DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SAN PEDRO RIPARIAN NATIONAL CONSERVATION AREA ANALYSIS OF THE MANAGEMENT SITUATION REPORT

BLM

SPRNCA RMP
Analysis of the Management Situation

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ACRONYMS AND ABBREVIATIONS

ACEC – Area of Critical Environmental Concern
ADA – Arizona Department of Agriculture
ADEQ – Arizona Department of Environmental Quality
ARIES – Artificial Intelligence for Ecosystem Services
ADWR – Arizona Department of Water Resources
ASLD – Arizona State Land Department
AZGFD – Arizona Game and Fish Department
AMS – Analysis of the Management Situation
APIF – Arizona Partners in Flight
AUM – Animal Unit Month
BCR – Bird Conservation Region
BLM – Bureau of Land Management
CFR – Code of Federal Regulations
CRMP – Coordinated Resource Management Plan
CWPP – Community Wildfire Protection Plan
CO – Carbon Monoxide
CO_2 – Carbon Dioxide
CH_4 – Methane
DFC – Desired Future Condition
EIS – Environmental Impact Statement
ESA – Endangered Species Act
EO – Executive Order
FAR – Functional at Risk
FLPMA – Federal Land Policy and Management Act
FMP – Fire Management Plan
FR – Federal Register
FRCC – Fire Regime Condition Class
FRG – Fire Regime Group
FSPR – Friends of the San Pedro River
ft. – feet
GHG – Greenhouse Gas
GIBA – Globally Important Bird Area
GIS – Geographic Information System
GtC – Gigatons of Carbon
IBA – Important Bird and Biodiversity Area
IM – Information Memorandum
IMPROVE – Interagency Monitoring of Protected Visual Environments Network
IMW – Intermountain West
in. – inch
InVEST – Integrated Valuation of Ecosystem Services and Tradeoffs
IPCC – Intergovernmental Panel on Climate Change
LUPA – Land Use Plan Amendment
N_2O – Nitrous Oxide
NAAQS – National Ambient Air Quality Standards

NRCD – Natural Resources Conservation District
NAWCP – North American Waterbird Conservation Plan
NAWMP – North American Waterfowl Management Plan
NCA – National Conservation Area
NCDC – National Climactic Data Center
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act
NHL – National Historic Landmark
No. - Number
NLCS – National Landscape Conservation System
NPS – National Park Service
NO_2 – Nitrogen Dioxide
NOAA – National Oceanic and Atmospheric Administration
NRCS – Natural Resources Conservation Service
NRHP – National Register of Historic Places
NRST – National Riparian Service Team
0_3 – Ozone
OHV – Off Highway Vehicle
PA – Planning Area
PFC – Proper Functioning Condition
PFYC – Potential Fossil Yield Classification
PL – Public Law
$PM_{2.5}$ – Particles less than 2.5 micrometers in size
PM_{10} - Particles less than 10 micrometers in size
ppm – parts per million
ppb – parts per billion
PSD – Prevention of Significant Deterioration
PDSI - Palmer Drought Severity Index
p.z. – precipitation zone
RAC – Resource Advisory Council
REA – Rapid Ecoregional Assessments
RMP – Resource Management Plan
RMZ – Recreation Management Zone
RNA – Research Natural Area
ROW – Rights-of-way
SGCN – Species of Greatest Conservation Need
SJV – Sonoran Joint Venture
SO – Secretary Order
SO_2 – Sulfur Dioxide
SPRNCA – San Pedro Riparian National Conservation Area
SRMA – Special Recreation Management Area
SRP – Special Recreation Permit
SWAP – State Wildlife Action Plan
TFO – Tucson Field Office
TTM – Travel and Transportation Management
USDI – United States Department of the Interior

USEPA – United States Environmental Protection Agency
USGS – United States Geological Survey
USFWS – United States Fish and Wildlife Service
UXO – Unexploded Ordnance
Vol. - Volume
VRM – Visual Resource Management
VRI – Visual Resource Inventory
WCR – Waterfowl Conservation Region
WUI – Wildland Urban Interface
ºC – degrees Celsius
ºF – degrees Fahrenheit
$\mu g/m^3$ – microgram/meter^3

1 Introduction

The United States Department of the Interior (USDI), Bureau of Land Management (BLM) Tucson Field Office (TFO), has initiated the process to develop a Resource Management Plan (RMP) for the San Pedro Riparian National Conservation Area (SPRNCA). Originally, a Riparian Management Plan (BLM 1989) was written to cover 47,668 acres of the SPRNCA. Subsequent to the preparation of the Riparian Management Plan, a land exchange was performed between the BLM and the Arizona State Land Department (ASLD) which added an additional 8,763 acres to the SPRNCA. These acres were part of existing grazing allotments and as part of the land exchange agreement, the grazing leases were allowed to continue. The Riparian Management Plan is not a true RMP because it contains both RMP and activity level decisions. The Record of Decision for the Riparian Management Plan stated that the management decisions and mitigations in the Riparian Management Plan would be incorporated into the Safford District's RMP (Safford RMP), which was in preparation at the time (BLM 1992 and 1994). The Record of Decision for the Safford RMP incorporates those management decisions and mitigations.

The SPRNCA was designated by Congress as the nation's first Riparian National Conservation Area on November 18, 1988. The SPRNCA starts at the US-Mexico border and continues north about 47 miles along the San Pedro River, supporting a nationally significant riparian area (Figure 1-1). The SPRNCA contains four of the rarest habitat types in the Southwest: Fremont cottonwood (Populus fremontii)/Goodding willow(Salix gooddingii) forests, marshlands locally known as cienegas, big sacaton (Sporobolus) grasslands, and mesquite (Prosopis) bosques. The National Audubon Society recognizes the SPRNCA as a Globally Important Bird Area (GIBA) that attracts birders from all over the world. The riparian area along the San Pedro River provides habitat for more than 400 species of birds. Two hundred and forty of these species are considered neotropical migrants that winter in Mexico and breed during the summer months in the United States and Canada. In addition, the SPRNCA currently contains, or contained within the last 150 years, more than 80 species of mammals, one of the richest assemblages of land mammal species in the world. More than 50 species of reptiles and amphibians have also been found within the boundaries of the SPRNCA. Historically, the river supported 13 species of native fishes; however, only two remain in the river, the longfin dace (Agosia chrysogaster chrysogaster) and desert sucker (Catostomus clarkii).

Currently, there is no comprehensive RMP-level management plan specifically addressing the SPRNCA resources. Provisions designed to protect the SPRNCA's resources and values will be developed during the planning effort. Public Law (PL) 100-696 identifies such resources to include:

- Aquatic;
- Wildlife;
- Archeological;
- Paleontological;
- Scientific;
- Cultural;

- Educational; and
- Recreational resources.

The purpose of the RMP is to identify Desired Future Conditions (DFCs) to be maintained or achieved, and management actions necessary to achieve those objectives for the aforementioned resources (BLM 2005).

Through the RMP process, specific decisions will be made to accomplish the following:

- Set DFCs for water quantity and quality; riparian and wetland function; riparian vegetation and upland plant communities;
- Identify priority fish and wildlife species and set desired habitat conditions for those species;
- Identify ecologically-important areas or scarce, limited habitats for special status species;
- Evaluate existing and consider need for designating additional Areas of Critical Environmental Concern (ACEC);
- Designate Visual Resource Management (VRM) classes for all BLM land in the SPRNCA;
- Designate Special Recreation Management Areas (SRMAs) and/or Extensive Recreation Management Areas (ERMAs);
- Designate areas in the SPRNCA as limited or closed to motorized and nonmotorized vehicles;
- Allocate cultural properties to specific uses;
- Identify Right-of-way (ROW) avoidance and exclusion areas and potential acquisition areas; and
- Determine which areas are open or closed to grazing.

In addition to the purpose described above, the RMP will also fulfill requirements and obligations set forth by the Federal Land Policy and Management Act (FLPMA) and BLM land use planning policy.

1.1 Purpose of the Analysis of the Management Situation

This Analysis of the Management Situation (AMS) is a summary document that describes the physical and biological characteristics and condition of resources within the planning area, provides a snapshot of how those resources are currently being managed, and identifies observable and measureable trends in resources and resource uses between past and present. The AMS represents an early component of the planning process, providing a reference for how a given resource might behave in response to issues presented during RMP development. It should not be regarded as a comprehensive or detailed analysis of specific resources. It is intended to provide a framework from which to resolve planning issues through the development of management alternatives. An Environmental Impact Statement (EIS) will be prepared as part of the RMP. An EIS is a document required by the National Environmental Policy Act (NEPA) for federal government agency actions that are “significantly affecting the quality of the human environment.”

1.2 General Description of Planning Area, Geographic Scope, and Resources/Programs

The planning area is the boundary of the SPRNCA, as designated by PL 100-696 (Figure 1-1). The planning area is approximately 56,000 acres of BLM land. The San Pedro River is located in southeastern Arizona with its headwaters about 20 miles south of the US-Mexico border close to the Cananea Mine in Cananea, Mexico. One of the last rivers with perennial stretches of water in the arid Southwest, the San Pedro River flows approximately 140 miles north out of Mexico to the Gila River near Winkelman, Arizona. The river elevation ranges from 4,260 ft. above sea level at the US-Mexico border to 1,920 ft. above sea level at the Gila River confluence.

1.2.1 Hydrology

The San Pedro River drains an area of approximately 4,720 square miles in Santa Cruz, Cochise, Graham, Pima and Pinal Counties. It flows through deep sedimentary basins of volcanic rocks surrounded by the Huachuca, Mule, Whetstone, Dragoon, Rincon, Winchester, Galiuro, Santa Catalina, and Tortilla Mountains. The San Pedro River is fed by numerous tributaries, which in general, drain relatively short and steep watersheds oriented more or less perpendicular to the main valley axis. The two major tributaries are the Babocomari River and Aravaipa Creek. The San Pedro River is considered divided into upper and lower reaches at the Narrows, just north of Benson, Arizona. The San Pedro River and the two aquifers (regional and alluvial) that supply it support a diverse and growing community of ranchers, farmers, urban citizens, and military base residents.

1.2.2 Wild and Scenic Rivers

The segment of the San Pedro River that passes through the SPRNCA was determined to be suitable for inclusion under the Recreational Classification in the National Wild and Scenic River System in 1994; however, it has not been designated by Congress (BLM 1994).

1.2.3 Threatened and Endangered Species

The SPRNCA provides habitat for 18 federally listed, or proposed, threatened and endangered species, including designated critical habitat for the endangered Huachuca water umbel (*Lilaeopsis schaffneriana ssp. recurva*) and proposed critical habitat for northern Mexican gartersnake (*Thamnophis eques megalops*) and yellow-billed cuckoo (*Coccyzus americanus*) occurs in the SPRNCA. Designated critical habitat for southwestern willow flycatcher (*Empidonax traillii extimus*) occurs on the San Pedro River downstream of the SPRNCA, and designated critical habitat for the jaguar (*Panthera onca)* occurs approximately three miles west of the SPRNCA.

1.2.4 Cultural Resources

The SPRNCA also contains significant cultural resources dating back approximately 11,000 years to the Paleoindians, the first human inhabitants of North America as well as the upper San Pedro River Valley. The Murray Springs Clovis Site lies within the SPRNCA and was designated as a National Historic Landmark (NHL) in 2012 by the Secretary of the Interior.

1.2.5 Recreation

The SPRNCA provides a variety of recreation opportunities in a largely undeveloped, semi-primitive nonmotorized setting. Recreation activities include birding and wildlife viewing; viewing historic, prehistoric, and paleontological sites; hiking and backpacking; primitive camping; hunting and fishing; mountain bike riding; and equestrian riding. An interpretive/visitor center facility, the San Pedro House, is located on the river at Highway 90 and is staffed by volunteers from the Friends of the San Pedro River (FSPR). Interpretive exhibits are also located at the historic town site of Fairbank, the Murray Springs Clovis site, the Presidio Santa Cruz de Terrenate, Millville, Hereford, and the San Pedro House.

1.2.6 Socioeconomics

The SPRNCA has experienced pressure from local development in the past twenty years. The 2010 population in Cochise County was about 131,346 (Census Bureau 2012). The 2010 population estimate represented an 11 percent increase in the county. It also represents a growth of 34 percent since 1989 when the Riparian Management Plan was written. The Arizona Department of Economic Security population projections predict an approximate 30 percent population increase by 2030. With an increase in population the demand for water has grown. There are approximately 8,000 wells that pump water out of the Upper San Pedro River basin, which is a 74 percent increase since 1990 (BLM 2012c). The SPRNCA has attracted public recreational use since it was created, and studies of recreational visitors in 1990 and 2013 indicate a growing contribution to the local economy from expenditures by nature based recreation visitors to the Upper San Pedro basin.

1.2.7 Water Quality

The 2006/2008 303(d) listing of impaired waters as prepared by the Arizona Department of Environmental Quality (ADEQ) identifies the San Pedro River as containing three separate river sections that are in violation of water standards. The water standards currently in violation include E. coli, nitrate, and selenium, which are believed to originate upstream in Mexico from mining and agricultural activities. The 2010 303(d) listing of impaired waters added a fourth section of the river as being impaired, removes nitrate and selenium as standards in violation, and adds copper as a standard in violation.

1.2.8 Current Management

The current *Riparian Management Plan* (BLM 1989) was incorporated by reference into the *Safford RMP* (BLM 1992 and 1994) and provides direction for management of BLM-administered lands in the SPRNCA. PL 100-696, which created the SPRNCA, mandates protection, conservation, and enhancement of the following resources: aquatic, wildlife, riparian area, archaeological, paleontological, scientific, cultural, educational, and recreational. Given this mandate to protect, conserve, and enhance these resources in the SPRNCA, there are opportunities through the RMP to improve resource conditions and be more proactive in resource management.

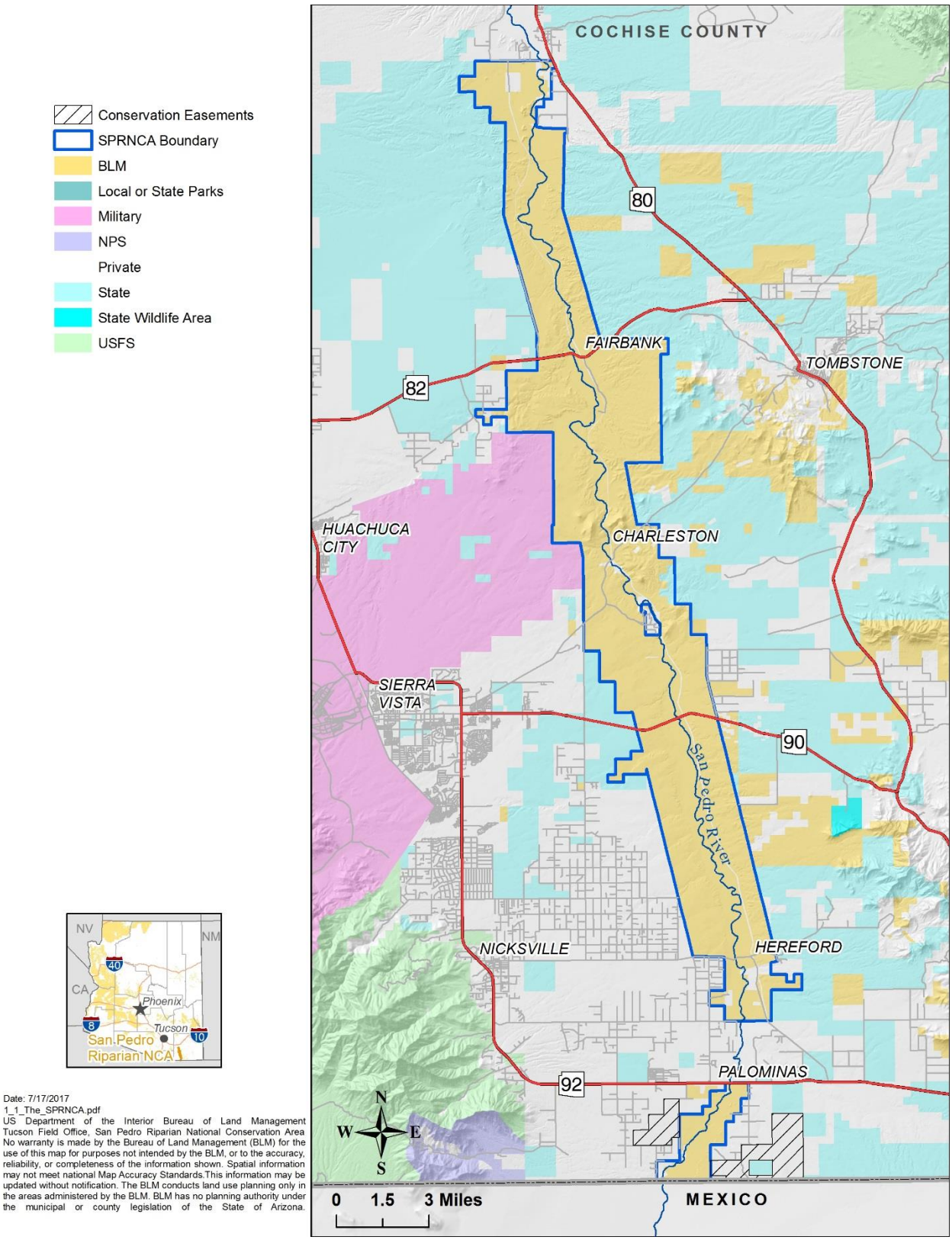


Figure 1-1. The SPRNCA

1.3 Key Findings

Several themes emerged in the course of preparing this AMS report:

1. The San Pedro River is one of the last rivers with perennial flows of water in the American Southwest. Its ecosystem is located at an important eco-tone between the Sonoran and Chihuahuan Deserts, resulting in a rich diversity of animals and plants. It contains one of the richest assemblages of species and supports one of the most important migratory bird habitats in North America. The San Pedro River is one of the few remaining north-south corridors that provides food, water, and shelter for birds as they migrate over the arid Chihuahuan and Sonoran desert landscapes. Up to four million birds annually depend on the river corridor during their migrations (Commission for Environmental Cooperation 1999). The San Pedro River also provides important habitat for a number of listed and BLM sensitive species as described in the Fish and Wildlife and the Special Status Species sections.

2. Studies by Laurel Lacher (2011, 2013) have shown that water flow in the San Pedro River has substantially decreased due to overdrafting of the aquifer as a result of increased groundwater pumping in Cochise County in the watershed and in areas immediately surrounding the SPRNCA. All groundwater modeling studies report continued groundwater gradient declines and a large and continually expanding cone of depression. The latest groundwater modeling studies verify declining groundwater inputs to the river. Spring flows, seep flows, and wetlands within the Sierra Vista subwatershed are also experiencing declines.

   Fort Huachuca has made extensive efforts to reduce its water consumption through the use of low impact development and enhanced water conservation measures. Fort Huachuca, Cochise County, and the City of Sierra Vista are implementing water recharge projects to enhance base flow in the San Pedro River.

   Continued overdraft of the aquifer in the watershed is an important factor affecting SPRNCA resources as well as potential management options for these resources. While this issue is outside of the scope of the RMP, it is a factor to consider in achieving desired conditions.

3. The SPRNCA contains four of the rarest habitat types in the Southwest: Fremont cottonwood/Goodding willow forests, marshlands locally known as cienegas, big sacaton grasslands, and mesquite bosques. These four habitat types have contributed to the SPRNCA's destination as a haven for birds. The National Audubon Society recognizes the SPRNCA as a GIBA, which attracts birders from all over the world. The riparian area along the San Pedro River provides habitat for more than 400 species of birds.

4. While most of the SPRNCA's natural resources are healthy, there are resources (in particular, water) that are threatened. As discussed above, three separate river sections are in violation of water standards, per the ADEQ. This is primarily due to upstream contamination from agricultural and mining activities in Mexico. In addition, only about half of the SPRNCA's riparian-wetland areas are in proper functioning condition and about half are functional at risk. Most of the functional at risk riparian-wetland areas show an upward trend with the exception of the reach at the northern end of the conservation area, which is functional at risk with a downward trend.

5. There has been rapid growth in both visitation and recreational activities on the SPRNCA. Internal scoping and public comments raise the question of whether some SPRNCA resources are being "loved to death." This growth is anticipated to continue in the future in the surrounding communities. Because PL 100-696 clearly calls equally for proactive protection of aquatic, wildlife, riparian area, archaeological paleontological, scientific, cultural, educational, and recreational resources, a balance must be determined and sustained to manage increased demand for recreational opportunities without threatening other resources.

6. Neither the *Safford RMP* nor the *Riparian Management Plan* provide clear goals and objectives to guide protection and conservation of the nine conservation values identified in PL 100-696.

2 Area Profile

This chapter describes the existing condition regarding the resources within the planning area. Recreation, special designations, and social and economic conditions are also discussed in this chapter. This chapter incorporates information compiled at multiple levels to provide a context for the resources and their various uses. The information provided here becomes the basis for the Affected Environment chapter of the SPRNCA RMP and EIS.

2.1 Regional Context of the San Pedro Riparian National Conservation Area

The SPRNCA is located within the Madrean Archipelago ecoregion in southeastern Arizona. This ecoregion is characterized by isolated forested mountain ranges that are surrounded by a virtual sea of intervening deserts and grasslands; thus the mountains in this area are also known as the "Sky Islands." The ecoregion is located within the Madrean Pine – Oak Woodlands, a globally significant biodiversity hot spot, and harbors the highest diversity of mammals, birds, bees, and ants anywhere in the continuous United States (BLM 2014). Large elevation gradients (ranging from approximately 1,800 ft. at the base to 9,000 ft. at the summits) and topographic roughness contribute to the high diversity of species and biotic communities. The ecoregion is located at the intersection of the temperate zone to the north and subtropics to the south where several major desert and forest biotic influences converge, including the Rocky Mountains, Sierra Madre, the piedmont and plains of the western Sierra Madre, Sonoran Desert, and Chihuahuan Desert (BLM 2013a).

Warm temperatures are a defining characteristic of the region and during dry summer months can climb above 100°F in lower elevations. Annually, the region receives around 12 in. of rain in valley bottoms and up to 30 in. on mountain tops. Precipitation occurs primarily during the summer monsoon and the winter season (BLM 2013a).

The Madrean Archipelago is home to numerous endemic species such as the Huachuca water umbel and Atascosa gemmed grasshopper (*Aztecacris gloriosus*), species at the edges of their ranges such as the elegant trogon (*Trogon elegans*) and ocelot (*Leopardus pardalis)*, and neotropical species such as coati (*Nasua narica*) and javelina (*Tayassuidae*). Biotic communities include montane coniferous forests, oak-pine woodlands, tropical deciduous forest, oak savanna, short-grass prairie, subtropical thornscrub, and subtropical desert. The ecoregion also contains critical riparian and wetland habitats (i.e., cienegas and springs) that encompass a very small portion of the land areas but are keystone ecosystems in this arid environment (BLM 2013a).

Changing climate trends and other widespread environmental influences are affecting western landscapes. In response, in 2010 the BLM launched seven Rapid Ecoregional Assessments (REAs) to improve the understanding of the existing condition of these landscapes and how conditions could be altered by ongoing environmental changes and land use demands. The REAs examine ecological values, conditions, and trends within ecoregions, which are large, connected areas that have similar environmental characteristics. The SPRNCA is in the Madrean Archipelago REA.

The SPRNCA is located in the upper San Pedro River watershed and is bounded by the Huachuca, Mustang, and Whetstone Mountains to the west and the Mule and Dragoon Mountains to the east. The Upper San Pedro River Basin has elevation ranges from more than 9,466 ft. in the Huachuca Mountains to 3,300 ft. near Benson (Stromberg and Tellman 2009).

2.2 Ecosystem Health and Processes

Overall ecosystem health can be defined as keeping natural environments healthy, diverse, and productive so plants, animals, and people can benefit from them year after year. Ecosystem health also consists of intact resources and functioning processes that, especially in riparian areas, include a range of natural variability. The integrity of the soil, vegetation, water, and air, as well as the ecological processes are balanced and sustained in a healthy system. Ecosystems do not stop at traditional boundary lines, and thus it is necessary to look across boundaries to manage at the ecosystem level. More in depth descriptions about the processes associated with different resources can be found under each relevant resource section in this chapter.

