPA10,CHLI2,BOCU ,BOBA2
PhotoNo.(s):1-1(105),1-2(105),1-44(324˚),1-45(57˚),1-46(128˚),1-47(230˚),1-49(78˚),1-50(124˚),1-51(105˚),1-68(295˚),1-69(34˚),1-70(123˚),1-71(207˚)
2.Apacherian-Chihuahuan Semi-Desert Grassland and Steppe S077Verified and/or redrawn on map? Y N
Dominant Species:PRGL2,BOGR2,BOCU,JUMO,ATCA2,BOBA2,BOER4
PhotoNo.(s):1-3(150˚),1-4(201˚),1-5(262˚),1-6(310˚),1-7(124˚),1-8(158˚),1-9(222˚),1-10(308˚),1-11(354˚),1-12(56˚),1-13(146˚),1-14(216˚),1-15(302˚),1-16(98˚),1-17(144˚),1-18(216˚)1-19(297˚),1-20(357˚),1-21(62˚),1-22(112˚),1-27(282˚),1-28(326˚)1-29(26˚),1-30(108˚),1-35(324˚),1-36(20˚),1-37(70˚)1-38(145˚),1-39(224˚),1-40(312˚),1-41(336˚),1-42(46˚),1-43(127˚),1-60(162˚),1-61(205˚),1-62(251˚),1-63(302˚),1-64(5˚),1-65(98˚),1-66(31˚),1-67(198˚),1-72(283˚),1-73(304˚),1-74(346˚),1-75(25˚),1-76(50˚),1-77(91˚)

3.Disturbed Area DO1 Verified and/or redrawn on map? Y N
Dominant Species: Plowed area used to harvest wheat in the spring
PhotoNo.(s): 1-23(309˚),1-24(40˚),1-25(113˚),1-26(217˚),1-31(316˚),1-32(46˚),1-33(123˚),1-34(232˚)
4._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
_____
PhotoNo.(s):_____

5._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
PhotoNo.(s):_____
_____

6._____ Verified and/or redrawn on map? Y N
Dominant Species:_____
_____
PhotoNo.(s):_____

Additional comments/information regarding vegetation communities:

Wildlife spotted in vegetation communities:

Raccoon tracks, three coyotes, coveys of quail, chipping sparrows, lark sparrows, crows, ravens, and lark buntings.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

2. Soils present (NRCS soils) circle Y or N for each. Provide at least one representative photograph of each showing soil surfaces.

1. Lonti- Monzano association Verified and/or redrawn on map? Y N
Description: 1 to 25%
PhotoNo.(s):_____

2. Lonti-Usthorthents association Verified and/or redrawn on map? Y N
Description: 5 to 60 %
PhotoNo.(s):_____

3. Orthents Verified and/or redrawn on map? Y N
Description: 25 to 60%
PhotoNo.(s):_____

4. Paymaster-Ellicot Complex Verified and/or redrawn on map? Y N
Description: 1 to 3%
PhotoNo.(s):_____

Additional comments/information regarding soils:

3. Other Habitats present (>1 ha) other than *SWReGAP vegetation communities, springs, wetlands, stream type, water bodies, riparian vegetation*, and draw on map. (e.g., cliff face, rock outcrop, cave, etc.). Write NONE for habitat 1 if none present.

1. Steep Wall Cliff Verified and/or redrawn on map? Y N
Photo No(s). 1-48(264) Description(s):Wall is made of soft silty clay, still frozen, and surrounding plants consisted of GUSA.

2._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

3._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

4._____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional habitat information, comments:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

4. Sensitive plant or animal species/habitats
Write NONE for species 1 if none present and draw habitats on map:

1. Species : Gila Brickellbush Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Habitat: Restricted to alluvial soils near the Gila River.

2. Species: Gila Monster Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s) Habitat: Rocky slopes, canyons, and washes.

3. Species: Pinos Altos Fame Flower Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Shallow gravely soils usually overlying rhyolite.

4. Species: Bairds's Sparrow Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Grassland areas that are not grazed.

5. Species: Sprauge's Pipit Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):Pipit is in association with grasslands that have not been grazed.

6. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

7. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

8. Species:_____ Verified and/or redrawn on map? Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on sensitive species habitats:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

5. Springs present/GPS coordinates and draw on map. Write NONE for spring 1 if none.

1. Description :NONE
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on springs:

6. Wetlands present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: should also be on vegetation map.

1. Description: NONE
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on wetlands:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

7. Riparian Vegetation present/GPS coordinates and draw on map. Write NONE for wetland 1 if none present. Note: Should also be on vegetation map and veg above.