2.2.1 Arizona Standards and Guidelines

The *Arizona BLM Standards and Guidelines* were developed to identify the characteristics of healthy ecosystems on public lands and the management actions that promote them. *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (Arizona BLM Standards and Guidelines)* were developed pursuant to 43 CFR 4180, through a collaborative process involving BLM staff and the Arizona Resource Advisory Council (RAC) and were approved by the Secretary of the Interior in April of 1997. The *Arizona BLM Standards and Guidelines* became Arizona BLM policy, guiding the planning for and management of BLM-administered lands.

The *Arizona BLM Standards for Rangeland Health* describe the conditions necessary to encourage Proper Functioning Condition (PFC) of ecological processes and are adopted as Land Health Standards that are applicable to Arizona BLM program-wide. Appendix A is a full description of the *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration*. Below is a brief description of the three Standards. The criteria for meeting these standards are in Appendix A.

Standard 1) Upland Sites: Upland soils exhibit infilitration, permeability, and erosion rates that are appropriate to soil type, climate and landform.

Standard 2) Riparian-Wetland Sites: Riparian-wetland areas are in properly functioning condition.

Standard 3) Desired Resource Conditions: Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

2.3 Resources

2.3.1 Air Quality

It is the role of the RMP to help ensure adequate air quality levels are maintained through the implementation of management decisions that mitigate and reduce air quality degradation caused

from activities on public land within the SPRNCA. Activities that may degrade air quality include fire management, recreation, construction, and rangeland management. The BLM is responsible for maintaining air quality standards that are in compliance with federal legislation and standards set by the United States Environmental Protection Agency (USEPA). Changing climate trends are discussed in Section 2.3.2, Changing Climate Trends.

Indicators

Air pollution and visibility are indicators that the BLM and other federal agencies use to specify a resource's air quality conditions. While air pollution and visibility are closely linked, the air pollution indicator refers to public health and welfare and the visibility indicator refers to visual environmental quality. The data for these indicators are collected by the ADEQ and the Interagency Monitoring of Protected Visual Environments (IMPROVE) network.

Air Pollution

In accordance with the Clean Air Act, the USEPA has set air quality standards for six common air pollutants. There are two types of standards for these pollutants: primary and secondary. Primary standards are set to protect health, while secondary standards are set to protect welfare. The six pollutants are ozone (O_3), particle pollution with aerodynamic diameters less than 2.5 and 10 micrometers ($PM_{2.5}$, PM_{10}), lead (Pb), nitrogen dioxide (NO_2), carbon monoxide (CO), and sulfur dioxide (SO_2) (USEPA 2012a). The standards are formally known as the National Ambient Air Quality Standards (NAAQS) (Table 2.3-1). States are required to have air quality standards which are either equal to or are more restrictive than the NAAQS. The state of Arizona has adopted the same standards as the NAAQS.

Geographic areas whose air quality does not exceed the NAAQS are classified as attainment areas, those that exceed the levels are classified as nonattainment areas, and those without sufficient data are unclassified. The USEPA has designated different areas into specific classes that allow for a certain amount of degradation to air quality up to the NAAQS. This degradation must be in accordance with the Prevention of Significant Deterioration (PSD) regulations. PSD Class I designated areas allow for minimal air quality deterioration, while Class II and III allow for progressively more. Federal lands that are not Class I areas have been designated as Class II areas (Clean Air Act 2004).

Atmospheric deposition on the land can occur through precipitation (wet) and the settling of airborne particles (dry). It is a major concern in the Midwest and Eastern United States where measured levels of nitrogen oxides and sulfur oxides are significantly higher. In Arizona and most of the Western United States, lower amounts of industrial pollution along with lower amounts of precipitation account for remarkably less atmospheric deposition.

Table 2.3-1. National Ambient Air Quality Standards (NAAQS)

Pollutant [final rule cite]	Type of Criteria	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, August 31, 2011]	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead [73 FR 66964, November 12, 2008]	Primary and Secondary	Rolling 3-month average	0.15 $\mu g/m^3$	Not to be exceeded

Pollutant [final rule cite]		Type of Criteria	Averaging Time	Level	Form
Nitrogen Dioxide [75 FR 6474, February 9, 2010] [61 FR 52852, October 8, 1996]		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb	Annual mean
Ozone [73 FR 16436, March 27, 2008]		Primary and Secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution December 14, 2012	$PM_{2.5}$	Primary	Annual	12 $\mu g/m^3$	Annual mean, averaged over 3 years
		Secondary	Annual	15 $\mu g/m^3$	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

FR – Federal Register
ppm – parts per million
ppb- parts per billion
$\mu g/m^3$ –micrograms per cubic meter

Source: USEPA 2012b.

Visibility

Obstruction of a view shed by suspended particulate matter in the atmosphere is referred to as haze. This is an issue in areas where far-reaching views are important. The measurement of haze and its effects on visibility are important indicators for air quality (USEPA 2012c). The USEPA measures visibility through the IMPROVE network. To present visibility data, the USEPA has adopted the haziness, or deciview index, which is a logarithmic scale that displays human-perceived changes in a linear relationship. A deciview value can be calculated from either visual range (kilometers) or light extinction coefficients from atmospheric components. A value of 0 deciviews represents pristine visibility conditions (IMPROVE 1993). A one deciview change in haziness is a small but noticeable change in haziness under most circumstances when viewing scenes in mandatory Class I Federal areas (Richards 1999). As mentioned previously, Class I areas allow for the least amount of air quality degradation. Areas where visibility is an important characteristic are often categorized as Class I. There are five areas of Class I designation within 60 miles of the SPRNCA (Figure 2.3-1). These are the Chiricahua Wilderness, Chiricahua National Monument Wilderness, Galiuro Wilderness, and Saguaro East and West Wilderness.

Current Conditions

Based on the indicators mentioned above, the current air quality conditions for the SPRNCA are as follows.

Air Pollution

No areas in the SPRNCA are designated as nonattainment areas, thus they meet the USEPA's NAAQS criteria for air pollution. In the Upper San Pedro River Basin, there are townships in the southeastern corner of the watershed that are classified as nonattainment. These townships, 23 South 24 East are not attaining the NAAQs criteria for PM_{10}.

Visibility

There are no IMPROVE network visibility monitoring sites in the SPRNCA. However, there are five sites that constitute the Southern Arizona region and monitor visibility for the nearby Class I areas that are shown in Figure 2.3-1. The monitoring sites are the Chiricahua Wilderness (CHIR1), Saguaro East Wilderness (SAGU1), Saguaro West Wilderness (SAWE1), Organ Pipe Cactus National Monument (south of Ajo, Arizona) (ORP1), and Douglas (DOUG1) sites. Table 2.3-2 lists the mean 2012 deciview levels for the five sites.

Trends

Nationally, air pollution levels have decreased. With increasingly stringent air quality criteria the number of areas of nonattainment has also decreased. Increased USEPA regulations and favorable meteorological conditions account for remarkably lower air pollution levels in 2009 (USEPA 2012d).

Air Pollution

Air pollution levels across the Pacific Southwest (USEPA Region 9) have improved since the establishment of the NAAQS standards. Figure 2.3-2 shows the air quality trends for Particulate Matter from 1990 to 2012 in the Sierra Vista – Douglas Area.

Visibility

The deciview values for the five IMPROVE sites in the Southern Arizona Region from 1990 to 2010 suggest a decreasing trend. A decrease in deciview values indicates a greater visual range and an increase in air quality. Figure 2.3-3 displays the average annual deciview values for the five sites.

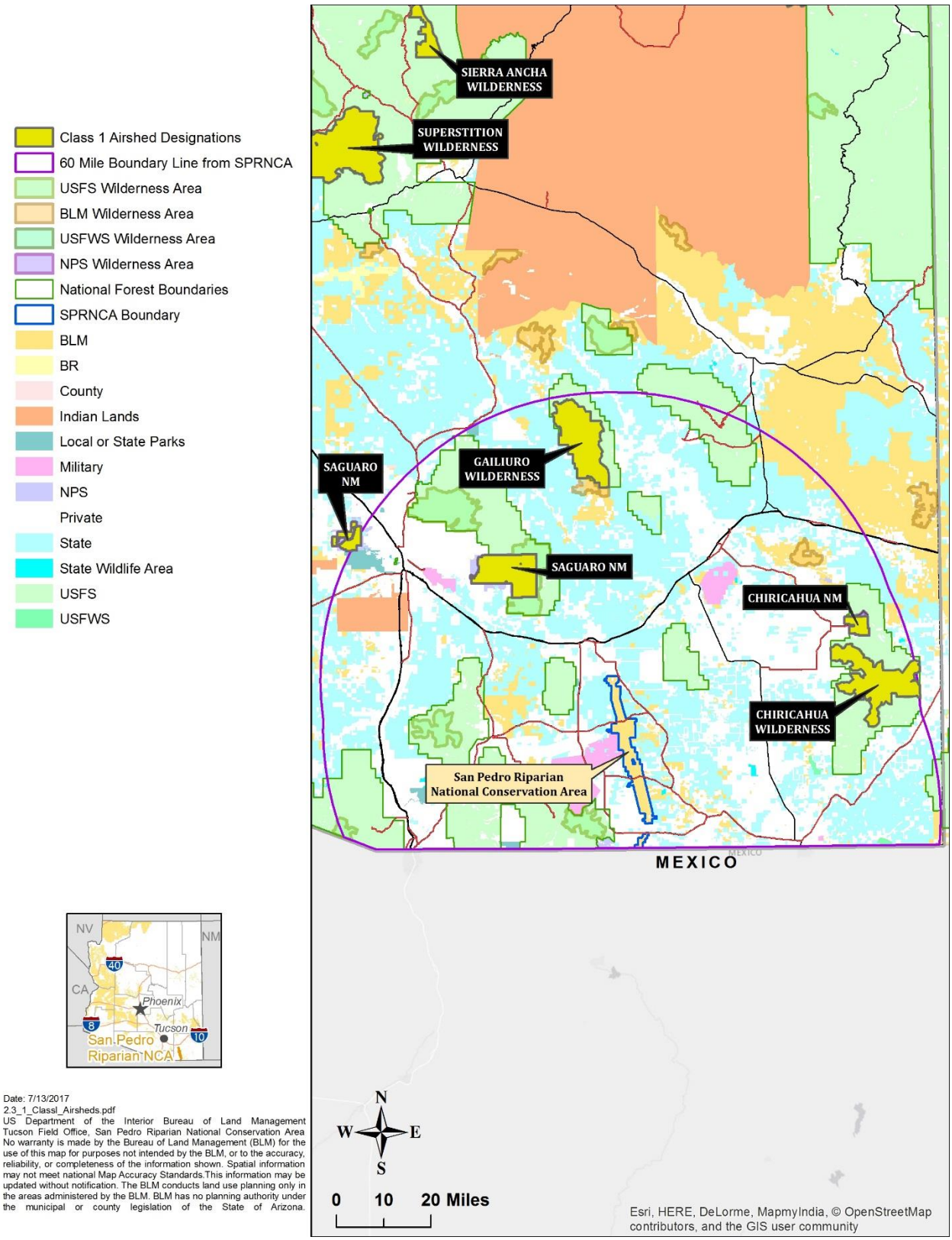


Figure 2.3-1. Class I Airsheds Within 60 Miles of The SPRNCA

Table 2.3-2. Southern Arizona Region 2000-2004 Mean Deciviews

Site Code	Annual Mean (dv)	Visual Range* (kilometers)
CHIR1	8.37	169.356
SAGU1	9.44	152.126
SAWE1	11.14	128.343
ORPI1	9.62	149.412
DOUG1	13.90	97.388

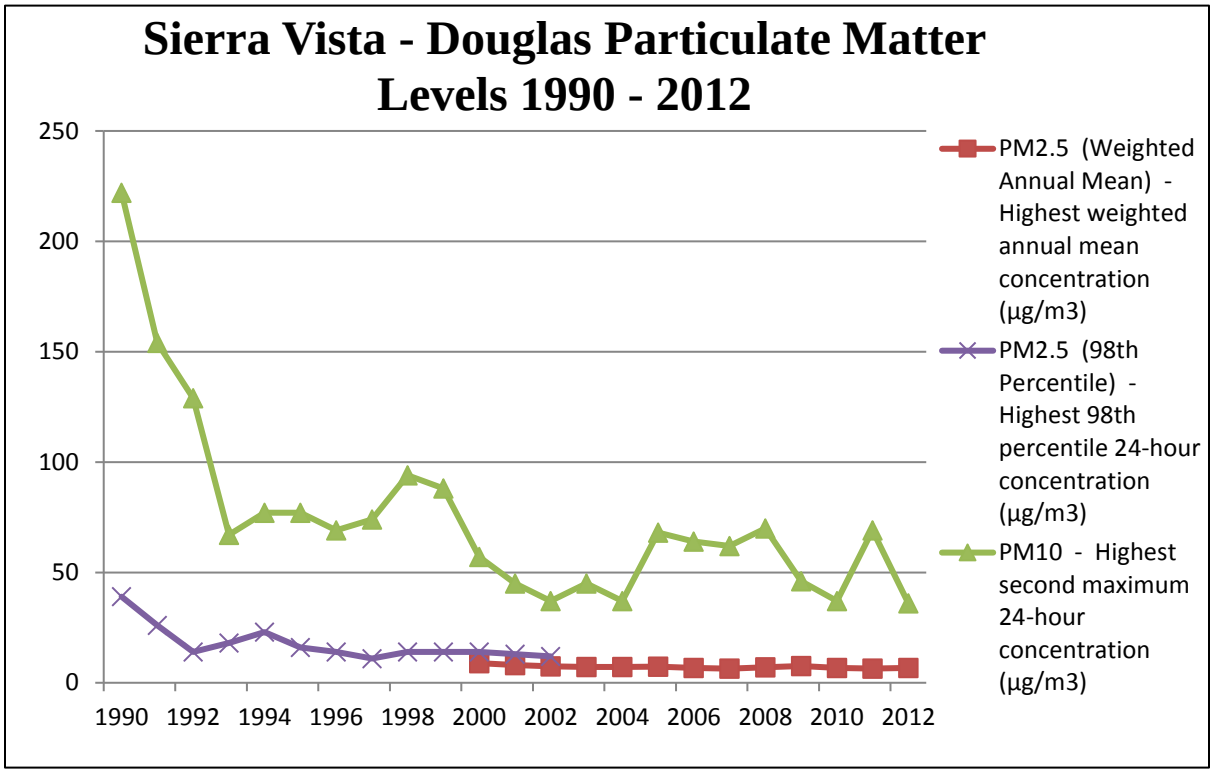
Notes: * Visual range derived from *dv* values using the formula *vr = 391/e^(dv/10)*
Source: IMPROVE n.d.

Forecast

Air quality levels are projected to further improve across the nation because of recent air quality regulations and implementation (USEPA 2012d). The trends suggest that the improvements in air quality are beginning to level out. This indicates that the improving trend will continue, but at a slower rate (USEPA 2012d).

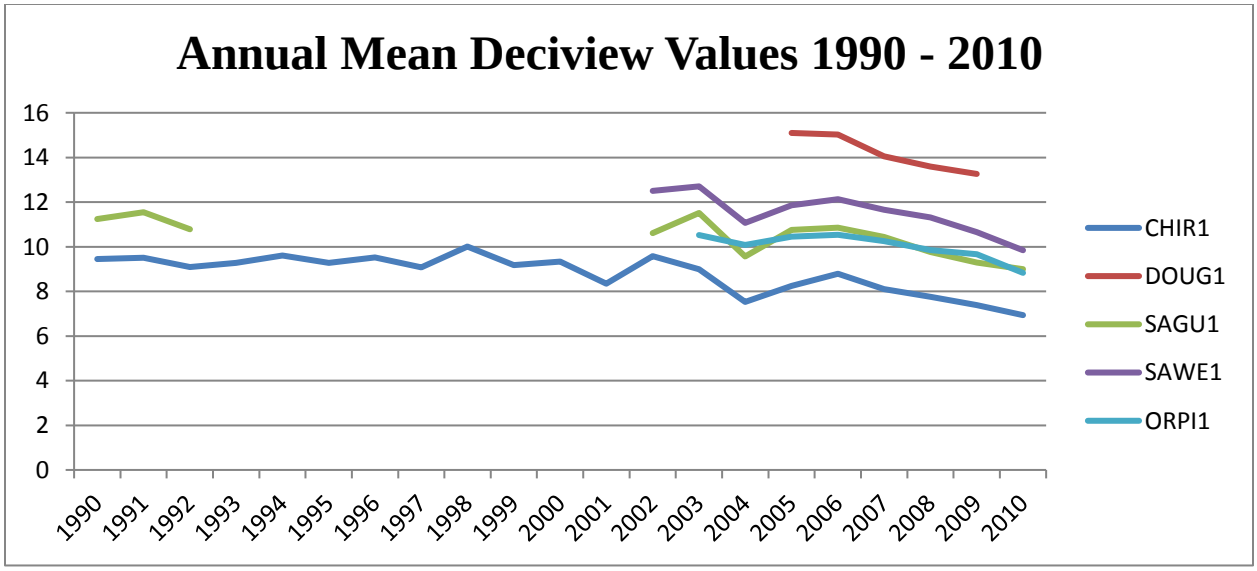
Air Pollution

The air pollution trends suggest a continued decrease in air pollutant levels; however the trends do not take into account urban and industrial growth. Changing climate trends may lead to increases in air pollution levels if increased temperatures and extended drought occur. Increased levels of motorized vehicles can cause an increase in particulate matter and emissions.



Source: USEPA 2013.

Figure 2.3-2. Particulate Matter Levels 1990-2012



Source: IMPROVE n.d.

Figure 2.3-3. Annual Mean Deciview Measurements for the Southern Arizona Region

Visibility

The air pollution trends suggest a continued increase in visibility. Urban and industrial growth, changing climate trends, and increases in motorized vehicle use that affect air pollution levels will also have an effect on visibility levels in the region.

2.3.2 Changing Climate Trends

The temperature of Earth's atmosphere is regulated by a balance of radiation received from the sun, minus the amount of that radiation absorbed by the planet and atmosphere, and the amount of energy reflected back out to space. In the atmosphere, greenhouse gases (GHG) keep the temperature of Earth warmer than it would be otherwise and allow the planet to sustain life. There has been an increase in atmospheric GHG concentration since the start of the industrial age, contributing to observed climate variability beyond the historic norm.

Indicators

In its recent report, "Climate Change Indicators in the United States" (USEPA 2010), the USEPA identified 24 indicators of human influences on climate. These are grouped into five categories:

- GHG;
- Weather/climate;
- Oceans;
- Snow and ice; and
- Society and ecosystems.

Of these, the first two, GHG and weather/climate, are the most relevant to describe changing climate trends for the SPRNCA because of the availability of data at the regional/local level. In this section, weather and climate has been broken down further into temperature and precipitation. Oceans and snow and ice are not used as indicators here, but further analysis would be useful in making broad scale projections. Society and ecosystem indicators are addressed in Sections 2.3.9, Migratory Birds, Section 2.4.3, Livestock Grazing Management, and Section 2.7, Current Social and Economic Trends.

Temperature and Precipitation

Climatic regions are defined by their average temperature and precipitation ranges. In this document, temperature and precipitation data are used to indicate the current conditions, trends, and forecasts for the climate of the planning area. Weather patterns and seasonality are also addressed in this indicator.

Greenhouse Gases

Anthropogenic (or human-caused) emissions include GHG emissions from electric power generation, industrial processes, transportation technology, urban development, agricultural practices, and other human activity. The Intergovernmental Panel on Climate Change (IPCC) states that "It is extremely likely that more than half of the observed increase in global average temperature from 1951 to 2010 was caused by anthropogenic increase in GHG concentrations and other anthropocentric forcings" (IPCC 2013). Carbon dioxide (CO_2), Methane (CH_4), and

Nitrous Oxide (N_2O) are the three main GHG emissions assessed in this section because of the confidence in the available data and their overall impact on the climate. In general data on GHG emissions is only available at the global and regional level, thus the current condition, trend, and forecast for this indicator must be assessed at those levels.

Current Condition

Temperature and Precipitation

The SPRNCA planning area is located in an arid-semiarid desert landscape, which is characterized by warm temperatures and low precipitation. It lies within the Upper San Pedro River Basin, which has elevation ranges from more than 9,466 ft. in the Huachuca Mountains to 3,300 ft. near Benson (Huckleberry 1996). There are two major precipitation periods in the typical southeastern Arizona water year. The first and most dramatic is the summer monsoon season (July-Sept), in which 50 percent of annual precipitation occurs. Some of the precipitation that occurs in the fall months, particularly September and October, can be accounted for by residual monsoon thunderstorms. A secondary wet season during the fall and winter months is caused by Pacific frontal storm movement. These precipitation events are often extended gentle rain periods (CLIMAS 2014).

Greenhouse Gases

According to the Summary for Policymakers of Working Group I's contribution to IPCC's Fifth Assessment Report (2014), global observed atmospheric CO_2 concentrations were 390.5 ppm for 2011. The report also shows the current levels of CH_4 and N_2O to be 1,803 ppb and 324 ppm, respectively. Global CO_2 emissions from fossil fuels for 2011 were 9.5 gigatons of carbon (GtC) (IPCC 2013). By comparison in 2009, the total CO_2 emissions for the Southwest US and Arizona were 0.726 GtC and 0.094 GtC, respectively. In 2009, Arizona was responsible for 1.74 percent of total US CO_2 emissions and 12.95 percent of CO_2 emissions in the Southwest (Liverman et al. 2013).

Trends

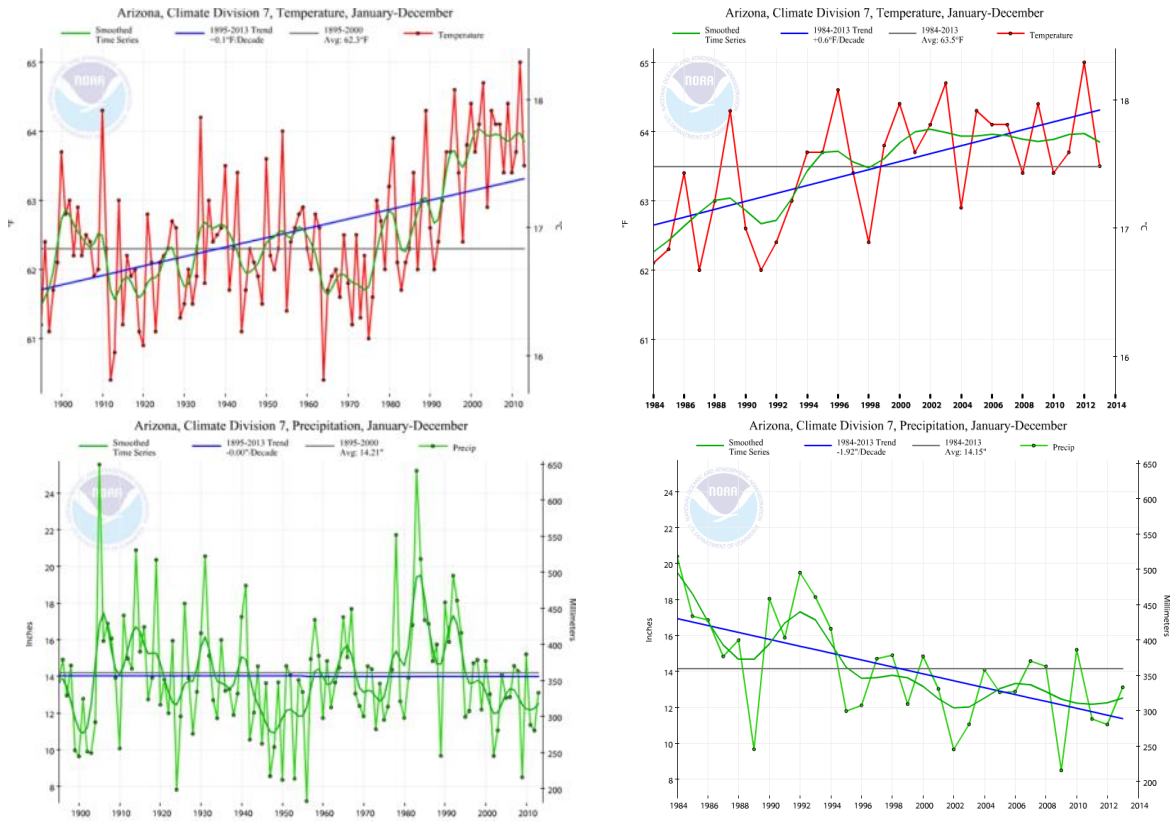
Temperature and Precipitation

The IPCC estimates that mean global surface temperatures increased by 0.85°C (1.53°F) from 1880 to 2012 (IPCC 2013). For the US Southwest, mean annual temperature trend matches that of the global trend with an increase of 0.9°C (1.6°F) and a range of 0.8°C (1.4°F) to 1.1°C (2.0°F) for the period of record 1901 to 2010 (Hoerling et al. 2013). Figure 2.3-4 shows the National Oceanic and Atmospheric Association's (NOAA's) National Climactic Data Center (NCDC) Climate at-a glance time series for temperature and precipitation trends in Southern Arizona (Climate Division 7) (NCDC 2014). The time series indicates a similar rise in temperature for Southern Arizona that is seen in the Southwest and globally. Similar to other analyses, the time series also indicates that for the last 30-year time period the rate of temperature change has also increased. The natural variability of the climate causes shorter time period analysis to be dependent on beginning and ending dates and thus does not properly indicate long-term climate trends (IPCC 2013).

Precipitation trends are not as straightforward as temperature. The IPCC states, with low to medium confidence that since 1901 precipitation has increased across the mid-latitudes of the

Northern Hemisphere (IPCC 2013). For the US Southwest, the trend in annual precipitation exhibits little change from 1901 to 2010 (Hoerling et al. 2013). The NOAA NCDC Time-series (Figure 2.3-4) illustrates a similar case for precipitation trends in Southern Arizona (NCDC 2014). The 1895-2013 precipitation time series shows no trend, while the 1984 to 2013-time series indicates a drying trend. As with temperature, the short time period of the latter time series is not indicative of long term climate trends. It is shown that the drying in the last 30 years is due to natural variability of the climate, in particular, variations in sea surface temperatures (SST) (Hoerling et al. 2010). For the Upper San Pedro River Basin, no trend in annual precipitation has been distinguished (Hereford 1993). Pool and Coes (1999) noted a slight decrease in wet season (June-October) precipitation at the Tombstone station for the time period of 1897 to 1997. When including 3 other stations with the available time period of 1956-1997, Pool and Coes (1999) again noted decreasing wet season precipitation amounts, and also an increase in winter (November-February) precipitation. Thomas and Pool (2006) also noted that when precipitation trends are analyzed monthly and seasonally, there is a decreasing trend for the month of July and the summer season (July to August) for the period of 1913-2002 at the Tombstone station.

The Palmer Drought Severity Index (PDSI) is the most widely used metric for displaying trends in drought. It is based on a monthly water budget which combines previous month's precipitation amounts and temperatures to compute a severity index. While also identifying wet spells, the index has been most useful for analyzing drought, and thus its name reflects that fact. Figure 2.3-5 from the NOAA NCDC Time-series shows the PDSI for the time period 1895 to 2013 (NCDC 2014). The positive index numbers indicate periods of wet spells, while negative numbers indicate periods of drought. Based on case studies in Iowa and Kansas, the index of -4.00 is considered to be an "extreme" drought (Palmer 1965). When a simple linear trend is analyzed with this index, there is a slight increase in the number and severity of drought events from 1895 to 2013.



Source: NCDC 2014.

Figure 2.3-4. Seasonal Patterns

More recent studies for the Madrean Archipelago (a smaller study area within Arizona and New Mexico which includes the SPRNCA) *Rapid Ecological Assessment* reveal the relative stability of high elevations and mountainous areas compared to low-lying areas. Both recent and future changes in minimum temperature show the most pronounced change in actual climate values, as well as in relation to natural variability. Recent precipitation changes are lesser in magnitude than temperature changes in comparison to the baseline; changes across months fall within one standard deviation of the baseline mean. Precipitation changes do not exhibit a clear spatial pattern and are generally not statistically significant. However, future projections of precipitation (as well as moisture stress indices such as climatic moisture deficit) show a general drying trend, particularly in spring. Inconsistencies in the trends between current precipitation patterns and modeled future projections make conclusions about shifts in precipitation patterns difficult to identify with confidence. Additional indices for characterizing future climate show that the average length of the frost free period (warm season) is projected to become substantially longer, which may benefit some species while stressing others (BLM 2014).

Greenhouse Gases

According to the 2013 IPCC, the amount of CO_2, CH_4, and NO_2 has risen 40 percent, 150 percent, and 20 percent, respectfully, since about 1750, or pre-industrial levels. Furthermore, the IPCC states in Working Group I's Summary for Policy Makers, "Concentrations of CO_2, CH_4, and NO_2 now substantially exceed the highest concentrations recorded in ice cores during the

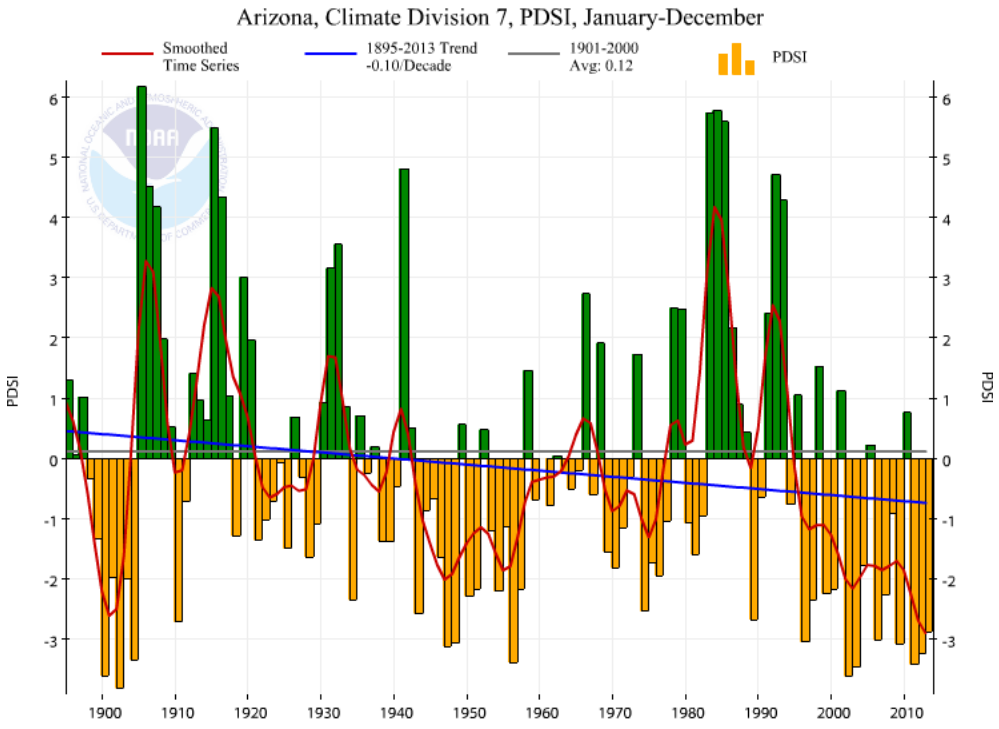
past 800,000 years. The mean rates of increase in atmospheric concentrations over the past centuries are, with very high confidence, unprecedented in the last 22,000 years" (IPCC 2013). The USEPA reports that from the period 1990-2014, total US emissions have increased by 7.4 percent and emissions increased from 2013 to 2014 by 1.0 percent (USEPA 2014).

Forecasts

Temperature and Precipitation

Global mean surface temperature predictions for 2046-2065 range between an increase of 1.0°C (1.8°F) and 2.0°C (3.6°F). For the years 2081-2100, the projected global mean surface temperature increase is between 1.0°C (1.8°F) and 3.7°C (6.7°F) (IPCC 2013).

Although globally precipitation is projected to increase, precipitation amounts in mid-latitude arid and semi-arid areas are projected to decline (Stocker et al. 2013). In the most recent IPCC report, extreme precipitation for the mid-latitudes is expected to increase in intensity (IPCC 2013). Dominguez et al. (2012) indicates that winter mean precipitation will decline while winter extreme precipitation events will intensify for the Southwest US. The El-Nino Southern Oscillation (ENSO) is a major contributor to natural climate variability, particularly in the Southwest. The ENSO variability is predicted to intensify in the future; although there is low confidence on what the regional effects of this intensification will be (IPCC 2013).



Source: NCDC 2014.

Figure 2.3-5. Palmer Drought Severity Index for 1895-2013.

Greenhouse Gases

In predicting future levels for climate variability indicators, it is necessary to point out the following statement from the IPCC's Working Group I.

> "A large fraction of anthropogenic climate change resulting from CO_2 emissions is irreversible on a multi-century to millennial time scale, except in the case of a large net removal of CO_2 from the atmosphere over a sustained period. Surface temperatures will remain approximately constant at elevated levels for many centuries after a complete cessation of net anthropogenic CO_2 emissions. Due to the long time scales of heat transfer from the ocean surface to depth, ocean warming will continue for centuries. Depending on the scenario, about 15 to 40 percent of emitted CO_2 will remain in the atmosphere longer than 1,000 years" (IPCC 2013).

As a result, global surface temperatures are projected to increase; the amount of that increase is dependent on continued levels of GHG emissions. The IPCC models predict that the 2050 annual CO_2 emissions will be less than the 1990 emissions (IPCC 2013). The Arizona Climate Change Advisory Group suggested in 2006 that the total net GHG emissions for Arizona would increase 70 to 87 percent between 2000 and 2020 depending on prediction scenarios.

2.3.3 Geology

Indicators

Geologic resources are defined through descriptions of the surficial and bedrock geology and stratigraphy of the planning area. Several geologic type localities and areas of paleontological significance occur within the SPRNCA.

Current Conditions

The SPRNCA is situated in a deep sedimentary basin of volcanic rocks flanked by the Huachuca, Mustang, and Whetstone Mountains to the west and the Mule and Dragoon Mountains to the east. The basin is bisected by the San Pedro River. The San Pedro River flows from south to north with its headwaters located near Cananea, Sonora in Mexico, and its mouth at its confluence with the Gila River at Winkelman, Arizona.

Surficial geology within the riparian zone consists primarily of Pliocene through Holocene alluvial fill with Cretaceous volcanic and intrusive igneous rocks cropping out near Charleston and Fairbank. The uplands consist of Miocene through Holocene terrace deposits (Figure 2.3-6).

Geologic History

The San Pedro River basin formed as a graben (down dropped block) during extensional faulting 25.8 million years before present. As the basin formed it filled with sediments washing off the adjacent mountain blocks (horsts) (Figure 2.3-7). Early in the evolution of the basin, closed depressions formed allowing the formation of playa lakes and the accumulation of lacustrine and evaporite deposits, (Cook et al. 2009). Later, the San Pedro River drainage was captured by the Gila drainage leading to the formation of a riverine system as the San Pedro River down cut through the basin fill leading to a depositional environment dominated by alluvial fans, (Huckleberry et al. 2009).

Bedrock Features

The Cretaceous volcanic and intrusive igneous rocks of the Charleston area were mined from 1879 through 1961. The shallow Cretaceous bedrock at Charleston forms a subsurface barrier to groundwater flow. Groundwater subsequently is forced to the surface upgradient of the shallow bedrock, augmenting stream flows in these areas.

Mining Legacy

The SPRNCA has historically been a central location for mining in southeastern Arizona. Mines and mining infrastructure such as mills and railroads were developed in the SPRNCA in the mid-to-late 1800s. The mines produced lead, zinc, silver, copper, and mica, (USGS et al. 1969). This was primarily driven by the discovery of silver in the vicinity of Tombstone, Arizona several miles to the east in 1877. Even with the decline of silver mining in the late 1800s, sand and gravel mining continued, and a sand and gravel mine was in operation when the SPRNCA was created in 1988.

Millville, and Sunset mill sites as well as the Charleston Lead Mine are regulated under the Comprehensive Environmental Response, Compensation, and Liability Act. The remediation of the mill sites is complete; however long term monitoring and maintenance of the Comprehensive Environmental Response, Compensation, and Liability Act remedies is required. The BLM backfilled the abandoned mine features at the Brunckow Mine within the SPRNCA in 2014.

PL 100-696, which is the enabling legislation for the SPRNCA, stated specifically that, subject to valid existing rights, all federal lands in the conservation area are withdrawn from location, entry and patent under the United States mining laws; and from disposition under all laws pertaining to mineral and geothermal leasing and all amendments thereto. When the sand and gravel negotiated contract sale (AZA-022590) expired it was not renewed. There have been no mineral materials disposals within the SPRNCA since 1990. No active mining claims exist within the boundaries of the SPRNCA. The last mining claim located within the SPRNCA closed in 1996. ROW for energy projects are addressed under Section 2.4.2, Lands and Realty.

Trends

An increased understanding of area geology can be expected from geologic mapping. Qualitative observation indicates the condition has remained stable for geological resources protected or mitigated through the permitting process and other standard operating procedures (e.g., pre-disturbance clearance) associated with federal management actions. In these cases, the trend is toward conservation.

The trend is slightly downward for resources not associated with direct management actions. The primary contributors to this trend are unauthorized collection of fossils and ground-disturbance associated with recreational activities.

Forecasts

Projected increases in recreational activity may increase the risk of unauthorized collection of rocks, such as decorative rock for private landscaping, in areas where geological resources are present.

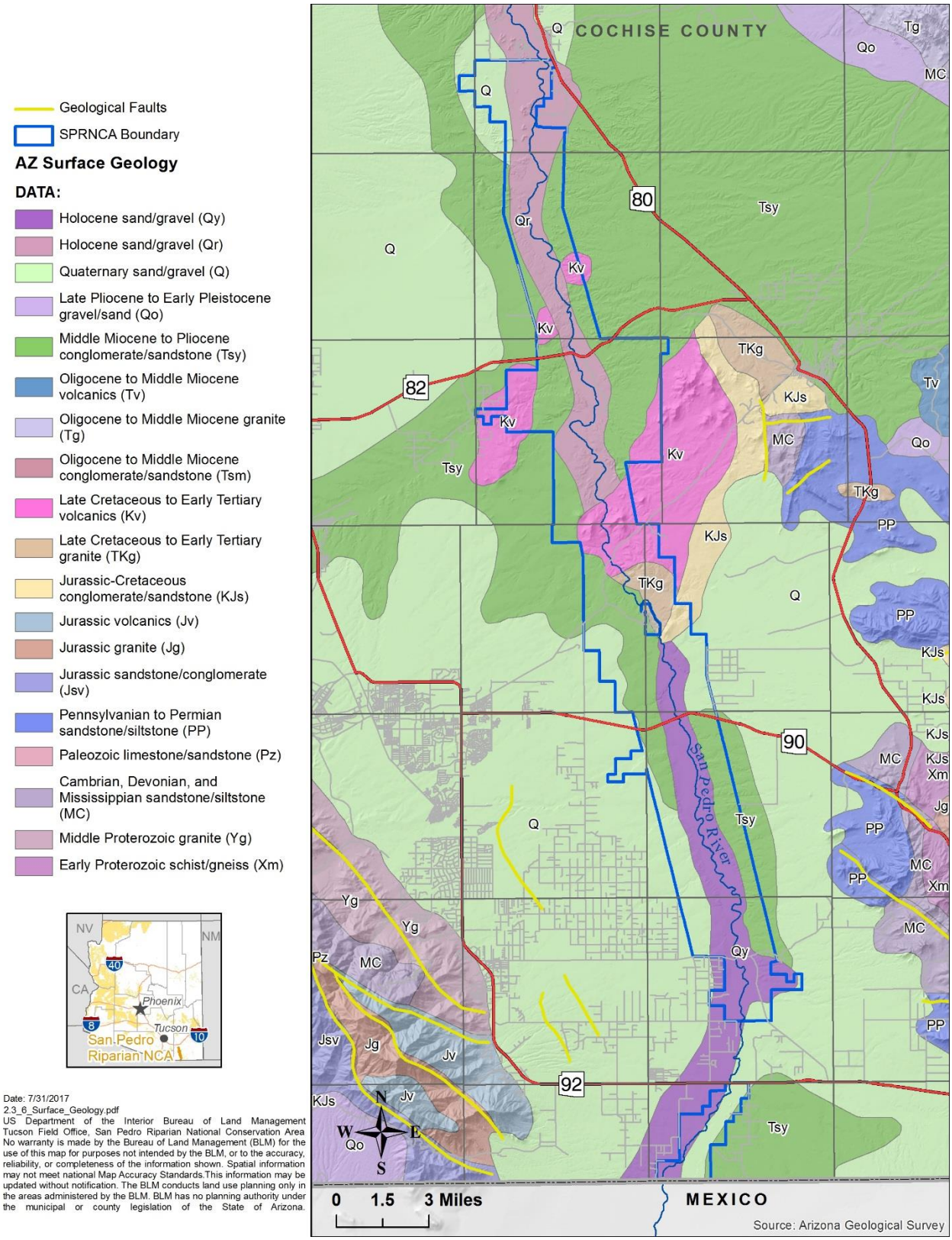


Figure 2.3-6. SPRNCA Surface Geology

2.3.4 Soils

Soils are created through the interaction of climate, parent material (rock type), topography, and microorganisms in the soil. Over time, the interaction of these variables develops specific soil types. Formation of soils is a slow process, particularly where moisture levels are low. Disruption of soils can lead to long-term changes in soil productivity and changes in ecological conditions for the site.

Soils across the SPRNCA are varied, and descriptions of soils can be complex without at least a fundamental understanding of geology and terminology specific to soil science. Soils descriptions and other data for the SPRNCA are discussed in Section 2.3.7, Upland Vegetation and are also provided in the Soil Survey Cochise County, Arizona, Douglas-Tombstone Part. Additional soil information is available from the Natural Resources Conservation Service (NRCS) at: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

Riparian soils are addressed in the Riparian and Wetlands Resources section of this document and are primarily discussed in relation to riparian PFC surveys throughout the SPRNCA.

For the purpose of this document, soils are discussed in the ecological site section under upland vegetation (Section 2.3.7, Upland Vegetation). Ecological sites comprise a land classification system that describes ecological potential and ecosystem dynamics of land areas. They are used to stratify the landscape and organize ecological information for purposes of monitoring, assessment, and management.

Indicators

The most recent indicators of soil health and productivity in the SPRNCA are Rangeland Health data collected during 2013. Current conditions are described based on the area in which Standard 1, discussed in Section 2.2.1, Ecosystem Health and Processes Standards and Guidelines and Appendix A, is met or not met using these indicators:

- Soil/Site
- Rills Bare ground line point intercept (2, 3) Stability;
- Water flow patterns point frame (2);
- Pedestals and/or terracettes proportion of soil surface covered canopy gap intercept (3);
- Bare ground by canopy gaps longer than a continuous line intercept (2);
- Gullies defined minimum;
- Wind-scoured, blowout, Proportion of soil surface covered basal gap intercept (3) and/or depositional areas by basal gaps longer than a continuous line intercept (2);
- Litter movement defined minimum;
- Soil surface resistance to erosion Soil macro-aggregate stability soil stability kit (3);
- Soil surface loss or degradation in water; and
- Compaction layer.

Sensitive Soils

Sensitive soils are those with characteristics that make them extremely susceptible to impacts or those that might be more difficult to restore or reclaim after disturbance. Those characteristics

can include high wind or water erosion hazard, steep slopes, moderate to high salinity, low nutrient levels, low water-holding capacity, or high water tables, such as wetlands, riparian areas, and soils that support phreatophytic vegetation (plants that are supplied with surface water and often have their roots constantly in touch with moisture). Information used to identify sensitive soils includes NRCS published soils surveys, ecological site descriptions, local monitoring records, and research studies.

Current Conditions

Soil types in the SPRNCA vary in response to climate, topography, and geology or parent material (Stromberg and Tellman 2009). Classified according to soil order, the soils commonly found within the SPRNCA include:

- **Entisols**: *Young soils that have little or no evidence of development of pedogenic horizons and are common in floodplains throughout the desert Southwest.*
- **Aridisols**: *Soils that occur in cool and warm deserts and show development of pedogenic horizons.*
- **Inceptisols**: *Soils of terraces lacking an illuvial horizon enriched with clay, iron, or organic matter.*
- **Vertisols**: *Clayey soils in seasonally flooded wetlands such as playa lake beds*.
- **Mollisols**: *Dark organic-rich soils of some riparian grasslands.*
- **Histolsols**: *In some graminoid-dominated wetlands.*

Additional information on the current condition of the soils can be found in Section 2.3.5 Water Resources.

Trends

The standard for upland soils is to maintain or improve soil productivity so that soils exhibit permeability and infiltration rates and produce healthy diverse stands of vegetation consistent with site potentials. Land Health Assessments have been performed on 29 sites within the SPRNCA. There are several factors that have been associated with areas that are in fair condition only in the SPRNCA. In addition to historic livestock overgrazing, soils with fair health were the result of both erosion from high intensity rains that occurred only 1-2 months prior to the assessment, as well as lower ground cover caused by an increase of brush cover. If any of these factors increase substantially, either singularly or in combination, increased soil loss can be expected.

Forecast

The forecast for soils in the geologic floodplains that are now terraced well above the entrenched river and currently active floodplain levels is that conditions are likely to improve, especially if the historic agricultural fields are restored to potential natural vegetation. However, removal of the dikes or berms along the east and west sides of the abandoned farm fields is not recommended without careful evaluation of potential consequences, such as initiating head-cuts, and loss of groundwater recharge currently occurring behind these historic structures. Additionally, because the terraces were altered to become agricultural fields, it is highly questionable that berm removal would result in re-establishment of pre-existing drainages.

Uplands soils are also in need of restoration to potential natural vegetation and without restoration from shrub invasion, decreased groundcover and soil compaction they will continue to lose topsoil.

2.3.5 Water Resources

Watershed

The San Pedro River originates in desert grasslands near the mining town of Cananea, Sonora, Mexico, draining approximately 696 square miles before entering the United States near Palominas, Arizona at the southern end of the SPRNCA (Figure 2.3-8). It continues flowing north through the SPRNCA to Winkleman, Arizona for a total of 140 miles where it joins the Gila River, which flows west to the Colorado River (BLM 1987). Within the SPRNCA, the river comprises approximately 51 miles of perennial, intermittent, and ephemeral stream reaches, which receive flows from several large, mostly ephemeral tributaries (NRST 2012).

Groundwater

The San Pedro river valley is formed by a geologic structural trough referred to as a graben, as a result of block faulting typical of the basin and range province of the United States characterized by north/south valleys (basins) and mountain ranges (Figures 2.3-8 and 9). Over geologic time, sediments from the mountains filled the graben forming the regional basin fill (older alluvium), which comprises the regional aquifer. Younger alluvium (i.e., the floodplain/Holocene) deposits of weathered rock along the river corridor comprise the floodplain aquifer, which typically has much higher hydraulic conductivity (effective porosity/permeability), due to unconsolidated deposits, than the regional aquifer. Baseflows in the river's perennial gaining reaches depend primarily on lateral inflows of groundwater from the regional aquifer. Large infrequent floods sporadically overflow the river banks, recharge the younger alluvium, and subsequently discharge slowly back to the river providing a secondary source of flow to the channel. The underlying regional aquifer contributions to the San Pedro River sustain baseflows that would otherwise be lost as water in the younger alluvium would simply sink down to the regional water table, in losing reaches (Putman et al. 1987, BLM 1987).