1. Description: NONE
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on riparian vegetation:

8. Stream types present/GPS coordinates and draw on map.
Stream types = 1) permanent, 2) intermittent, 3) ephemeral.

1. Description (stream type, extent of canyon, aquatic habitats): Dry Ephemeral
GPS N_____W_____ Mapped: Y N
Photo No(s).See vegetation type photos under SWReGAP

2. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

3. Description (stream type, extent of canyon, aquatic habitats):_____
_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____

Additional information on stream types:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

9. Water body (lentic) present/GPS coordinates and draw on map. Write NONE for water body 1 if none present.

1. Description :NONE
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

2. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

3. Description:_____
GPS N_____W_____ Mapped: Y N
Photo No(s).:_____Description(s):_____
_____

Additional information on lentic water bodies:

10. NRCS Rangeland (Pasture) Condition Score (use separate NRSC scoring sheets, report final score here, partition by landscape units below):

1. Riparian/stream Zone: Score = 37 Comments:_____
_____

2. Upland Zone: Score = 38 Comments:_____
_____

3. Other (describe): Score = ___ Comments:_____
_____

Any additional information on Rangeland Conditions:
Many desired plant species were present, and the area is not currently being grazed.

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

10. NMRAM Biotic Metric Scores (use separate NMRAM scoring sheets, report final scores here for each AA. Number of AAs will vary, usually one per canyon):

AA-1

1. Relative Native Plant Community Composition: Score = 1.2
Comments:

2. Vegetation Horizontal Patch Structure : Score =0.2
Comments:

3. Vegetation Vertical Structure: Score =0.2
Comments:

4. Native Riparian Tree Regeneration: Score = 0.1
Comments:

5. Invasive Exotic Plant Species Cover: Score = 0.8
Comments:

6. Total Biotic Metrics Score: 2.5

AA-DS END	AA-US END	
1-52(312) 1 -55(38')	1-56(127')	1-59(238')
1-53(127')	1-57(334')	
1-54(205')	1-58(56')	

Any additional information on NMRAM Biotic Metrics:
Great pasture scored due to strong desired plants. Diversity of plants at Winn canyon is not very strong .Vegetation group is grass and wash.

AA-2

1. Relative Native Plant Community Composition: Score = ___
Comments:

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:

3. Vegetation Vertical Structure: Score = ___
Comments:

4. Native Riparian Tree Regeneration: Score = ___
Comments:

5. Invasive Exotic Plant Species Cover: Score = ___

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-3

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Any additional information on NMRAM Biotic Metrics:

AA-4

1. Relative Native Plant Community Composition: Score = ___
Comments:_____

2. Vegetation Horizontal Patch Structure : Score = ___
Comments:_____

3. Vegetation Vertical Structure: Score = ___
Comments:_____

4. Native Riparian Tree Regeneration: Score = ___
Comments:_____

5. Invasive Exotic Plant Species Cover: Score = ___
Comments:_____

6. Total Biotic Metrics Score: _____

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

Any additional information on NMRAM Biotic Metrics:

Place additional information on back side of this page as needed

Environmental Survey of Gila Watershed Potential Impoundment Canyons

11. Other Additional General Comments or Information about canyon:

Place additional information on back side of this page as needed

APPENDIX F
PHOTOGRAPHS FOR PROPOSED WATER IMPOUNDMENT CANYONS IN GRANT COUNTY, NEW MEXICO

Appendix E available electronically on attached CD

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APPENDIX G
NMRAM ASSESSMENT AREA PHOTOGRAPHS FOR PROPOSED WATER IMPOUNDMENT CANYONS IN GRANT COUNTY, NEW MEXICO

Appendix F available electronically on attached CD

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Photograph E.1. Facing north (360°) at North American Warm Desert Wash (S020) habitat in Davis Canyon.

Photograph E.2. Facing northeast (64°) at Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077) habitat in Davis Canyon.

Photograph E.3. Facing southwest (270°) at Madrean Pinyon-Juniper Woodland (S112) habitat in Davis Canyon.

Photograph E.4. Facing northwest (304°) at Disturbed/Nonspecific (D01) habitat in Davis Canyon.

Photograph E.5. Facing west (272°) at Open Water (N11) habitat in Davis Canyon.

Photograph E.6. Facing south (180°) at North American Warm Desert Wash (S020) habitat in Dix Canyon.

Photograph E.7. Facing southwest (241°) at Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077) habitat in Dix Canyon.