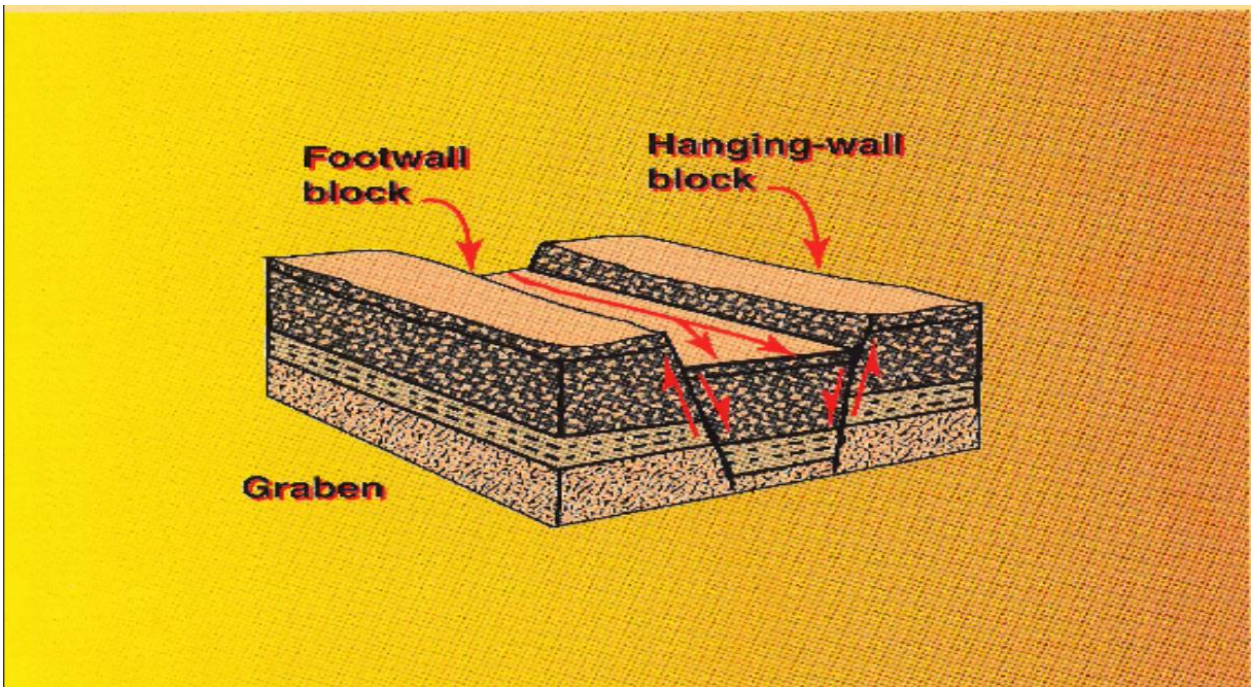
Indicators

Groundwater levels, well hydrographs, the regional and floodplain water tables, rainfall/runoff ratios of overland flows, the presence and condition of riparian vegetation, baseflows (summer and winter low-flows), regional groundwater gradients, the extent and rate of growth of the cone of depression, spring and seep flows, micro-gravity measurements, the presence and extent of any land subsidence/fissuring, the water budget, isotope studies, and the number of wells in the basin through time are all useful indicators of groundwater conditions and trends.

Stream gauges, stream discharge measurements, summer and winter low-flow analysis, wet/dry mapping, PFC assessments by river reach, and gauged stream flows all provide valuable hydrologic information as indicators of surface water conditions.

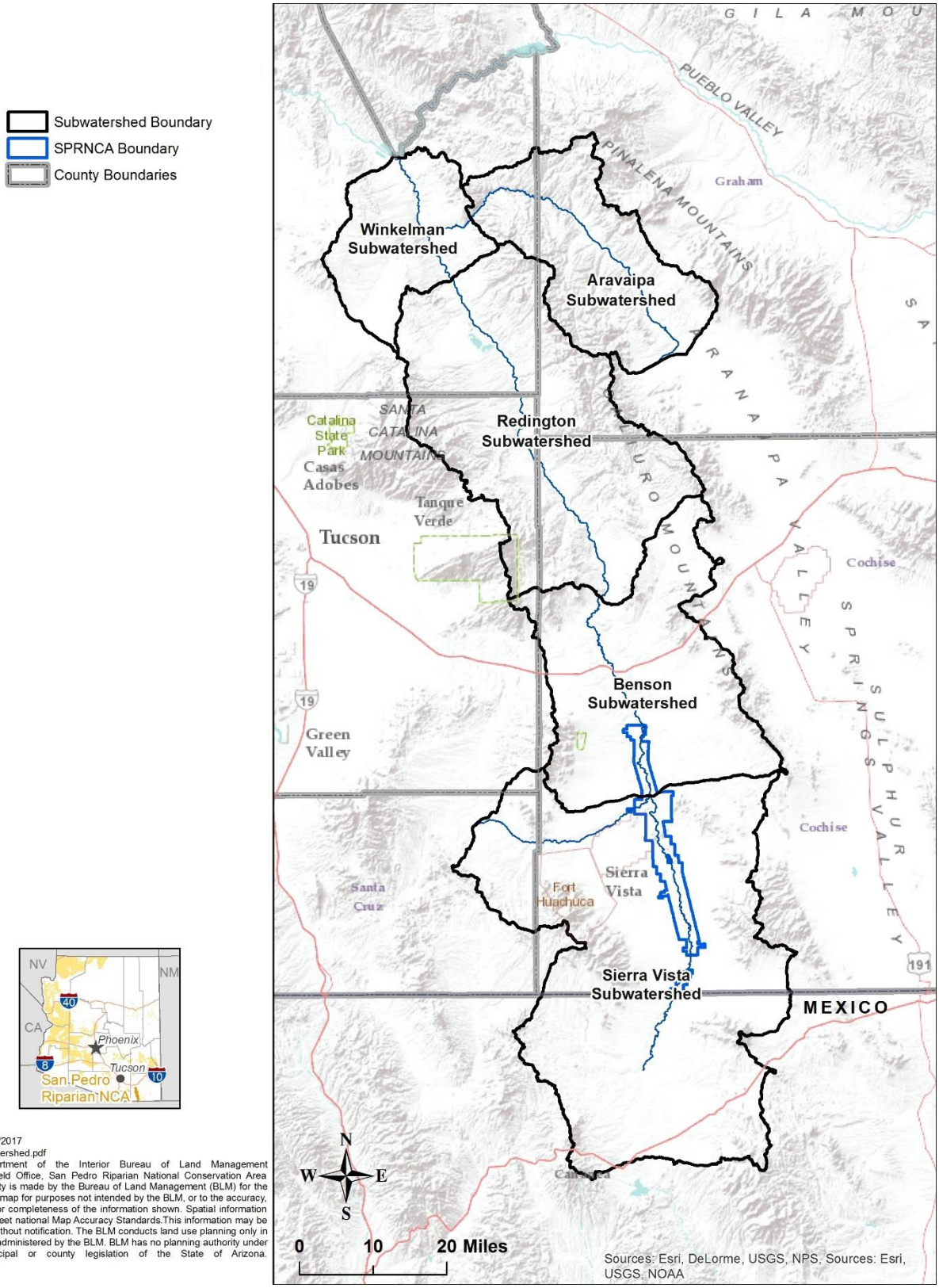
Water quality parameters monitored as indicators of the physical, chemical and biological quality of water include pH, dissolved oxygen, temperature, E-Coli, total and fecal coliforms, total

dissolved solids, turbidity, heavy metals, and electrical conductivity. Other parameters such as salinity, macroinvertebrates, and pharmaceuticals have been and may be monitored in special cases, depending on the issues that may arise. It should be noted there are no promulgated regulatory levels for pharmaceuticals, nor are there standardized test methods.



Source: USGS 1980.

Figure 2.3-7. Typical Graben



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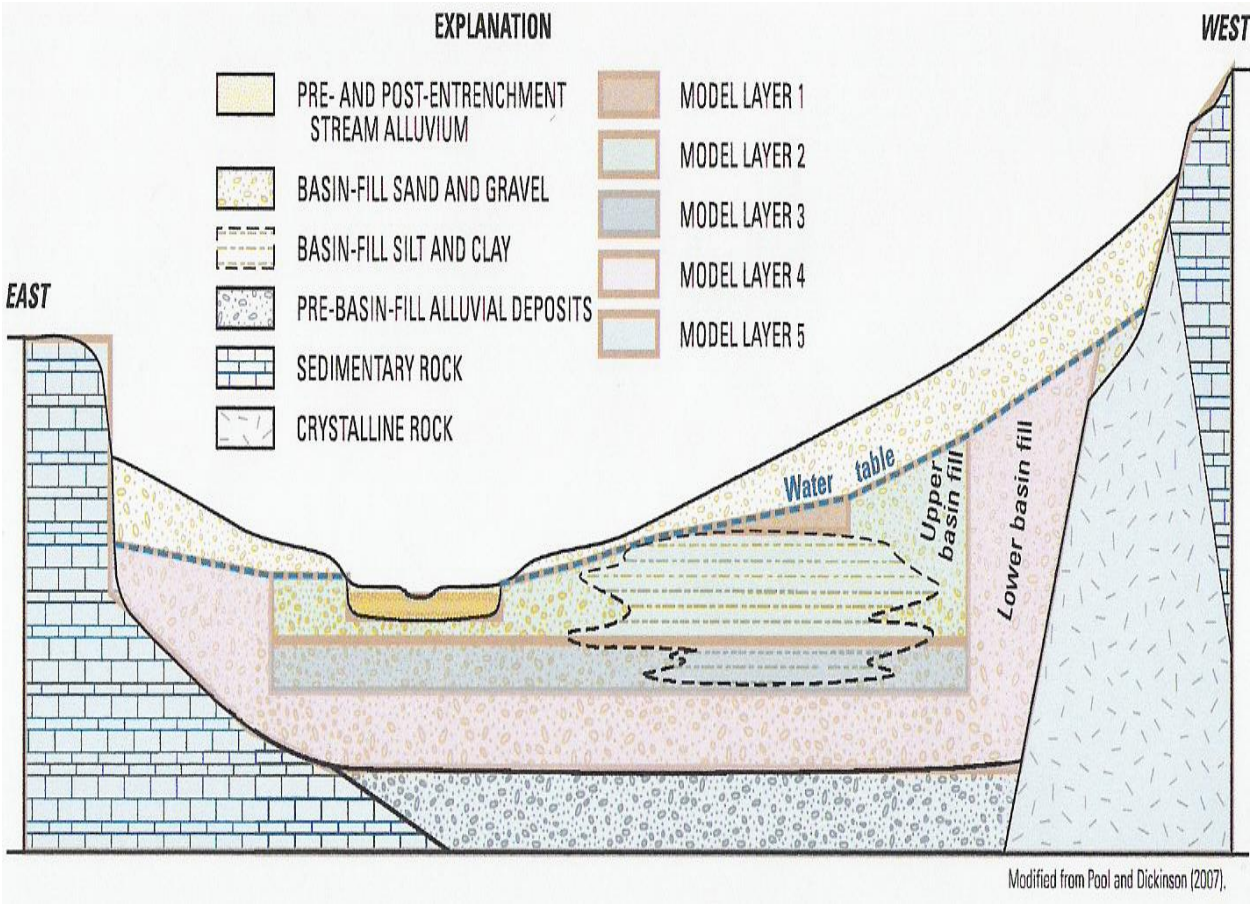
US Department of the Interior Bureau of Land Management Tucson Field Office, San Pedro Riparian National Conservation Area No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by the BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet national Map Accuracy Standards.This information may be updated without notification. The BLM conducts land use planning only in the areas administered by the BLM. BLM has no planning authority under the municipal or county legislation of the State of Arizona.

Figure 2.3-8. San Pedro River Watershed

Current Conditions

Erosion and Sedimentation

In a general sense within the SPRNCA, upland vegetative groundcover decreases downstream, as do perennial and intermittent stream reaches within the riparian corridor. Generally, the geologic floodplain terrace (old agricultural fields) and uplands have less erosion and better groundcover at the southern end of the SPRNCA than the more northerly downstream locations. The areas on the west side of the river north of Highway 82 are in degraded conditions, partly due to less precipitation, highly erodible soils, and historic over-grazing, but also because of historic railroad drainage crossings patterns that routed three or more natural drainages and concentrated them into one. These tributary drainage channels subsequently became deeply incised and their contributing areas have since been eroding to match the lowered (incised) grades (B. Lomeli per obs.).



Source: Pool and Dickinson 2007.

Figure 2.3-9. Generalized Hydrogeologic Section and Model Layers of the Upper San Pedro River Basin, United States and Mexico

In tributary watersheds where rapid and extensive urbanization has occurred, some of the drainages reaching the river exhibit down-cutting, bank sloughing, and high levels of sediment yields. Bare soils, sheet erosion, rills, gullies and head-cutting are also evident on many of the

urbanized upland tributary watersheds, as well as on the relatively undeveloped rural areas on the west side of the river north of Highway 82 (B. Lomeli per obs.).

Although, prior to the 1880s the San Pedro River was a cienega through much of the SPRNCA, it has evolved from a major period of channel incision that transformed it into a high-energy, confined river system (Hereford 1993). More recently the system is stabilizing from south to north, and, with the introduction of beaver (*Castor canadensis*) and senescence of the cottonwood/willow forest, appears to be evolving back to marshlands (Stromberg et al. 2010). The San Pedro River is geomorphologically young, as evidenced by its low sinuosity and the presence of only a few large mature meanders.

Regional Aquifer

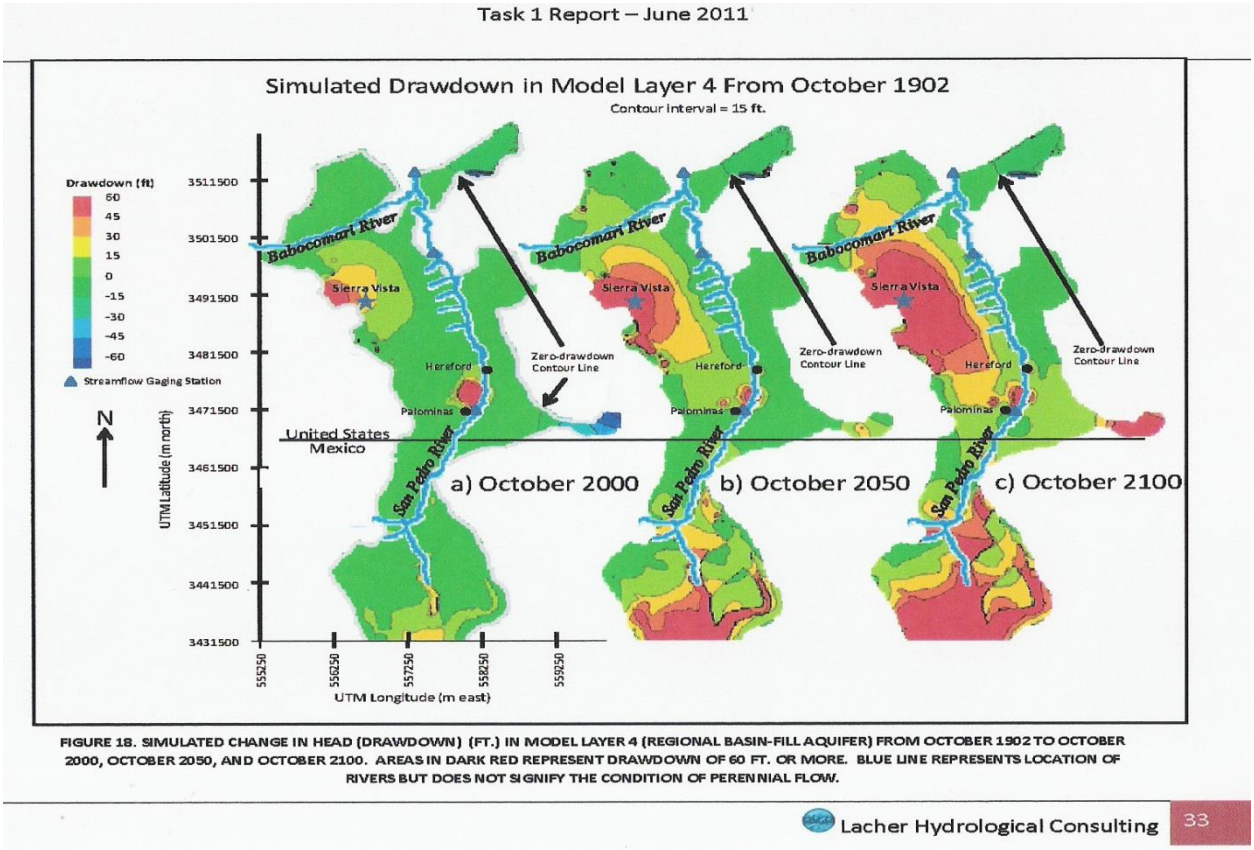
Mountain front recharge is the primary source of recharge to the regional aquifer. Additional recharge to the regional aquifer comes from ephemeral flow in tributary washes, and is highly dependent on the timing of runoff from tributary watersheds. Mainstem flooding recharges the alluvial (floodplain) aquifer and thus also provides significant additional contributions to base flows as this moisture is slowly released back to the river. Slower, longer lasting runoff deliveries to the washes provide the best form of tributary recharge to the regional aquifer. Most tributary washes are underlain by their own older buried coarse deposits that form underground paleo-channels, which can be quick conduits of groundwater to the valley center. Closer to the river, especially on the west side, there is a substantial layer of clay which can impede and significantly reduce percolation of surface moisture to the water table and groundwater flow rates towards the river (McKenna et al. 2011).

Groundwater is the only source of drinking water supply in the Upper San Pedro River Basin. Consequently, all water users – military, industrial, commercial, agricultural, residential, and natural – depend on groundwater withdrawals. Since the advent of the turbine engine, groundwater has been withdrawn from the Upper San Pedro River Basin. Because withdrawals largely exceed natural recharge, there is now a deficit in the water budget for the Sierra Vista Subwatershed (USPP Section 321 Reports 2004- 2012). A large cone of depression has formed under the larger pumping center near Fort Huachuca and Sierra Vista as a result of the long-term over-drafting, which continues to grow towards the river and south towards the Hereford area. The cone of depression does not physically affect the entire Sierra Vista subwatershed. Its geographic extent is limited to the Sierra Vista/Fort Huachuca area. However, the aquifer's deficit caused by the cone of depression is accounted for in the water budget at the Tombstone Gauge as are all other water budget items regardless of their physical location within the Sierra Vista subwatershed.

Baseflows in the river's perennial gaining reaches depend primarily on lateral inflows of groundwater from the regional aquifer reaching the younger alluvium of the river's floodplain. Groundwater storage in the aquifer has been steadily reduced and groundwater gradients have significantly declined due to over-drafting. Both are predicted and modeled to continue declining, thus reducing the rate of lateral groundwater flow towards the river (Figures 2.3-10, 11, 12, and 13) (Lacher 2012). The regional aquifer in Mexico is also pumped for mining, and for industrial, commercial, agricultural, municipal and rural residential uses. Groundwater inflows from Mexico are relatively minimal naturally and historically (USPP Section 321

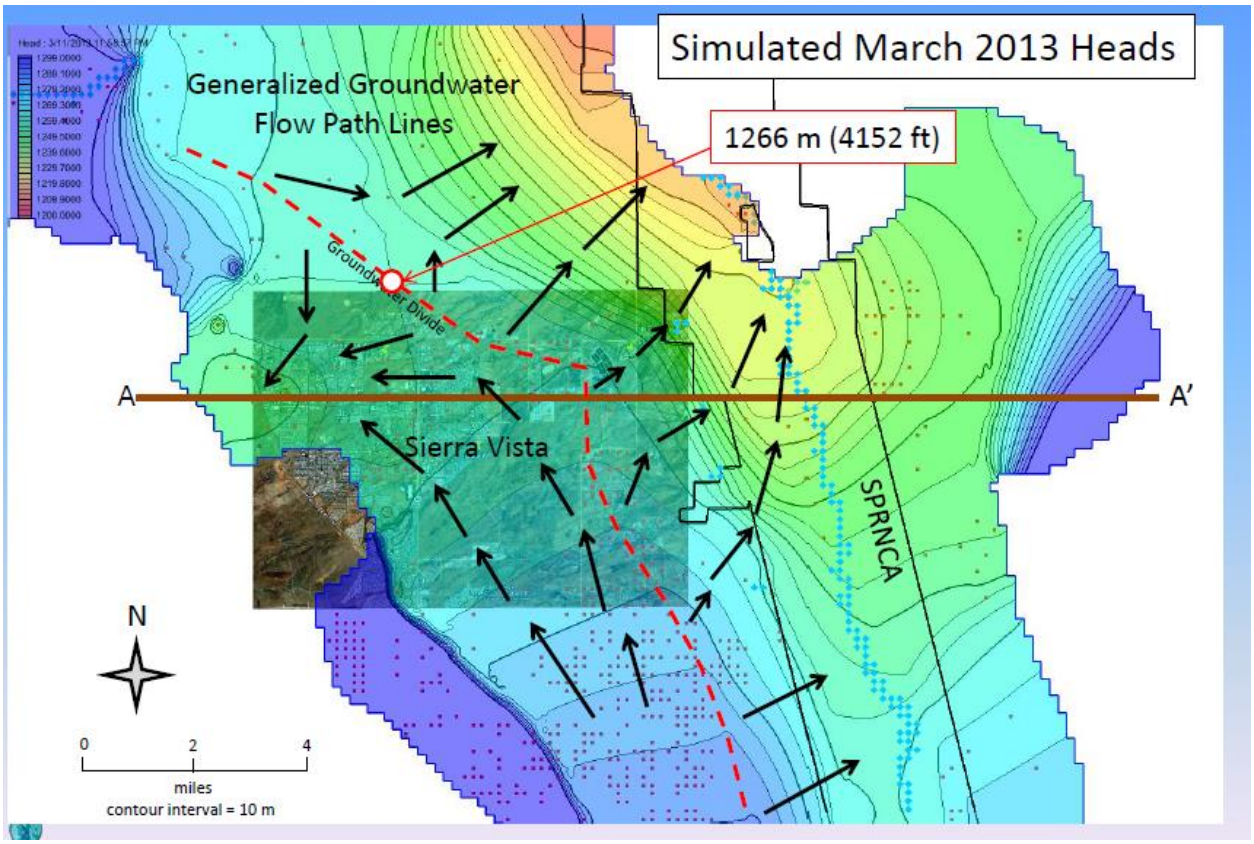
Reports), but groundwater modeling does show water table declines and a cone of depression forming in the future near the international border (Lacher 2011).

The water budget is calculated at the lower discharge point of the Sierra Vista subwatershed (USPP Section 321 Reports). Because of its distance from Sierra Vista, the expanding cone of depression, and its inherent subjectivity and uncertainties, the water budget is not a very good indicator of groundwater conditions that affect the river's baseflow. Historical groundwater over-drafting has been partially mitigated by recharging Sierra Vista's and Fort Huachuca's effluent, water conservation programs, and may be further mitigated in the future by recently proposed stormwater recharge projects. However the cumulative aquifer deficit is very large and has continued to grow with population (Lacher 2012). Land subsidence and fissuring have not been observed in this mountainous geological structure.



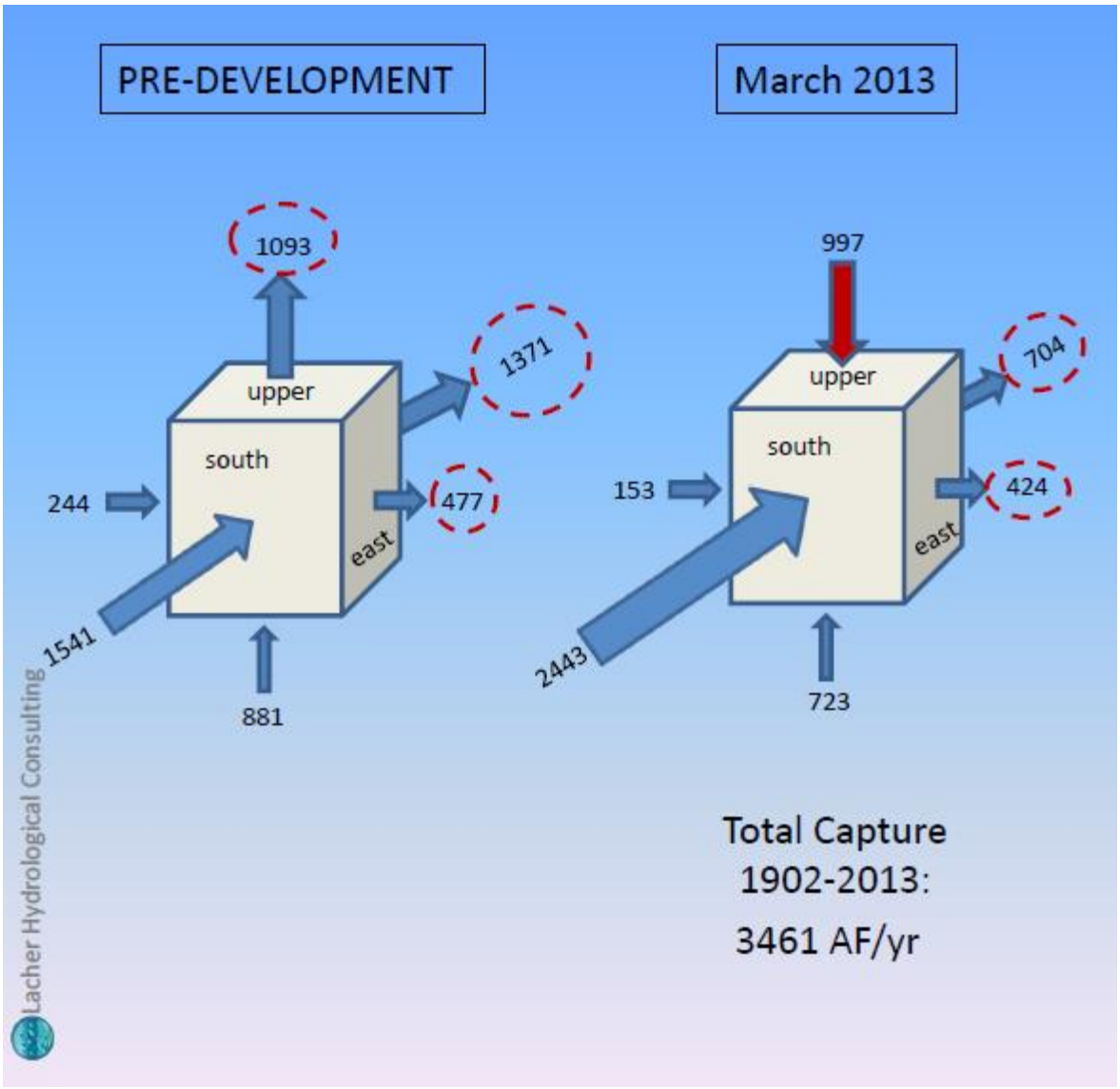
Source: Lacher 2011.

Figure 2.3-10. Cone of Depression



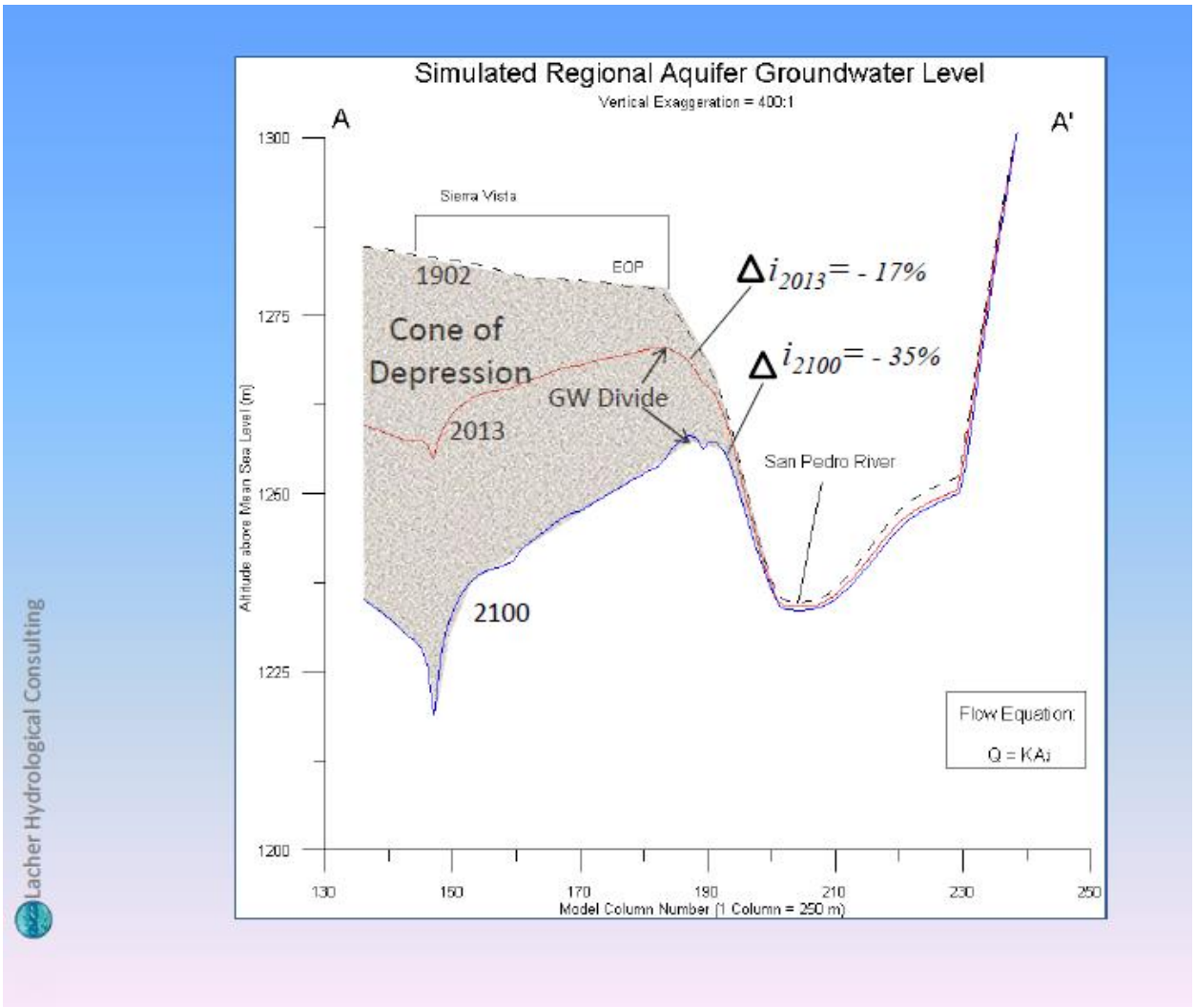
Source: Lacher 2013.

Figure 2.3-11. Cone of Depression with Groundwater Contours, Flow Direction Arrows and Groundwater Divide



Source: Lacher 2013.

Figure 2.3-12. Changes in Regional Aquifer Storage 1902 – 2013



Source: Lacher 2013.

Figure 2.3-13. Declines in Regional Groundwater Gradient 1902-2013-2100

Alluvial Aquifer

Younger alluvium (Holocene) deposits along the river corridor comprise the alluvial floodplain aquifer, which typically has much higher hydraulic conductivity than the regional aquifer. Each properly functioning tributary contributes naturally regulated flows of water, sediment, and nutrients, and provides temperature buffering and biotic diversity. Riparian tributaries act as wildlife corridors between mountains, uplands, and the river by providing habitat continuity for species migrations. Small pools and near-surface water along these washes make excellent habitats. The vegetation provides cover, food, and nesting and roosting areas. Riparian corridors also provide habitat for many insects and reptiles, which in turn serve as a base for a complete food chain. All vegetated drainages play an important role in maintaining proper hydrologic function and a dynamic ecosystem equilibrium capable of supporting a healthy environment and a viable economy. Healthy tributary watersheds help preserve the river's perennial nature by improving the form and timing of flows within the valley. Isotope studies show the varying

percentages of regional aquifer and floodplain aquifer groundwater contributions to baseflows along the river. Regional aquifer contributions to base flows vary between 20 to 80 percent (USGS 2010). Water ponds forming upstream of beaver dams also provide bank recharge and storage that help maintain baseflows with slow releases from the beaver ponds and from the recharged river banks in the vicinity of the beaver dams. The BLM performs monthly monitoring for groundwater levels at nine locations within the SPRNCA. Surface flow rates are also measured monthly at 12 locations on the San Pedro River and one location on the Babocomari River. Monitoring wells near the river provide water level information of the younger floodplain alluvium. However, these wells do not provide any early warning of approaching regional aquifer declines or of the proximity of the cone of depression. Nested wells in the Lewis Springs area do serve that purpose because they monitor both the regional and floodplain aquifer levels at one site.

The BLM uses riparian Proper Functioning Condition (PFC) assessments as the accepted protocol for determining compliance with Land Health Standards and establishing baseline conditions. More information can be found in Secion 2.3.6 Riparian and Wetland Vegetation.

In addition, a survey on surface flow extent during June (Wet-Dry Mapping) is conducted during the dry season each year. Wet/dry mapping on the San Pedro River has been an annual monitoring program since 1999. Begun as a joint effort by the BLM and staff from The Nature Conservancy within the 50-mile length of the SPRNCA, it now includes many organizations and hundreds of volunteers who map perennial surface water in the San Pedro River each year during the third weekend in June. In 2015, almost 140 miles of the river and over 160 miles of its tributary streams in the US and Mexico were surveyed. Results for 2015 were similar to other wet years, with 35.6 miles (72 percent) of the stream length wet within the SPRNCA (Figure 2.3-14). The river maintained continuous flow through segments 5 and 6, the area underlain with clay or bedrock. That portion also receives subsurface contributions of effluent from Sierra Vista's Environmental Operations Park (The Nature Conservancy 2012).

Water Quality

The SPRNCA's surface water quality is controlled by seasonal changes in runoff and underlying groundwater conditions. Generally, groundwater quality in the basin is found to be within USEPA use standards and can act as a seasonal control on surface water quality (Stromberg and Tellman 2009). During the dry seasons, sediment is allowed to accumulate in tributary watersheds and because of this high run off events are highly sediment laden; heavy metals tend to bond to sediments and are "flushed" from the floodplains into streams.

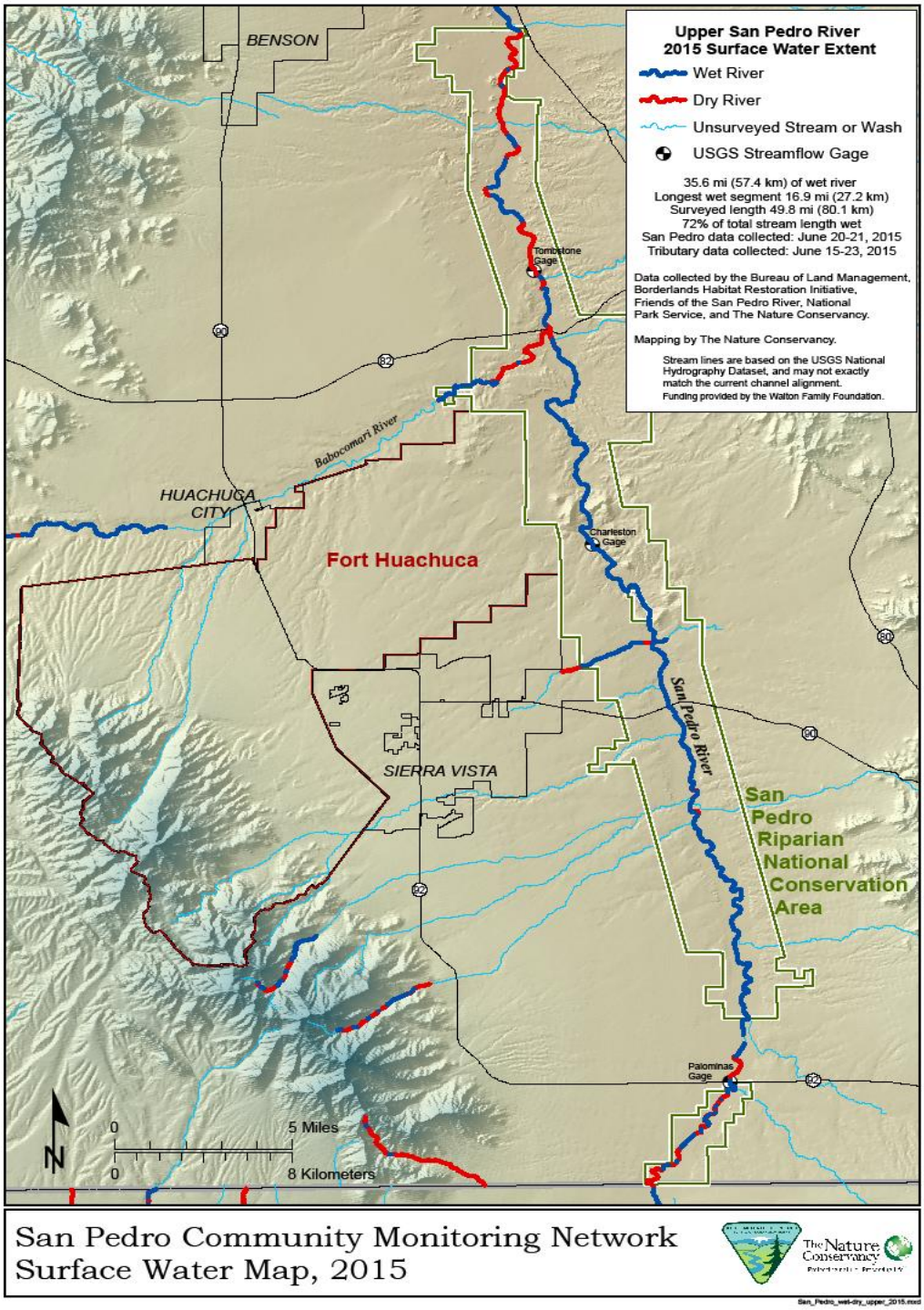


Figure 2.3-14. SPRNCA Wet Dry Mapping 2015

Currently, BLM water quality monitoring is limited to sampling special high priority sites and cases, and is often conducted by other entities including ADEQ, the Sierra Club's Water Sentinels, and the United States Geological Survey (USGS).

In accordance with the Clean Water Act, ADEQ is required to produce a section 305(b) water quality assessment and section 303(d) listing of threatened or impaired waters in the state every two years. In the draft ADEQ 2012/2014 integrated 305b/303d report, the San Pedro River within the NCA boundary was assessed in three reaches. The reach of the San Pedro River from the border of Mexico to Charleston is listed as category 5, impaired, for not-attaining the water quality standards for E-coli and dissolved copper for the designated uses of Full Body Contact and Aquatic and Wildlife (warm water). The reach from Charleston to Walnut Gulch is listed as category 3, inconclusive for all uses, and requires more sampling. The reach from the confluence of the Babocomari River to Dragoon Wash is listed as category 5, impaired, for exceedances in E-coli for the full body contact designated use. ADEQ is in the process of additional sampling for the completion of the required Total Maximum Daily Load (TMDL) report for these exceedances in E-coli and dissolved copper. In the 2012/2014 report, there were two tributaries assessed on the San Pedro whose confluences are within the NCA, they are the Babocomari River and Green Bush Draw. The Babocomari is listed as category 2, attaining for some uses, while Green Bush Draw is listed as category 3, inconclusive, and requiring more sampling.

The Sierra Club's Water Sentinels take E-coli samples and monitor basic water quality parameters of pH, dissolved oxygen (DO), electrical conductivity (EC), and total dissolved solids (TDS) every year during the summer months of May to October. The samples and measurements are conducted at the five sites in the SPRNCA: the Highway 92 Bridge, Hereford Road Bridge, Highway 90 Bridge, Charleston Road Bridge, and Highway 82 Bridge. From 2011 to 2013, the Water Sentinels took 85 samples for E-coli, of those 26 exceeded the maximum standard of 235 MPN (Most Probable Number of colonies)/100 ml across all five sampling sites. Of those exceedances, 24 occurred during the monsoon months of July, August, and September (Pawlowski, n.d.). Furthermore, the Coronado Resource Conservation and Development's San Pedro River Targeted Watershed Improvement Plan from 2013 indicates that E-coli contamination is from both human and bovine sources. The segment of the San Pedro River within the NCA from the border of Mexico to Charleston road has been impaired for e-coli and dissolved copper since 2010 and the segment from the confluence of the Babocomari river to Dragoon wash has been impaired since 2004 (ADEQ 303d).

Pharmaceuticals, insect repellents, and other emergent contaminants have been detected at Murray Springs through limited water quality sampling. Sampling was conducted by the BLM on June of 2010, and by the USGS between 2006 and 2009. The water quality sampling of June 10, 2010 revealed "non-alarming" results. Per Arizona Revised Statutes Title 18 Chapter 11, no pharmaceuticals are currently regulated by USEPA or ADEQ, and therefore no federal or state standards exist for pharmaceuticals or emergent contaminants.

ADEQ has conducted some sampling of macro-invertebrates, most of which was performed shortly after the BLM acquired the SPRNCA. Private consultants also conducted some subsequent sampling; however, the BLM is not currently in possession of this data.

Contaminants from mining operations in the watershed present an additional concern for the water quality of the river. For instance, the 1979 runoff event that overflowed leaching ponds in Mexico led to extremely low pH and DO levels as well as high levels of heavy metals (BLM 1987). In September 2014, overflow from a detention pond in the Buena Vista Mine near Cananea, Sonora entered a tributary to the San Pedro River 30 miles from the US-Mexico

Border. ADEQ samples taken after the spill for the San Pedro River in the US were within the historical range (US International Boundary and Water Commission 2014).The monitoring of heavy metals in the river is conducted by the state and federal agencies other than the BLM.

Trends

Erosion and Sedimentation

There are three basic types of erosion, classified primarily by rate and location (BLM 1987). A natural rate of erosion occurring gradually over long time periods is referred to as "geologic erosion." Although there can be episodes of locally high rates in response to intense rains, runoff and flooding, the overall long-term rate is still slow enough to be considered to be a geologic time process. Relatively quick vegetation recoveries, usually seasonal depending on subsequent precipitation patterns, followed by natural soil stabilization are characteristic of geologic erosion.

Accelerated erosion, on the other hand, is usually in response to a land use practice that causes excessive runoff from even normal intensity storms. This type of erosion persists and worsens until the land use of contributing areas is corrected and/or mitigated. Any land use activity that leads to bare soils and/or other types of increased impervious areas can cause accelerated erosion. In tributary watersheds where rapid and extensive urbanization has occurred, some of the drainages reaching the river exhibit down-cutting, bank sloughing, and high levels of sediment yields. Bare soils, sheet erosion, rills, gullies, and head-cutting are also evident on many of the urbanized upland tributary watersheds, as well as on the relatively undeveloped and rural aforementioned areas on the west side of the river north of Highway 82.

Rapid channel adjustments are natural episodic changes in fluvial geomorphology. Channel meandering and widening are examples of relatively quick locally occurring natural riverine adjustments. These should be recognized as a part of natural channel evolution and not interfered with, unless special issues or conditions are present such as threatened infrastructure. Since there are no urban areas in the SPRNCA, the only reason to try to interfere with rapid channel adjustments would be when highway bridge crossings, or perhaps historic structures, or private land in-holding residences, and other improvements are threatened.

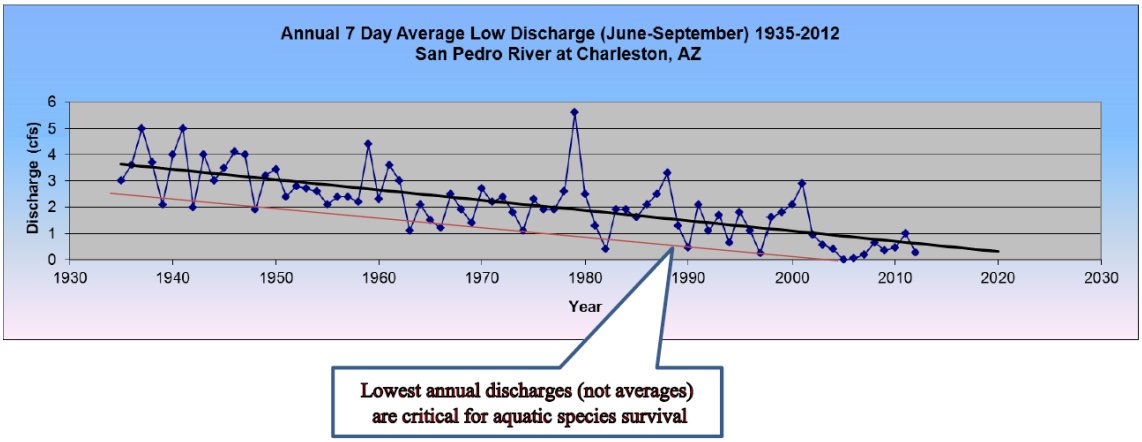
Regional and Alluvial Aquifer

With the exception of Fort Huachuca, the current trend throughout the Sierra Vista subwatershed is for continued and increased groundwater withdrawals as population grows. There are some recent efforts to enhance natural recharge and to increase artificial recharge, including treated effluent, as attempts toward mitigating the over-drafting and reducing the aquifer/water budget deficit.

Baseflow in the river has steadily declined over time. Both summer and winter low-flows have been declining. Micro-gravity measurements can detect groundwater level changes over time, and generally agree with the declining levels measured in wells. The river went completely dry at the Charleston Gage in the summer of 2005 (Figure 2.3-15). According to USGS studies, precipitation inputs are not the reason for these declines.

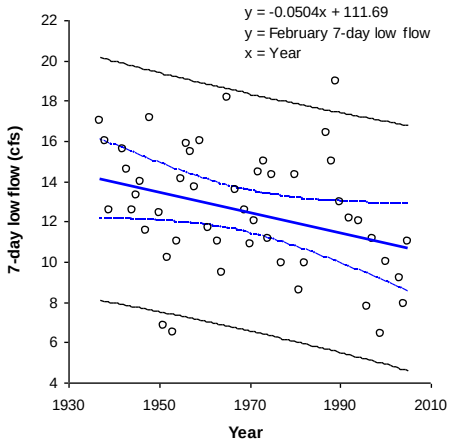
> "This lack of response to precipitation cycles is one indication that other factors besides precipitation could be affecting streamflow of the San Pedro River."

Since there is no evapotranspiration from dormant riparian vegetation in the winter, evapotranspiration is not the cause for these steady long-term baseflow declines either. Reduced groundwater gradients and the cone of depression are much more likely the reason for these steady baseflow declines. Long-term over-drafting of the regional aquifer is capturing groundwater flows that would otherwise reach the river. (Figure 2.3-16 and 17) (Barlow and Leake 2012). All groundwater modeling studies report continued groundwater gradient declines and a large and continually expanding cone of depression. The latest groundwater modeling studies verify declining groundwater inputs to the river. Spring flows, seep flows and wetlands within the SPRNCA are also experiencing declines.



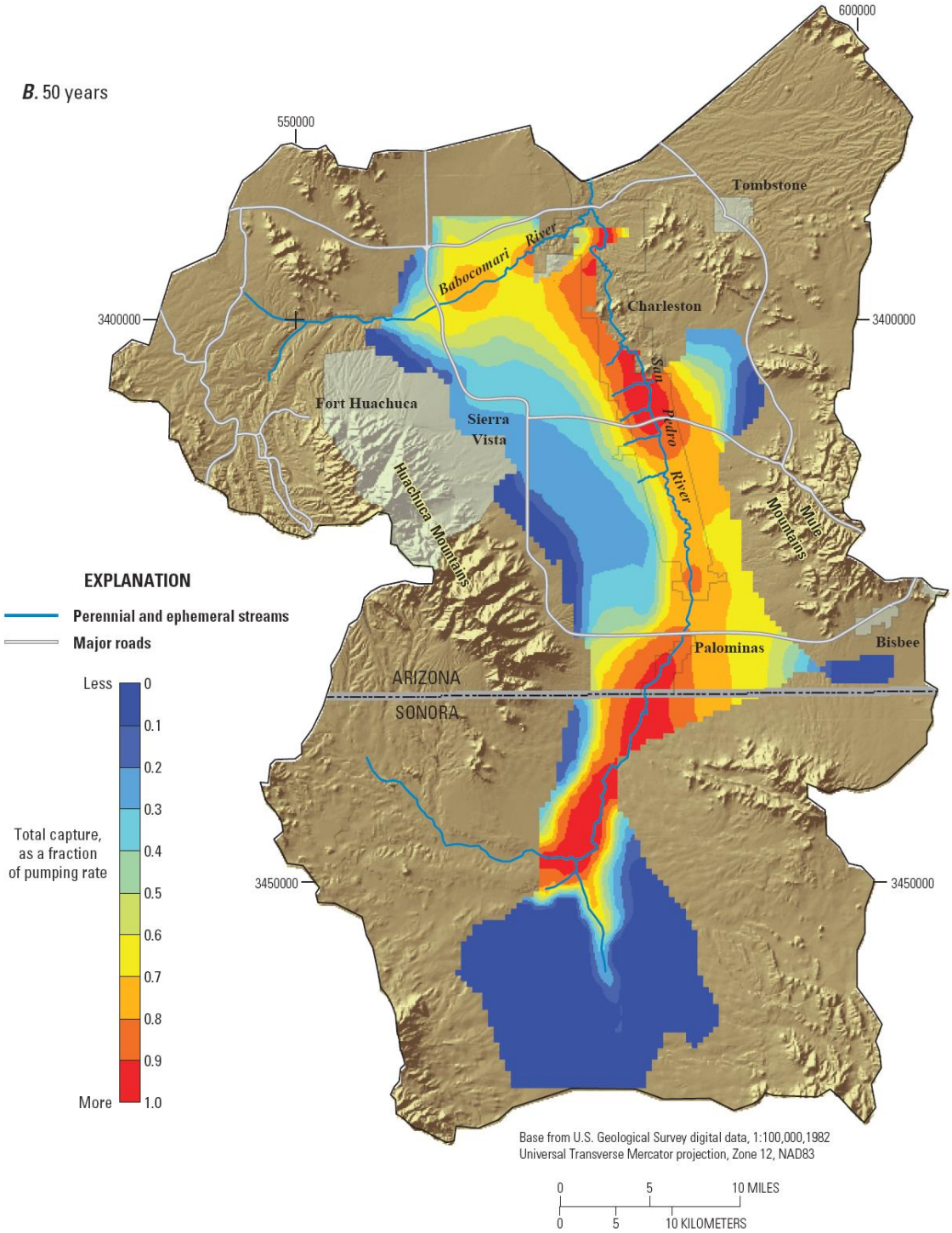
Source: BLM 2012a.