Photograph E.8. Facing southeast (156°) at Madrean-Juniper Savanna (S115) habitat in Dix Canyon.

Photograph E.9. Facing southwest (217°) at Madrean-Juniper Savanna (S115) habitat in Maldonado Canyon.

Photograph E.10. Facing east (90°) at North American Warm Desert Wash (S020) habitat in Maldonado Canyon.

Photograph E.11. Facing northeast (62°) at Disturbed/Nonspecific (D01) habitat in Maldonado Canyon.

Photograph E.12. Facing southwest (243°) at Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077) habitat in Pope Canyon.

Photograph E.13. Facing southeast (101°) at Madrean Juniper Savanna (S115) habitat in Pope Canyon.

Photograph E.14. Facing southwest (198°) at North American Warm Desert Wash (S020) habitat in Pope Canyon.

Photograph E.15. Facing southwest (240°) at Disturbed/Nonspecific (D01) habitat in Pope Canyon.

Photograph E.16. Facing north (358°) at Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (S109) in Pope Canyon.

Photograph E.17. Facing northwest (330°) at North American Warm Desert Wash (S020) habitat in Schoolhouse Canyon.

Photograph E.18. Facing southwest (226°) at Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077) habitat in Schoolhouse Canyon.

Photograph E.19. Facing southeast (154°) at Madrean Pinyon-Juniper Woodland (S112) habitat in Schoolhouse Canyon.

Photograph E.20. Facing southeast (190°) at Madrean-Juniper Savanna (S115) habitat in Spar Canyon.

Photograph E.21. Facing southeast (160°) at North American Warm Desert Wash (S020) habitat in Spar Canyon.

Photograph E.22. Facing southwest (190°) at Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077) habitat in Spar Canyon.

Photograph E.23. Facing northwest (356°) at Disturbed/Nonspecific (D01) habitat in Spar Canyon.

Photograph E.24. Facing southeast (343°) at North American Warm Desert Lower Montane Riparian Woodland and Shrubland (S094) in Sycamore Canyon.

Photograph E.25. Facing southwest (270°) at North American Warm Desert Wash (S020) habitat in Sycamore Canyon.

Photograph E.26. Facing east (90°) at Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077) habitat in Sycamore Canyon.

Photograph E.27. Facing south (180°) at Madrean Pinyon-Juniper Woodland (S112) habitat in Sycamore Canyon.

Photograph E.28. Facing south (272°) at Madrean Juniper-Savanna (S115) habitat in Sycamore Canyon.

Photograph E.29. Facing east (90°) at Disturbed/Nonspecific (D01) habitat in Sycamore Canyon.

Photograph E.30. Facing southwest (230°) at North American Warm Desert Wash (S020) habitat in Winn Canyon.

Photograph E.31. Facing southwest (222°) at Apacherian-Chihuahuan Semi-Desert Grassland and Steppe (S077) in Winn Canyon.

Photograph E.32. Facing northwest (316°) at Disturbed/Nonspecific (D01) habitat in Winn Canyon

Photograph F.1. View of AA habitat (90°) in Davis Canyon.

Photograph F.2. View of AA habitat (270°) in Davis Canyon.

Photograph F.3. View of AA habitat (83°) in Dix Canyon.

Photograph F.4. View of AA habitat (94°) in Dix Canyon.

Photograph F.5. View of AA habitat (90°) in Maldonado Canyon.

Photograph F.6. View of AA habitat (57°) in Maldonado Canyon.

Photograph F.7. View of AA habitat (40°) in Pope Canyon.

Photograph F.8. View of AA habitat (237°) in Pope Canyon.

Photograph F.9. View of AA habitat (90°) in Schoolhouse Canyon.

Photograph F.10. View of AA habitat (270°) in Schoolhouse Canyon.

Photograph F.11. View of AA habitat (102°) in Spar Canyon.

Photograph F.12. View of AA habitat (284°) in Spar Canyon.

Photograph F.13. View of AA#1 habitat (91°) in Sycamore Canyon.

Photograph F.14. View of AA#1 habitat (25°) in Sycamore Canyon.

Photograph F.15. View of AA#2 habitat (135°) in Sycamore Canyon.

Photograph F.16. View of AA#2 habitat (158°) in Sycamore Canyon.

Photograph F.17. View of AA#3 habitat (90°) in Sycamore Canyon.

Photograph F.18. View of AA#3 habitat (270°) in Sycamore Canyon.

Photograph F.19. View of AA habitat (312°) in Winn Canyon.

Photograph F.20. View of AA habitat (238°) in Winn Canyon.