Figure 2.3-15 Baseflow Summer Declines at Charleston Gage 1935 – 2012



Source: Koehler 2005.

Figure 2.3-16. Regression analysis of non-storm influenced February 7-day low flows. San Pedro River at Charleston Gage



Source: Barlow and Leake 2012.

Figure 2.3-17. Computed Capture of Streamflow, Riparian Evapotranspiration, and Springflow that would result for groundwater withdrawal at a constant rate for 50 year

Several wetlands recently assessed for PFC also show indications of declining moisture levels and drying conditions and drying trends. More details can be found in Section 2.3.6 Riparian and Aquatic Vegetation.

Groundwater levels in wells and the water table in the regional aquifer have been declining since pumpage of the basin began and are expected to continue to decline as existing pumpage continues and the number of uses continues to increase with population. There were a total of 8,737 wells in the Upper San Pedro River Basin in 2012. While some agricultural wells have been retired, the number of groundwater wells in the Upper San Pedro River Basin have increased by 77 percent from 1990 to 2012 (Figure 2.3-18). The regional water table has dropped significantly where long-term over-drafting has and continues to occur.

Collaborative wet-dry mapping of the river from 1999 to present is showing both positive and negative trends in wetted segment lengths (Figure 2.3-14). Segments 1, 7, and 8 continue to show declining trends that have not reached statistical significance. A significant positive trend in Segment 2 continued, which may be the result of agricultural retirement efforts. Just downstream, Segment 3 has a positive trend that is not yet statistically significant (at the level of p=0.05). Combining Segments 2 and 3 into a 10-mile reach, wetted length has increased by 1.1 miles since 1999.

Water Quality

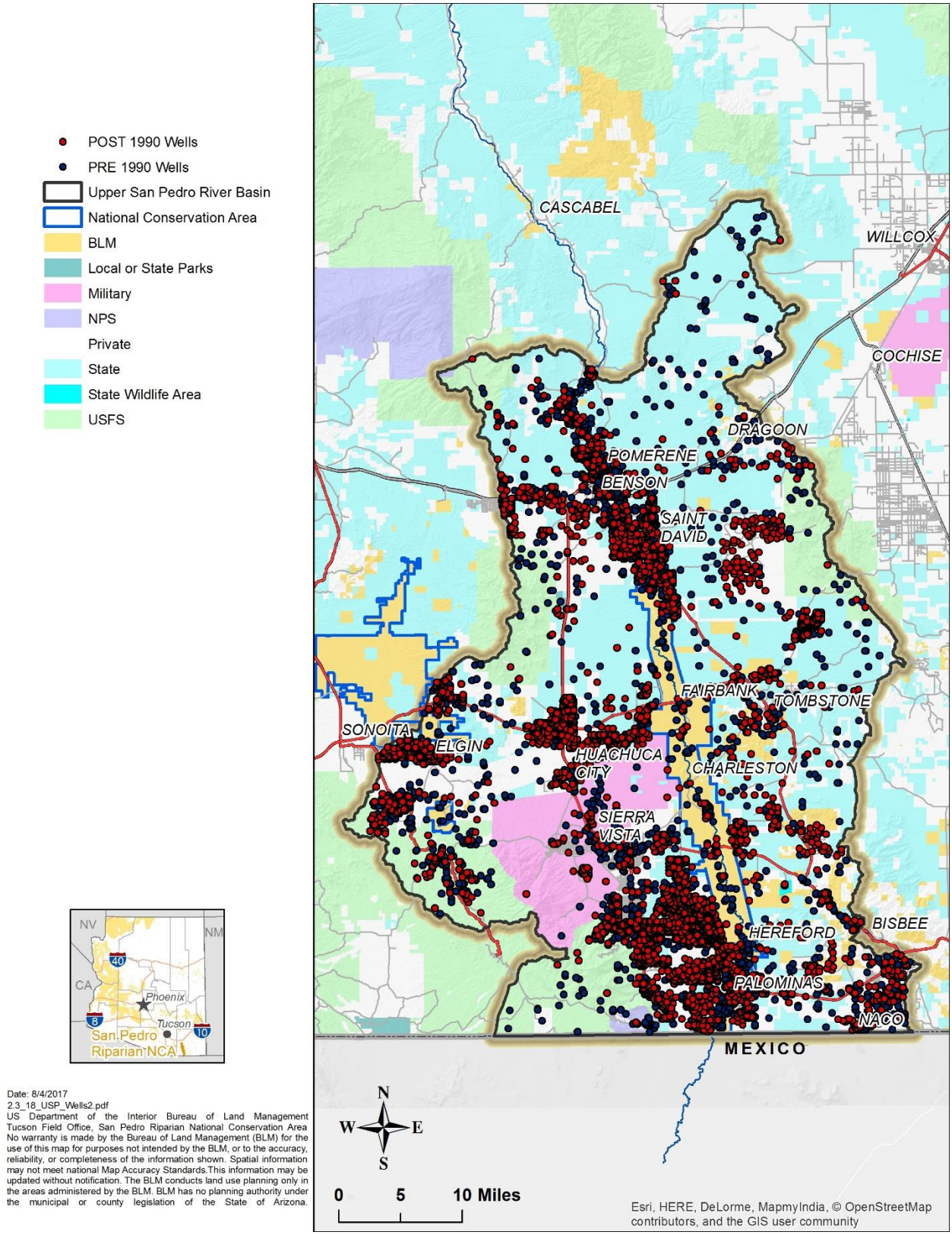
No discernable trends are observed in pH, dissolved oxygen, temperature, or conductivity. Sources of E-coli have been analyzed by the aforementioned ADEQ grant study but none have been specifically identified. No trends have been identified from the few limited samplings of fecal and total coliforms, pharmaceuticals, or heavy metals.

Forecasts

Erosion and Sedimentation

Erosion could be expected to increase as grass cover on the tributary watersheds decreases in response to less precipitation and higher temperatures predicted as part of changing climate trends.

> "By all indications, the San Pedro River is no longer incising and is aggrading by building a floodplain and by narrowing its channel. In the context of channel evolution, those are favorable signs indicating that some reaches have achieved PFC while others are moving in that direction. Consequently, the National Riparian Service Team (NRST) recommends against using active restoration practices in the San Pedro River channel, such as induced meanders. Sound riparian management and passive restoration practices should be adequate to facilitate completion of the channel evolutionary process" (NRST 2012).



Source: BLM-TFO 2012.

Figure 2.3-18. Wells in the Upper San Pedro River Basin

Overland runoff from the tributary watersheds can be expected to become even flashier as vegetative cover continues to decrease in response to certain land uses, urbanization, and predictions of hotter temperature, and increased storm intensity.

Regional and Alluvial Aquifer

Baseflows can be expected to continue declining in response to the growing cone of depression which intercepts groundwater that would otherwise reach the San Pedro River as evidenced by declines in groundwater gradients and continued declines in groundwater gradients unless recently proposed stormwater and effluent recharge sites are implemented and are effective. Baseflows and springs, seeps, and wetlands can be expected to decline in response to changing climate trends and to the growing cone of depression.

Groundwater levels in wells and the water table in the regional aquifer are expected to continue to decline as existing pumpage continues and the number of uses continues to increase with population. The growing cone of depression can be expected to continue expanding for the above reasons. Modeling indicates groundwater depletion in 10-30 years for the SPRNCA within the Sierra Vista subwatershed (USGS 2013).

Historical groundwater over-drafting has been partially mitigated by recharging Sierra Vista's and Fort Huachuca's effluent, water conservation programs, and may be further mitigated in the future by recently proposed stormwater recharge projects. However, the cumulative aquifer deficit is very large and will continue to grow with population.

The number of groundwater wells in the Upper San Pedro River Basin increased by 77 percent from 1990 to 2012, and can be expected to continue increasing commensurate to any population increases. However, the increase in the number of wells alone does not necessarily account for the actual change in acre-feet of water usage because one agricultural irrigation well can equal the water usage of hundreds of domestic wells.

Population increases have slowed down in response to a weakened economy, but may again increase as the economy recovers. Fort Huachuca has demonstrated that groundwater pumping can decline with a population increase and is an example for others to follow.

It is very difficult to predict what changes may occur in Mexico's water uses. If copper prices rise, more mining activities and higher water uses may be expected. The residential population of Cananea, Sonora may be expected to grow commensurately in response to increased mining activities, as may industrial, commercial, and agriculture uses. There is always a possibility of a dam in the river or a major tributary to provide additional water supplies and recreational opportunities for that part of the Mexican headwaters.

The latest climate trend predictions indicate much less summer (Monsoon) moisture and more variability of winter (frontal) storms. The dry river bed of Santa Cruz River is a perfect example of what can be expected of the San Pedro River if historic water use trends continue. All riparian vegetation will be lost if regional water tables continue to decline. With continued drier conditions and declining groundwater inputs, a general decline of wetland, springs and seeps can be expected.

Water Quality

If riverine low-flows and other surface waters continue to decline, dissolved oxygen could decrease. Water temperature, salinity, total dissolved solids, turbidity, heavy metals, conductivity, E. coli, fecal and total coliforms, pH (water could become more basic), and pharmaceuticals may be expected to increase.

2.3.6 Riparian and Wetland Vegetation

Riparian vegetation generally occurs along stream courses where soil moisture is higher than the surrounding bottomland and upland habitats. Aquatic vegetation consists of those species associated with surface water, while wetland plants (facultative wetland species) are often associated with surface water but can also survive in mud or seasonal inundation with surface water. The SPRNCA has 8,639 acres of riparian vegetation according to Watts (Table 2.3-3 and Figure 2.3-19).

Table 2.3-3. Riparian Vegetation Table

Name	Description	Acres
Cottonwood/willow	Overstory dominated by cottonwood trees, understory open, herbaceous, or dominated by shrubs/Overstory dominated by willow trees, understory open or herbeceous	1,464
Mesquite (floodplain)	Overstory dominated by mesquite trees, understory open, herbaceous, or dominated	1,567
Mesquite/Sacaton	Co-dominated by mesquite and sacaton	2,481
Sacaton/tobosa (*Pleuraphis mutica*)	Dominated by sacaton grass	2,715
Salt cedar (*Tamarix)*	Dominated by salt cedar trees	412
Total		8,639

Source: US Army Corps of Engineers n.d.

Riparian, wetland and their functional companion, flood plain vegetation, have a number of key functions that support river channel function, which in turn supports riparian and wetland vegetation types: (1) slow water velocity during floods, (2) aid in overbank flow and aquifer recharge, (3) capture sediments, which enhances or creates new sites for water storage, (4) increase infiltration and soil-moisture retention by adding organic matter and creating

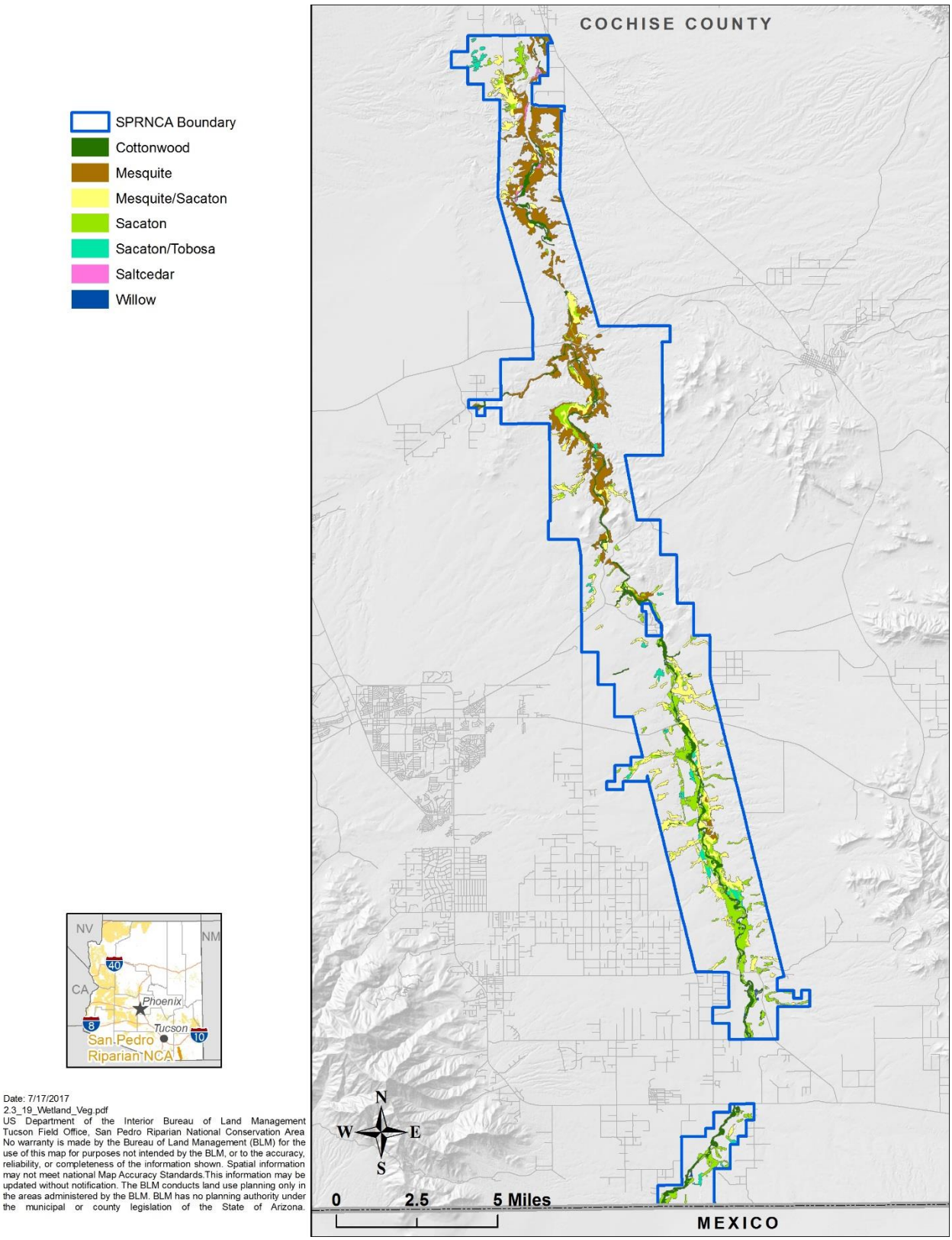


Figure 2.3-19. SPRNCA Wetland Vegetation

macropores, and (5) prevent the decline in channel processes (i.e., channel evolution) such as excessive bank, floodplain erosion and proliferation of secondary channels.

Desert wetlands, or cienegas, form large alluvial surfaces important for slowing seasonal flood pulses, promoting groundwater recharge, and reducing stream channel degradation (Minckley et al. 2009). Cienegas are a habitat type that results from a specific combination of a permanent water source, topography, and water-bearing soils. They are considered the most imperiled of wetlands, with close to 95 percent of cienegas in southern Arizona having been destroyed (Fehlberg et al. 2011). Since the late 1800s, many of these cienegas have lost in-stream function through draining and subsequent conversion to agricultural fields and pastures, which has promoted twentieth-century channel incision and lowering of groundwater levels (Minckley et al. 2009). Since 1900, erosion associated with post-settlement channelization and drawdown of local water tables have dried up most cienega environments (Bryan 1928, Hendrickson and Minckley 1985). Many cienegas are only remnants of their historical condition, and are aquatic islands with a precarious future (Makings 2006).

Fires are required to rejuvenate and keep wetlands open and were a common occurrence in the past. Both fire and water level fluctuation are disturbance factors important to wetland plant species diversity. The water storage of wetland soils is directly proportional to bulk density. Soils high in organics have a lower bulk density with greater porosity and, therefore, water storage capability (Mitsh and Gosselink 1993). Wetlands have some of the highest vegetation productivity of any plant community (Westlake et al. 1998). Organic deposition during wetland soil formation is high as well. Many of the vertical cut banks along the San Pedro River and its tributaries have “gley” (blue-grey color) layers where anoxic wetland soils were formed in the past. These soils were likely a key component of water storage in the past before incision.

Indicators

Primary indicators for riparian areas and wetlands are ecological site characteristics (soil type and water availability); hydrologic regime (base flow and floods); erosion rate; floodplain inundation; beaver dams, channel dimension, pattern and profile; riparian expansion or contraction; condition of the upland watershed; age and composition of plant community; plant health and regeneration; stream bank stability; and the presence of objects (live plants, woody debris, boulders, etc.) that dissipate flood energy.

The *Rangeland Health Standards, Standard 2* (BLM 1997) states that riparian and wetland areas need to be in “Proper Functioning Condition (i.e., PFC)” (Prichard et al. 1993, Prichard et al. 1999). For both riparian and lentic (ponds and wetland) areas, PFC is defined as the following:

> “Riparian-wetland areas, including lentic types, are functioning properly when adequate vegetation, landform, or debris is present to: dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality; filter sediment and aid floodplain development; improve flood-water retention and ground water recharge; develop root masses that stabilize islands and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, water bird breeding, and other uses; and support greater biodiversity.”

Current Condition

Riparian Vegetation

In 2012 the NRST, with the assistance of staff at the TFO, conducted a PFC assessment for the riparian areas (lotic) of the San Pedro River within the SPRNCA. The PFC assessment method provides a framework for evaluating physical functionality based on hydrology, vegetation and erosion/deposition attributes and processes. Assessment findings provide an important foundation for understanding the current condition of a system, limiting factors within and outside BLM control, and areas where additional information is needed. This understanding then informs the process by which objectives relating to desired future riparian conditions are set, and alternative management and monitoring approaches are considered.

Most BLM state offices consider PFC riparian assessments as the accepted protocol for determining compliance with Agency Land Health Standards and establishing baseline conditions. More information can be found in Section 2.3.7, Upland Vegetation. While there have been many scientific investigations and reports on various aspects of the San Pedro River, this was the first integrated assessment that synthesized existing information and resulted in a report of current on-the-ground conditions as compared to potential, on a reach-by-reach basis, throughout the SPRNCA (NRST 2012).

The PFC assessments provide a description of the current riparian condition of individual reaches of the San Pedro River compared to their potential, or the highest ecological status that could be attained in the current climate given no political, social or economic constraints. Although, prior to the 1880s, the San Pedro River through much of the SPRNCA was a cienega; it is currently evolving from a major period of channel incision where it was transformed into a high-energy, confined river system. In addition to geomorphic changes, the climatic and hydrologic regimes that affected the river have also changed significantly, and are not likely to revert back to historic conditions within a management time scale. Therefore, the current sediment and flow regime has and will require the channel to adjust to a new, dynamic equilibrium based on bio-geomorphic processes. Even though you cannot go back to historical conditions of climate, sediment and water balance, it does indicate what channel evolution is likely to lead to even under current conditions. This is as long as the processes that influence channel pattern, dimension, and profile are allowed to occur without interruption. Thus, the reach-based potentials described in 2012 categorize reaches A-E as perennial, F as transitioning from perennial to intermittent, and G-J as intermittent based on permanence of streamflow and associated vegetative communities (Figure 2.3-20).

The NRST (2012) findings provide evidence that the physical function and ecological health of the San Pedro River through the conservation area have improved dramatically since designation, largely due to the 1989 decision to end permitted livestock grazing along the river. However, the combination of groundwater overdraft, surface water diversion south of St David, and drought pose a significant risk to the current conditions and may lead to riparian degradation and loss. For example, some river segments may go from perennial to intermittent (this has already occurred on the Babocoomari River). Others will go from intermittent to ephemeral with concomitant loss of wetland vegetation that is replaced by upland vegetation community types or tamarisk (Tamarix). Relief from grazing pressure has allowed development of riparian vegetation and channel characteristics that greatly improve the function and sustainability of the San Pedro

River. Continued recovery in all reaches is necessary to meet congressional direction, but significant positive changes have occurred in the amount and density of wetland vegetation since permitted grazing has been eliminated along the river (Commission for Environmental Cooperation 1999; Krueper et al. 2003). Of the 51 miles assessed (Table 2.3-4), 27.4 miles (54 percent) were rated as PFC, and the remaining 23.4 miles (46 percent) rated as Functional at Risk (FAR). The FAR reaches were further assigned apparent trend. 8.9 miles showed an upward trend, 10.3 miles showed a not apparent trend, and 4.2 miles (the northernmost reach below St. David's diversion) showed a downward trend.

Reach-specific assessment can be found in Tables 2.3-5 and 2.3-6. Reach J at the northern end of the conservation area is the only reach rated as FAR with a downward trend, which indicates that it requires management attention. The conclusions of the PFC assessment were that this reach of the San Pedro River is behaving more like an ephemeral channel in terms of its hydrology and erosion deposition. The primary rationale for the FAR rating is that none of the needed channel characteristics are functioning. Young cottonwood trees showed evidence of livestock use over several years, and this use is preventing young trees from growing into larger trees. Although the riparian area extent has increased since 1987, vigor of Goodding willow and seep willow (*Baccharis salicifolia*) were both very low. Browsing on cottonwood seedlings and a lack of vigor in these species prevents recovery (NRST 2012).

A small number of unauthorized livestock utilize areas along the river, and in some sections this unauthorized grazing is slowing recovery of wildlife habitat (BLM 2012a). Recreational activities in the SPRNCA in the form of increasing numbers of hikers, equestrians, mountain bikers, and unauthorized Off Highway Vehicles (OHV) users are creating localized disturbance and impacts to habitat (BLM 2012a).

	PFC Reach	Functional Rating	Trend on FAR
○	A	FAR	N/A
●	B	PFC	
●	C	PFC	
○	D	FAR	N/A
●	E	PFC	
●	F	FAR	Upward
●	G	PFC	
○	H	FAR	N/A
●	I	PFC	
●	J	FAR	Downward

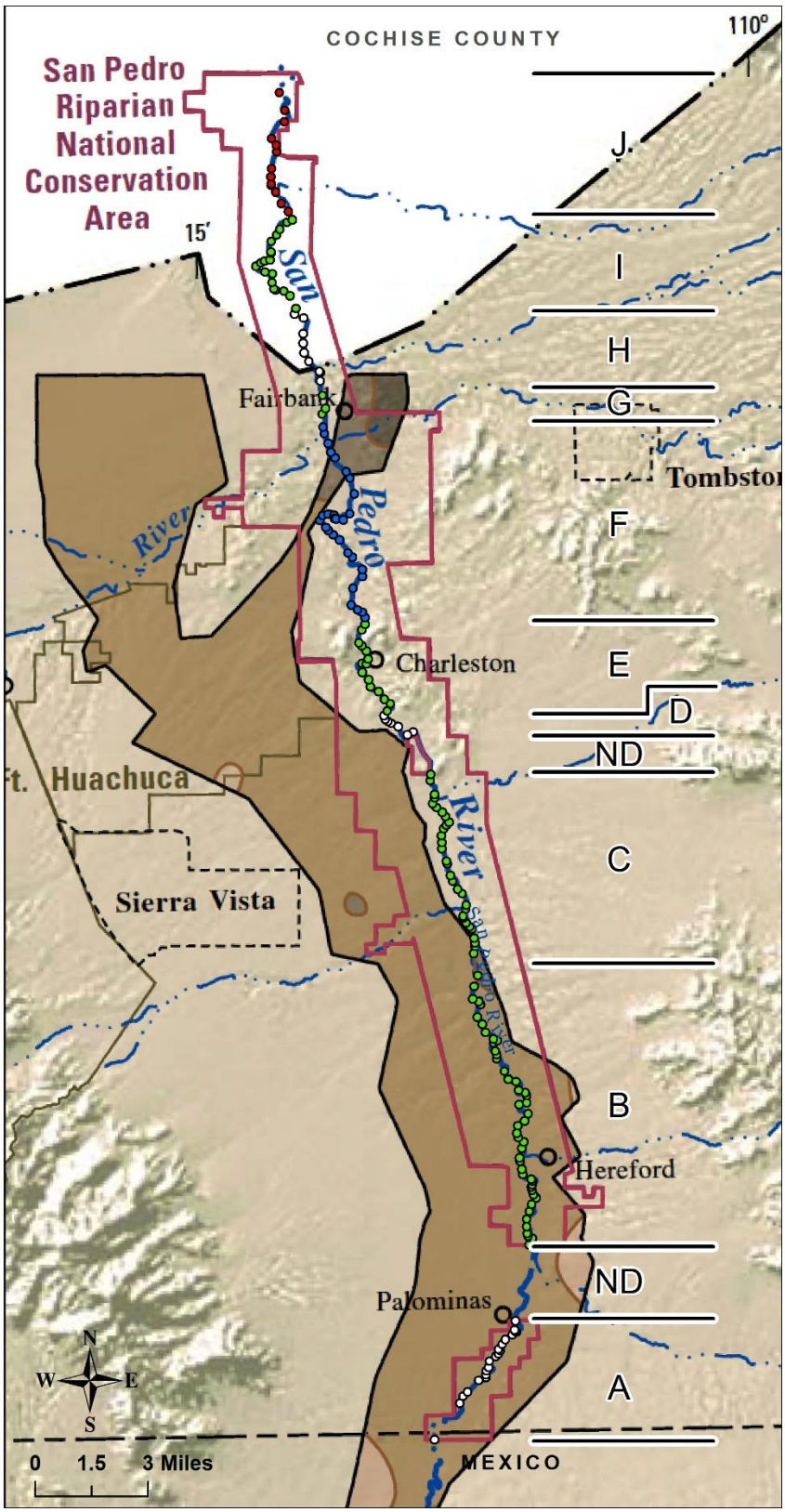
Fine, Restrictive Unit

Reaches G-J Intermittent:
-Losing reaches with transmission losses into coarse basin fill and streamflow diversion at St. David diversion

Reach F Transitional:
-Transitional reaches with decreasing streamflow in downstream direction

Reaches A-E Perennial:
-Gaining reaches either underlain by restrictive silt-clay layers or affected by basin bedrock geometry

ND: No data -- private lands not assessed



Date: 8/17/2017
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US Department of the Interior Bureau of Land Management Tucson Field Office, San Pedro Riparian National Conservation Area No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by the BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet national Map Accuracy Standards.This information may be updated without notification. The BLM conducts land use planning only in the areas administered by the BLM. BLM has no planning authority under the municipal or county legislation of the State of Arizona.

Source: NRST 2012.

Figure 2.3-20. San Pedro River Reaches

The NRST also conducted PFC assessments on the Babocomari River, Horse Thief Draw, and Government Draw (BLM 2012a). A PFC assessment was conducted on the Babocomari River within the SPRNCA in October 2013 using a BLM interdisciplinary team. The upper reach of the Babocomari River was rated as PFC. However, the lower reach was rated as FAR with a downward trend due to the following factors: watershed condition, unauthorized livestock grazing, and upstream land use. The PFC documented that bank and floodplain vegetation in the lower reach showed evidence of disturbance from livestock trampling and foraging. Bank extensions had been trampled to the extent that plants and root mats were inadequate to support PFC, cattle trailing appeared to have caused cut-off channels, and trampling had further loosened soil where cover was poor. Many young cottonwoods were in a shrubby form, indicating ongoing and heavy foraging.

Horse Thief Draw is augmented by water recharge from treated effluent. It was rated as FAR due to vertical erosion (headcutting) and other rapid channel adjustments resulting from past erosional processes related to stream downcutting that is over a century old that is likely aggravated by redirection of water from Moson Road. Government Draw (lower) was rated as FAR due to the following factors: watershed condition, ground water development, drying cottonwood, little tree regeneration, and rapid channel adjustments resulting from past erosional processes that are over a century old and likely aggravated by redirection of water from watershed in poor condition. The upper portion of Government draw is much wetter and has a robust riparian development (cienega-like conditions). However, the reach rated as FAR due primarily to vertical erosion (downcutting), but has many of the same risk factors as the lower reach.

Table 2.3-4. Proper Functioning Condition Assessment Summary, San Pedro River

Functional Rating	Trend	Miles	%	Comments
Proper Functioning	Not Evaluated	27.4	54	PFC rating system does not take into account decreasing groundwater levels which pose a severe risk to riparian health
Functional at Risk	Upward	8.9	18	If ground water continues to declines, trend will be downward Tree regeneration appears to be impaired by low base flows and steep banks
	Static or Not Apparent	10.3	20	
	Downward	4.2	8	Largely a product of declining flows
Nonfunctional		0.0	0.0	There are no parts of the San Pedro River that are non functioning.
Totals		50.8	100	

Source: NRST 2012.

Proper Functioning Condition (PFC): A riparian-wetland area is considered to be in PFC when adequate vegetation, landform, or large woody debris is present to:

- Dissipate stream energy associated with high stream flows, thereby reducing erosion and improving water quality;
- Filter sediment, capture bedload, and aid floodplain development;
- Improve flood-water retention and ground-water recharge;
- Develop root masses that stabilize stream banks against cutting action;
- Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and
- Support greater biodiversity.

Functional at Risk (FAR): Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.
Nonfunctional: Riparian-wetland areas that clearly are not providing vegetation, land form, or large woody debris to dissipate energy associated with high flows and thus are not reducing erosion, improving water quality, etc., as listed above. The absence of certain physical ibutes, such as a floodplain where one should be, are indicators of nonfunctioning conditions.

Note: The PFC ratings are relative to the areas "capability" which is not its historical or potential highest ecological state. Capability–is defined as the highest ecological status a riparian-wetland area can attain given political, social, or economic constraints. These constraints are often referred to as limiting factors.

Therefore, the PFC rating is relative to the level of intensity and extent of constraints. For example, ground water development that dramatically reduces ecological function can still be found to be in PFC even though its long-term trend is at risk as the water level drops from a lack of tree recruitment or decline in tree vigor. This is especially true if another more tolerant tree comes in behind it (e.g transition from cottonwood to ash [*Fraxinus*] or seep willow). The loss of ground water is not considered a characteristic that puts the riparian area in the FAR category as this limiting factor is seen as a political, social or economic constraint on the systems ecological potential.

Table 2.3-5. Proper Function Condition Assessment Summary by Reach, San Pedro River

PFC Reach	Reach Length (miles)	Permanence of Streamflow at Potential	Functional Rating	Trend on FAR
A (International Border to south of Palominas)	6.1	Perennial*	FAR	NA
B (Waters Road to Cottonwood)	12	Perennial	PFC	
C (Cottonwood to Escapule)	6.3	Perennial	PFC	
D (Escapule Wash Area)	1.4	Perennial	FAR	NA
E (Above Charleston Bridge to Charleston Hills)	3.8	Perennial	PFC	
F (Charleston Hills to Fairbank RR Trestle)	8.9	Perennial transitioning to intermittent	FAR	upward
G (Fairbank RR trestle to Tombstone Gage)	1.0	Intermittent	PFC	
H(Tombstone Gage to Contention)	2.8	Intermittent	FAR	NA
I (Contention to St. David Diversion)	4.3	Intermittent with short perennial segments	PFC	
J (St. David Diversion to Escalante Crossing)	4.2	Intermittent	FAR	downward
Total	*50.8*			

***** Intermittent with short perennial segments (The Nature Conservancy 2012)
Source: BLM 2012a.

In addition to reach-based information, the PFC assessment also provided insight into larger ecological processes and management issues affecting the San Pedro River through the SPRNCA. Pumping of groundwater that is essential to the San Pedro River and its tributaries poses significant threats to the long-term function and sustainability of the San Pedro River (Lacher 2011). Studies show that groundwater is being pumped in excess of the amount of recharge; if balance is not achieved the river will eventually become seriously impaired.

Table 2.3-6. Summary of Proper Functioning Condition Ratings for Streams by Reach other than the San Pedro River

Stream Name (reach)	Reach Length (miles)	Permanence of Streamflow at Potential	Functional Rating	Trend on FAR
Babocomari River (Upper)	0.3est	Nearly Entirely Intermittent (small amount perennial)	PFC	No Trend
Babocomari River (Lower)	2.5est	Nearly Entirely Intermittent (small amount perennial)	FAR	Downward
Horse Thief Draw		Interrupted Perennial	FAR	Downward
Government Draw (Upper)	0.5	Interrupted Perennial	FAR	Downward
Government Draw (Lower)	0.2	Perennial	FAR	Downward
Lewis Spring South	Not Evaluated			
Escapule Wash	Not Evaluated			
Murray Spring	Not Evaluated			
Moson Spring	Not Evaluated			
Meusel Spring	Not Evaluated			
Frog Spring	Not Evaluated			
Graveyard Gulch Spring	Not Evaluated			
McDowell-Craig Spring	Not Evaluated			
Ben's Spring	Not Evaluated			
Garden Canyon Spring	Not Evaluated			

Source: NRST 2012.

The effects of declining groundwater can cause visible changes in the kind, condition, recruitment and distribution of riparian vegetation (Stromberg and Tellman 2009). Linking riparian vegetation attributes to hydrologic factors with quantitative measurements have been studied by Stromberg et al. 2006, Stromberg and Tellman 2009) to understand how the riparian vegetation is being affected by changes to surface water and groundwater levels. By the time impacts from declining groundwater on riparian and wetland vegetation are apparent, the options for reversing the trend are limited. At this point, desertification of riparian and floodplain vegetation has advanced to the point where recruitment of cottonwood, willow, sedges (*Cyperaceae*), and rushes (*Juncaceae*) is minimal, while the older plants hang on. At the same time, an increase in plant species that can tolerate dryer conditions would occur (e.g., seep willow, salt cedar, etc.). Currently, riparian vegetation in some reaches show signs of stress (e.g., cottonwood trees with contracted canopies or dead tops, and sapling trees with poor leaf density and stunted growth form). In some cases, some individual trees may show signs of age in mature cottonwood galleries (e.g., the San Pedro House). Because the PFC evaluations were done in April before many of the trees were leafed-out, conclusions about tree vigor were difficult to make (e.g., cottonwood trees with contracted canopies or dead tops). Most reaches were

dominated by healthy trees, but they were often patchily distributed and interspersed with dryer plant types such as seep willow and Johnson grass (*Sorghum halepense*).

The NRST concluded that because 72 percent of the river was determined to be in PFC and/or FAR with an upward trend, the system has the attributes and processes in place to further improve. The ratings included seep willow as a key riparian plant for most of the reaches. In any case, the groundwater pumping deficit issue must be addressed now while the river still has the ability to take advantage of the water it receives from both surface and groundwater flows for system maintenance and recovery.

An overarching consideration relates to the channel forming process at work along the San Pedro River. Rosgen (1996) outlined the key factors that influence channel function that are important to river function (and creation of off-channel wetlands). The primary consideration is the balance between water and sediment conveyed to the river by its tributaries (i.e., watershed function) and conveyed by a stream or river itself. In valley bottom streams like the San Pedro River, sediment types, sinuosity, level of entrenchment (connectivity of floodplains), and stream gradient determine riparian function and stability. This stability is often referred to as the level of "dynamic equilibrium" based on the streams balance of channel dimension, pattern and profile. Floodplain function is also important to channel and riparian-wetland function. Sacaton grass and mesquite bosques adjacent to riparian vegetation on river margins prevent secondary overflow channels from proliferating and decrease the rate in which flood water returns to the river following storm events; these are critical process in aquifer recharge that sustain vegetation along the San Pedro River.

Wetland Vegetation

The distribution of aquatic and wetland plants is dependent on soil type, successional state and the seasonal water gradient. Some wetland plants occupy perennial water sources such as the San Pedro River, Lewis Springs wetland complex, wetlands fed by artesian wells, and Government Draw spring, while others occupy intermittent reaches of the San Pedro River, Babocomari River and portions of the St. David Cienega. Wetland and aquatic plant diversity is relatively high, but cannot be compared to the diversity upon designation as a Riparian National Conservation Area as no detailed surveys were conducted.

Makings (2006) conducted a comprehensive inventory of the SPRNCA from 2000-2003. She recorded 61 species that are native obligate aquatic and wetland species or facultative wetland species. Another 11 species are not native to the basin. Cienegas (wetland unique to the southwest [Hendrickson and Minckley 1985]) were noted to have a small (20) unique group of plant species (Making 2006). The more notable species found in riverine and wetland habitats include the following: Huachuca water umbel (federally endangered), Arizona eryngo *(Eryngium sparganophyllum*—only known from three localities in southern Arizona), clustered field sedge (*Carex praegracilis*—widespread along borders of wetlands), showy flatsedge (*Cyperus spectabilis*—rare in Arizona), bulrush (*Typha*) and chairmaker's bulrush or tule (*Schoenoplectus acutus* and *S. americanus*—widespread), cattail (*Typha latifolia* and *T. domingensis*), yerba mansa (*Anemopsis californica*—widespread), and watercress (*Rorippa nasturtium-aquaticum*—widespread).

The Bulrush and cattail stands that dominate the wetland ponds and cienegas in the SPRNCA reduce the amount of open water desirable for both aquatic plant diversity and wildlife that depend on shallow open water and deeper pond habitat in some wetlands that have filled in or partially desiccated over time. However, perennial open water may not be a component of some sites due to hydrology and spring type (e.g. Lewis spring).

Wetland Proper Functioning Condition

Nearly all wetland areas have been inventoried using the standard lentic PFC protocol and future monitoring will be necessary to determine wetland trends and to determine mechanisms for changes in their status and health.

PFC was assessed for wetland areas in the SPRNCA in 2013 (Table 2.3-7). The protocol looks at normal water level fluctuations. The team often did not have annual or seasonal surface water information in which to judge fluctuations, but instead looked at vegetative expression and plant community stability versus transition to a dryer plant community. This was interpreted as a ground water discharge issue, which appears to be either stable or declining.

Table 2.3-7. Summary of Proper Functioning Condition Ratings for Wetlands

PFC Wetland Name	Acres	Perennial or Seasonal	Functional Rating	Trend on FAR
St. David Cienega	~ 75 (fluctuates)	Perennial (partially seasonal)	FAR	Downward
Lewis Spring Wetland Complex	TBD	Perennial and Seasonal	FAR	Downward
Dunlavy Wetlands North (#1)	TBD	Artesian	PFC	No Trend
Dunlavy Wetlands Middle (#2)	TBD	Artesian	PFC	No Trend
Dunlavy Wetlands South (#3)	TBD	Artesian	PFC	No Trend
Kolbe Wetland	TBD	Artesian	PFC	No Trend
Little Joe Wetland	TBD	Not Evaluated (newly Restored Wetland)	N/A	N/A
Little Lewis Spring (Upper)	TBD	Intermittent	FAR	Downward

Source: BLM n.d.

Proper Functioning Condition (PFC): A riparian-wetland area is considered to be in proper functioning condition when adequate vegetation, landform, or large woody debris is present to:

- Dissipate stream energy associated with high stream flows, thereby reducing erosion and improving water quality;
- Filter sediment, capture bedload, and aid floodplain development;
- Improve flood-water retention and ground-water recharge;
- Develop root masses that stabilize stream banks against cutting action;
- Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and
- Support greater biodiversity.

Functional at Risk (FAR): Riparian-wetland area will possess some or even most of the elements in the definition, but have at least one attribute/processthat gives a high probability of degradation with wind action, wave action, and overland flow event(s).

Nonfunctional: Nonfunctional riparian-wetland areas clearly lack elements listed in the PFC definition. Usually nonfunctional riparian-wetland areas translate to a preponderance of "no" answers on the rating checklist, but necessarily not all "no" answers. A riparian area may still be inundated in "relatively frequent" events, but be clearly nonfunctional because it lacks vegetation to protect the area from erosion and deposition. The lack of vegetation and inability to buffer the sediment being supplied greatly reduce the extent of this wetland and prevent it from recovering.

The St. David Cienega is a helocrene spring, formerly a common spring type in southern Arizona, but now much reduced in abundance and size by groundwater withdrawal exacerbated by impacts of unauthorized grazing. The St. David Cienega is a large cienega in the San Pedro River basin but is not directly connected to the San Pedro River. The cienega has a lengthy history of grazing prior to protection as an ACEC by the BLM. Although the site has been fenced and excluded from grazing for several years, some unauthorized use occurs, leaving signs of trampling and grazing. Erosion from past and contemporary land uses is evident in adjacent upland settings, and may also be related to the abandoned railroad berms. Flow from the St.

David Cienega emerges through seepage or filtration, apparently from unconsolidated sedimentary gravels that overlie clay beds. The emergence environment is subaerial, with gravity flow. The wetlands are dominated by spring flows, although several drainages mouth into the extensive cienega (e.g., Cecil Wash) (Stevens et al. 2012) maintained by several artesian springs. These springs can be found near the southwestern most portion of the cienega near the El Paso pipeline. This cienega is maintained by both sheet flow and ground water.

During a 2012 inventory, 49 plant species were identified at the St. David Cienega. At least 83 plant taxa may occur on St. David Cienega. Although this is a high number of species for an individual springs ecosystem, the large size of the site reduces plant density to <0.001 species/m2. A total of 32 ground covering taxa produced an overall site visually-estimated ground cover of 90 percent: 16 shrub species produced 25.3 percent cover; 4 mid-canopy species produced 3.0 percent cover; and three tall canopy species (ash, Goodding willow, cottonwood) produced 0.2 percent cover. Aquatic green algae (*Cladophora glomerata*) and water pimpernel (*Samolus valerandi*) were the only aquatic species reported or detected. Vegetation cover and composition varied widely among the eight microhabitats mapped at the site (Stevens et al. 2012).

St. David Cienega was rated as FAR due to the following factors: apparent decline in spring (groundwater) discharge, watershed condition, and level of unauthorized livestock use, leading to desiccation due to hoof action that increases the soil surface area, thereby leading to increased evaporation rates. During the field visit in 2013, some areas of repeated trampling and heavy grazing were noted. A transition from wetland indicator plants to upland plants was noted on some portions of the site. Headcutting on the south side may drain the cienega if it continues to travel north. The cienega is filling with detritus from vegetation and sediment from a highly degraded watershed surrounding the wetland (BLM 2012a).

Currently, St. David Cienega is a Research Natural Area (RNA) type of ACEC. The designation was largely to protect the area from disturbance so that it could be studied by those in the environmental sciences. A few studies of this RNA has occurred over the 26 years since the SPRNCA was established, including a plant inventory, marshbird surveys, butterfly inventory and monitoring, spring assessment by Spring Stewardship Institute, and PFC assessment by BLM interdisciplinary team. However, small numbers of trespass livestock have grazed the area year-round, and fire has been suppressed.

The Lewis Springs area is a set of seeps and springs with a plant community unlike that of other wetlands in the SPRNCA. The functionality appears to be tied to discharge of seeps and springs which appears to be declining. Risk factors include poor watershed condition affecting recharge. Ground water extraction is another risk factor as well as large mesquite where depth to groundwater is high enough for mesquite tap roots to reach. Johnson grass invasion is also a risk factor to the native plant community.

The three Dunlavy Wetlands are fed by artesian springs with relatively constant discharge. All three are in PFC and appear to be expanding in surface area. The wetlands were ponds at one time, but have nearly filled with vegetation and detritus leaving only small patches of open water.

The Kolbe Wetland was rated PFC as well. It also has artesian flow and appears to have a relatively stable surface coverage (not expanding or contracting).

Little Joe wetland relies on a natural spring re-established when the wetland was restored through excavation of sediment. It was not evaluated, but it is protected from the risk factors adversely impacting the St. David Cienega. This mini-cienega (0.3 acres) is the remnant of a small reservoir created by homesteaders to impound water for irrigation and livestock. The risk factors for Little Joe, an arm of the St. David Cienega, are not the same as those for the St. David Cienega. The watershed that feeds into this basin is less than five acres and the invasive plants (bulrush and cattail) are controlled along the border of the pond, but not in the rest of the cienega. Eventually, the unmanaged portion of the cienega will fill in with dead plant material and change to wet meadow with little or no perennial surface water.

Trends

Riparian and wetland extent increased initially after designation largely due to cessation of livestock grazing. More recently however, water availability for riparian plants and wetland (cienegas) areas has decreased in some areas apparently due to ground water withdrawal, changing climate trends, and poor watershed condition which impairs recharge to the regional aquifer. This is most apparent at the St. David Cienega. In contrast, Little Joe Wetland is relatively stable but does fluctuate with season and annually related more to spring discharge.

The Lewis Springs wetland complex is rather stable, but appeared to have contracted when visited in 2013. Natural wetlands do expand and contract seasonally and with changes in groundwater discharge and precipitation. The wetlands supplied by artesian wells all appear to be stable or expanding slowly.

Riparian Vegetation

Most riparian areas have been inventoried using the standard lentic PFC protocol. Future monitoring will be necessary to determine wetland trends and to determine mechanisms for changes in their status and health. In these areas there has been a shrinkage in riparian plant extent and a drier plant community has emerged. For example, the San Pedro and Babocomari rivers are slowly going from perennial to intermittent and intermittent reaches are becoming more ephemeral. More information can be found in Section 2.3.5, Water Resources. In contrast, ground water discharge from the city of Sierra Vista wastewater treatment plant is augmenting flows in Horse Thief Draw, Moson Springs and Murray Spring which is causing an expansion of aquatic, riparian and wetland habitat.

Another positive trend is the building of bank extensions (muddy shelves on lower banks) that support wetland plants including sedges and rushes. The channel evolution that supports these new channel features has improved habitat suitability for the Huachuca water umbel. While the number of metapopulations of Huachuca water umbel have stayed about the same during systematic monitoring completed from 2001 to 2010 by Fort Huachuca, data may indicate that the length of metapopulations has increased. This is likely the case in reaches of the river that have remained perennial, while some metapopulations may be lost in reaches that are becoming intermittent.

Although evaporation is decreased to 0.65 in. at stream reaches where trees provide shade, those same trees and the increase in biomass of those trees continues to increase evapotranspiration. As a result, evapotranspiration, once estimated at around 6,500 to 7,500 acre-ft. per year, was estimated in 2008 to be between 11,431 and 13,377 acre-ft. per year (Scott et al. 2006). Simpson (2007) modeled stream aquifer interactions for flood events on the San Pedro River through the SPRNCA. The water balance for a "gaining" reach from his study is illustrated in Figure 2.3-21. His study indicates that recharge of summer flood water in perennial (gaining) reaches is greater than evapotranspiration by 34 percent. During flood events vegetation reduces the rates at which water travels downstream and increases flood stage allowing for more of the floodplain to be inundated for longer periods than it otherwise would. In a real sense, more trees equal more recharge. The recharge facilitated by the trees in turn is used for transpiration during the growing season. In ephemeral and intermittent reaches, recharge is greater than evapotranspiration by more than a factor of 10. If the regional aquifer drops in elevation, then the elevation of the recharged water is also affected. If enough ground water is extracted, then the recharged water will not be shallow enough for wetland vegetation, and there will not be enough surface water available in the stream channel for aquatic species like fish (Simpson 2007).

Figure 2.3-22 illustrates the change in surface water from historical records (1848 to the mid-1900s) to the current extent. Historically, the river in the US flowed 127 miles and now only flows about 38 miles depending on the water year. The Babocomari had flow for nearly its entire length (approximately 20 mi) and has been reduced to less than five miles. This trend of stream desiccation is alarming and is indicative of past degradation from historic land use practices and water use.

In contrast, treated effluent from Sierra Vista is currently being discharged into the aquifer upstream of Murray Spring, Moson Spring and Horsethief Draw. Some of this same water reaches the San Pedro River as shallow groundwater that supports surface flow. This addition may be most important for maintaining surface water from Currey Draw to the Charleston gauge. Additional flow in these three tributaries has enhanced riparian conditions and aquatic habitat.

Reaching a highest ecological status for the riparian and wetland areas within the SPRNCA will be challenging as water is the key, ultimately, to riparian and developing wetland plant community potential. Riparian extent increased initially after designation largely due to cessation of livestock grazing. The NRST concluded that because 72 percent of the river was determined to be in PFC and/or FAR with an upward trend (since the 1980s) that the system has the attributes and processes in place to further improve.

However, water availability for riparian plant areas has decreased in some areas due to ground water withdrawal and possible exacerbation from changing climate trends and poor watershed condition, which impairs recharge to the regional aquifer. Currently, riparian vegetation in some reaches show signs of stress (e.g., cottonwood trees with contracted canopies or dead tops, and sapling trees with poor leaf density and stunted growth form). In some cases, some individual trees may show signs of age in mature cottonwood galleries with little recent regeneration. Nearly all riparian areas have been inventoried through the PFC method, but consistent monitoring of key riparian characteristics for each reach will be necessary to determine riparian trends and to determine mechanisms for changes in their extent and health.

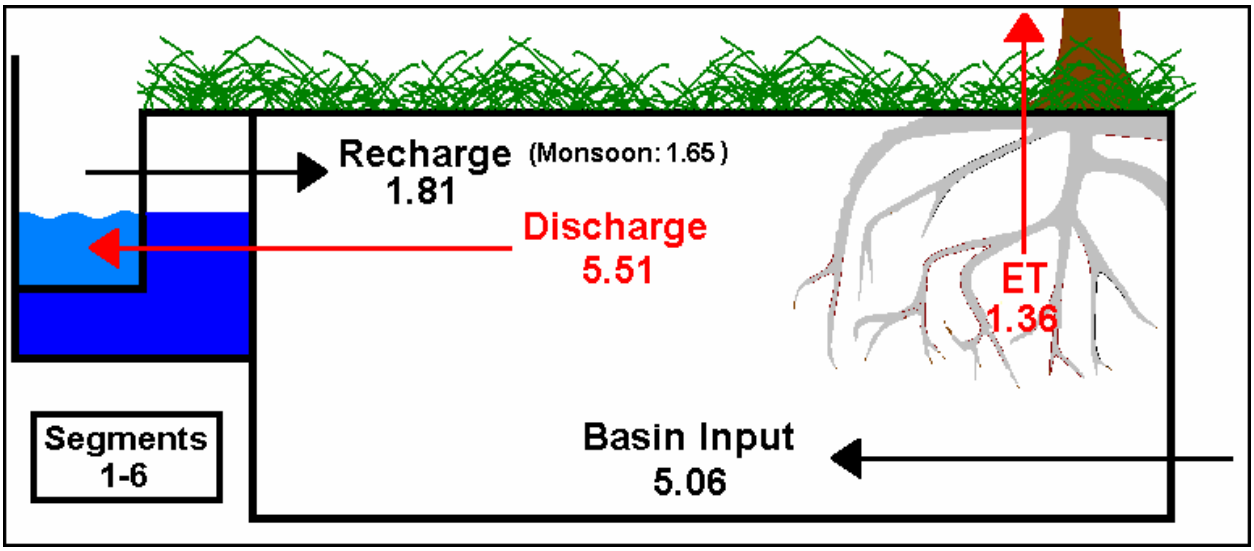


Figure 2.3-21. Cumulative flux during model time domain (October 1, 1995 to April 23, 2007) for model segments 1-6 (southern border to Charleston Narrows). Units for each flux are 10^7 m^3.

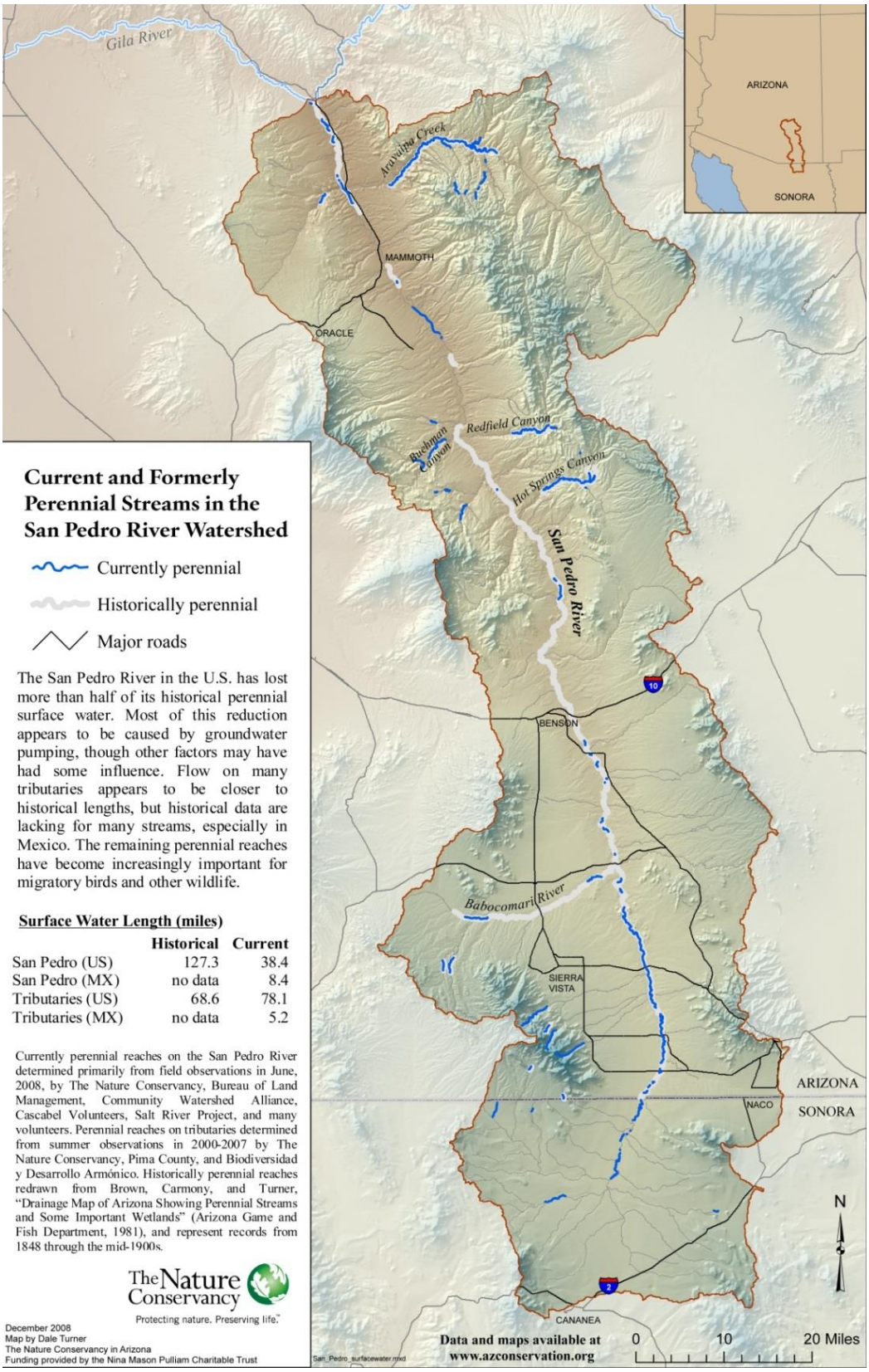


Figure 2.3-22. Currently and Formerly Perennial Streams in the San Pedro Watershed

Wetland Vegetation

Cienega wetlands occupied much of the San Pedro River above Benson in the mid-nineteenth century. Wetland (cienegas) creation is a process that was interrupted when the stream channels downcut as a result of past land management practices and subsequent flooding in the 1890s and 1900s (Bahre 1991). In addition, Rose (2012) provides historical information on the San Pedro regarding widespread agriculture, and numerous ditches, dams, and canals. Minckley and Marsh (2009) add additional historical context regarding objectives and effects on physical attributes of rivers from levees.

Many streams became straight and entrenched with high banks. In addition, channel dredging and straightening occurred in order to prevent flooding of adjacent agricultural fields and other property (Bahre 1991). Past meandering resulted in oxbows and sloughs that started out as ponds and then became cienegas. This process has been arrested by straight, tree-lined reaches that resist bank erosion and pointbar development that leads to dynamic channel processes (Rosgen 1996) characterized by meanders, meander cutoffs, and off-channel pools. Once formed, cienegas go through a gradual process of vegetative succession and filling, (Hutchinson 1957, Mitsch and Gosselink 1993) or erosion that transforms them back to stream-like habitat (Hendrickson and Minckley 1985).

Beaver had a large influence throughout the Gila River basin historically (Dobyns 1981). These large rodents were instrumental in creating and maintaining sluggish river conditions that promoted wetland creation and maintenance along the San Pedro River (Davis 1982). Beaver were extirpated in 1894 due to trapping (Bailey 1971). Beaver were released in the SPRNCA in 1999 (Fredlake 2004), but have had a limited impact on cienega formation as flood volumes are so great that beaver dams rarely last longer than two years. One recently formed cienega still persists in a cutoff meander above Hunter Wash, a remnant of the meander pattern that is still present in that reach.

Historically, the decline in wetland vegetation in the SPRNCA was the result of accelerated erosion, overgrazing, invasive species, ground water extraction for agricultural use, and other human-induced, manmade linear impacts, such as roads, pipelines, and dikes. These factors resulted in both impaired stream channel function and impaired watershed function.

After designation, there was an initial increase in extent of wetland vegetation from the ecological release (growth of vegetation with increased density) of vegetation from warm season livestock use. However, at the north end of the SPRNCA, there has been a decline in surface water extent at the Tombstone gauge and a poor response from riparian vegetation when compared to that located south of Charleston. There are a number of factors responsible for the current decline in wetland vegetation and surface water following the initial increase (Stromberg and Tellman, 2009). These include:

- Drought (changing climate trends);
- Fire suppression measures;
- Unauthorized OHV use; and
- Unauthorized livestock grazing.

The above listed factors currently affect individual wetland sites. As an example, St. David Cienega, located at the northern end of the SPRNCA, is at risk of becoming dry from headcut erosion on the southern end. A small number of unauthorized livestock use areas along the river and in some sections unauthorized grazing is slowing recovery of wildlife habitat (BLM 2012a). There is also an apparent decrease in discharge from the artesian source spring. The three artesian well fed wetlands (Dunlavy #1, #2 and #3), originally created for agricultural use, appear to have a stable water source.

One wetland fed by Little Joe Spring, contiguous with St. David Cienega, was nearly dry and filled with detritus and sediment. A recent restoration (2011) of this site created 2,400 sq. ft. of open water and reset the wetland filling process through excavation of decades of fill. This type of activity may be required to prevent the gradual senescing and transformation of wetland to dry bottomland. Another similar restoration has been approved for the small artificial wetland at White House Well, located near the Hereford Bridge. This will provide a quarter of an acre of habitat for wetland plants and animals.

On the east side of the river, Lewis Springs and Government Draw appear to have relatively stable flows, although there is some contraction of these wetlands, which is evidenced by death of deergrass (*Muhlenbergia rigens*) and other plants growing along edges of the wetlands.

Forecast

Ground water levels are projected to decline in the basin over time primarily due to increased demand and long term drought. Global warming is anticipated to result in dryer conditions in the region (Finch 2012, IPCC 2014). The literature reviewed by Finch (2012) indicates that rivers and marshes in the Southwest will continue to be impacted by long-term drought. Restoration of the grassland and montane habitats in the watershed are strategies to build resilience and partially mitigate drought and changing climate trend impacts (Finch 2012). Recharge projects are another strategy to mitigate excessive water extraction in the basin.

Riparian Vegetation

PFC assessment findings indicate that cottonwood and other trees are important to the recovery of the river channel both as living trees and also as dead and down wood. Cottonwood and Goodding willow, with their extensive and dense root systems, are important for anchoring banks in place, and providing stable banks where riparian plant species, including sedges, rushes and other herbaceous vegetation can grow. In some cases, some individual trees may show signs of age in mature cottonwood galleries (e.g., the San Pedro House). Where the current conditions foster seep willow and other more drought tolerant grasses, trees and shrubs can stabilize banks to some degree but are more susceptible to accelerated erosion from large flood events than cottonwood and willows, which are more water intensive users. Plants tolerant of dryer conditions are likely to increase over time as water resources feeding the rivers, such as spring and wetlands decline.

A small number of unauthorized livestock use areas along the river and in some sections, unauthorized grazing is slowing recovery of riparian vegetation (BLM 2012a).

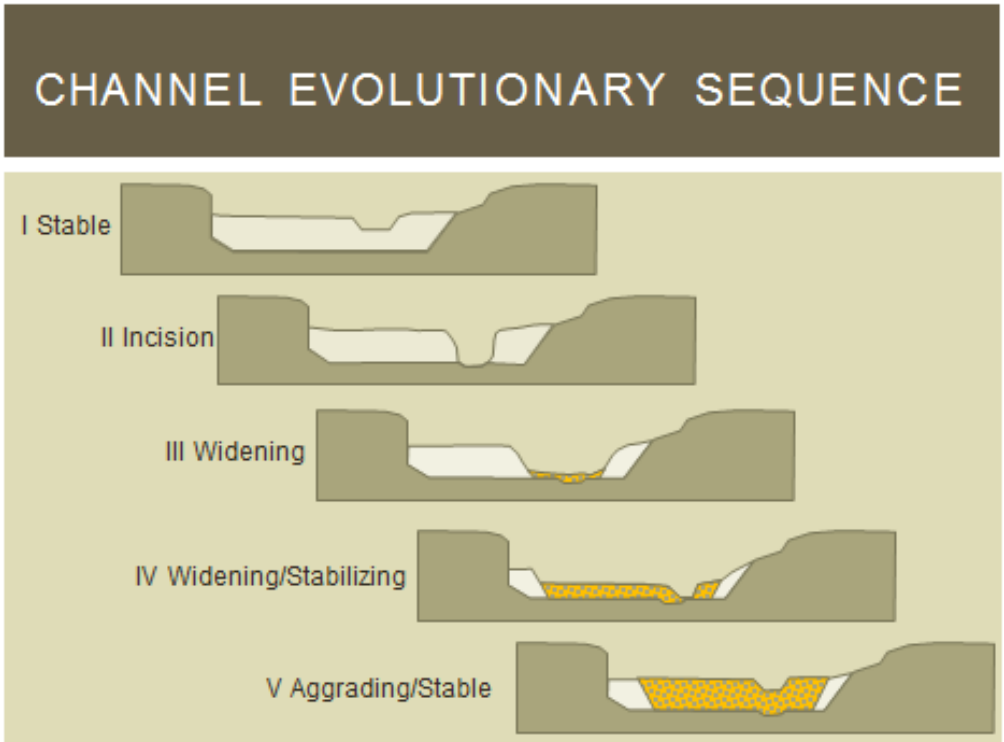
Current cottonwood galleries in reaches rated PFC are primarily dense stands, leaving little open ground for regeneration. This dense vegetation anchors banks fully in some segments to the point

where channel migration (meandering) is severely inhibited. The banks are so steep in many areas and so well vegetated that germination mostly occurs in the active channel where seedlings are subject to scouring and transport downstream. Thus, in general, current regeneration/recruitment conditions are very poor as indicated by the presence of seep willows on point bars instead of willows and cottonwoods (Arizona 2014). In some areas on the river there is recruitment on lower banks and point bars, but it is limited to small localized areas. These areas provide some insight into water relationships and channel geometry in some locations. Dense patches of invasive non-native weeds, such as Johnson grass and Bermuda grass (*Cynodon dactylon*), occur in perennial, intermittent, and ephemeral reaches, and also play a role in preventing the germination and recruitment of native riparian species (Stromberg and Tellman 2009). As a result, the acres of large cottonwood and willow will decrease gradually with age allowing for more rapid changes in channel shape (Figure 2.3-23) and meander formation that results in widespread regeneration events on new banks and point bars; this is likely to occur in decades. In some cases, some individual trees may show signs of age in mature cottonwood galleries (e.g., the San Pedro House). Wild or prescribed fire would accelerate the loss of older trees, but may allow for an increase in the generation of opportunities for the channel to meander, leading to new and more suitable seed beds.

Upon designation as a Riparian National Conservation Area in 1988, the channel function was ripe for riparian tree, such as cottonwood and willow, recruitment due in part to winter floods in the late 1970s and early 1980s (Webb and Leake 2006). Suitable seed beds were numerous, plant competition was low from past warm season grazing and channel widening provided gradually sloped banks that allowed seedlings to extend their roots down with the water levels as base flow water levels declined through the dry season. Following germination, livestock typically browse and trample seedling beds preventing them from becoming saplings. In subsequent years, saplings are grazed and trees rarely become mature during warm season grazing. By excluding livestock, riparian plants including cottonwoods and willows grew without being cropped and re-cropped by grazing animals. This allowed for dense and relatively even aged stands to develop rapidly.

While some research has created concern that cottonwoods contribute to considerable water loss in evapotranspiration (Scott et al. 2006), the river could not continue to develop and improve without them. Simpson (2007, 2011) has measured the recharge contribution of reaches with wetland vegetation (including the San Pedro River), and found that it contributes more to recharge than is used for transpiration. Therefore, riparian-wetland vegetation is not expected to reduce the already diminishing water resources that support it.

The risks of major, high-intensity wildfires in riparian areas are great given the observed fuel loadings and types of fuels on the floodplains and riparian areas. The risk of fire moving into the cottonwood trees is high due to presence of existing sacaton and Johnson grass stands that produce large volumes of dead and dry material as well as large quantities of down and dead wood. Riparian areas in the region are burning more severely and more frequently than in the past. This may radically alter the acreage of mature cottonwood and willow stands along the river.



Source: NRST 2012.

This model only shows the cross-section (dimension) change over time. Other aspects of the sequence often involve increased meandering that results in reduced cannel gradient.

Figure 2.3-23. General Conceptual Model of Channel Evolution Stages

Beaver dams modify hydrologic and channel processes. Overall, beavers are seen as a positive contributor to river health due to extended time of water retention behind dams and their influence on floods to jump river banks whereby inundating adjacent floodplains. This species is likely to aid in riparian wetland persistence through time, especially if watershed restoration efforts attenuate flood flows, reducing flood peaks that destroy the dams seasonally. Beaver may have a large influence on community diversity and ecosystem structure through their tree felling and dam building behavior (Pollack et al. 1995, Johnson and van Riper 2012). Beaver dams may increase storage capacity and lead to greater flows during dryer periods (Parker 1986), which may result in enhanced flow in intermittent streams (Yeager and Hill 1954, Rutherford 1955). Beaver impoundments may increase the area of riparian habitat by elevation of water tables through groundwater recharge (Bergstrom 1985, Johnston and Naiman 1987). By functioning as sediment traps, beaver ponds accumulate organic matter (Pollock et al. 1995) and also reduce erosion potential (Parker 1986).

Tamarisk is found only occasionally in the upper (southern) reaches, in part due to aggressive control efforts by the BLM and partners. In the lower (northern) reaches of the conservation area, tamarisk may displace most of the willow and cottonwood over time without aggressive control; this is due to its ability to spread rapidly and its deep roots that can tap into water tables beyond the reach of young cottonwood and willow. A small number of unauthorized livestock use areas along the river and, in some sections, unauthorized grazing is slowing recovery of riparian

vegetation (BLM 2012a). Depending on the location in the SPRNCA, native riparian plants will be selectively removed to the advantage of unpalatable salt cedar trees.

The abandoned railroad bed that runs along much of the San Pedro River has and will continue to alter channel function and riparian vegetation development through confinement and delivery of material directly to the river.

In sections of the San Pedro River, dikes were constructed to divert surface drainage around agricultural fields. Historic agricultural dikes should be assessed to determine whether they are negatively impacting flushing flows and recharge to the river. Remediation should occur if negative impacts are occurring. If these dikes are not removed, they will continue to impair channel and floodplain processes that affect vegetation. However, other dikes may serve to retain water and actually aid in recharge as discussed in Section 2.3.5, Water Resources.

Murray Spring, Moson Spring and Horsethief Draw are supported artificially by groundwater recharge from treated effluent. This water may be reallocated to other uses. One proposal by The Nature Conservancy and Cochise County is to move the recharge by pipeline to an area near Hereford to the south. This would likely reduce or eliminate surface flow at both sites and lessen surface water discharge in the San Pedro River above the Charleston Bridge. It is unknown what the habitat benefits would be at the new location of discharge. Water contaminants have been documented in effluent water surfacing in areas between the Sierra Vista Environmental Operations Park and the San Pedro River.

Another proposed project by Cochise County and The Nature Conservancy is to assess the feasibility of a stormwater recharge facility, or facilities, on the 1,811-acre Riverstone property that will increase base flows in the southern portion of the San Pedro River to the maximum extent possible. The property is located approximately six miles southeast of the city of Sierra Vista, within two miles of the San Pedro River and shares its eastern boundary with the SPRNCA. Recent hydrologic modeling scenarios indicate that stormwater recharge on Riverstone may result in increased San Pedro River base flows. Similar proposals are being considered at Bella Vista, and other recently acquired conservation properties.

Political environment, basin wide cooperation and sustained available funding will dictate the future of wetland and riparian areas in the conservation area. Recovery to historical status during the life of the plan is unlikely because of timeframes involved for watershed restoration, recovery of channel processes, and ownership fragmentation. This is compounded by multiple societal interests that make system-wide restoration very unlikely.

Wetland Vegetation

New off-channel wetland formation through natural processes is virtually at a standstill until the dynamics of erosion and deposition that creates meanders is re-established. In this dynamic process, pieces of channel in meanders that are abandoned can become new wetland sites, completing the cycle of wetland formation and senescence. The dynamic equilibrium that creates stream meanders reduces stream gradient, and simultaneously increases stream length. This combination results in increased recharge from flood events, which in turn, supports water levels in wetlands and discharge into the San Pedro River. These outcomes are not likely to occur for

decades under current management conditions. However, this is being offset to some degree through wetland creation and restoration efforts at existing artesian wells and springs.

2.3.7 Upland Vegetation

Vegetation serves multiple purposes on the landscape and provides many ecosystem services. Vegetation stabilizes soils, prevents erosion, uses CO_2, releases O_2, contributes to species diversity, and provides habitat and food for animals and products for human use. Many of the BLM's land management policies are directed toward maintenance of healthy vegetation communities that can be generally characterized by ecological provinces, and more specifically, characterized by plant communities.

Vegetation can be classified in a variety of ways. Ecological site descriptions developed by the NRCS provide a system for describing existing vegetation and for comparing existing vegetation conditions to potential or DFCs.

Major Land Resource Areas

In the 1960s, the NRCS (known as the Soil Conservation Service at the time) divided Arizona into Major Land Resource Areas (MLRAs) (SCS 1981). MLRAs are broad geographic areas having similar topography, climate, soils, and vegetation. In the 1970s, the MLRAs were further divided into subresource areas to obtain high-quality ecological site descriptions. Ecological (range) sites have been described for each MLRA. The SPRNCA is located within the Southeastern Arizona Basin and Range MLRA (Unit 41).

Ecological Sites

An ecological site is a unit of land occupying a specific environmental zone (within MLRAs) and capable of supporting a native plant community typified by an association of plant species that differs from other ecological sites in the kind or proportion of species. Within the MLRAs, the ecological sites are delineated by such criteria as topographic position, percent slope, soils and parent geologic material, precipitation, and elevation.

Ecological site descriptions are based on the concept of ecological site potential. The historic climax plant community—what could grow in response to the physical characteristics—may differ greatly from the existing plant community, which has been influenced by environmental variation or management practices. The ecological site approach recognizes that different vegetation states can occur on similar sites because of different environmental forces or land management practices.

A brief description of each of the 19 Ecological Site Description-Soil Groups is described below and in Table 2.3-8 and Figure 2.3-24.

Clay Loam Upland, 12-16 in. precipitation zone

This ecological site is characterized by deep soils that have formed in clayey alluvium of mixed origin. Surface textures range from gravelly sandy-loam (less than one inch thick over an argillic horizon) to clay loam. Subsoils are clayey, with mixed minerology, and lack vertic properties (soil cracking and churning). They are not calcareous in the upper 15 in. They can have calcic horizons at moderate depths (20 to 40 in). Plant-soil moisture relationships are fair to good. Soil

surfaces are dark colored. Soils mapped on this site include: Bernardino, Whitehouse, Gadwell, Forrest, Elgin, Eloma and Banshee.

The potential plant community on this ecological site is dominated by warm season perennial grasses. Most of the major perennial grass species on the site are well dispersed throughout their plant community. However, tobosa, vine mesquite (*Pancium obtusum*), and curly mesquite (*Hilaria belangeri*) tend to occur in patches on this site. These patches appear to be well dispersed and are variable in size. Perennial forbs are represented well on the site, as well as a few species of low shrubs. The aspect is open grassland.

Clayey Slopes, 8-12 in. precipitation zone
This ecological site is characterized by soils that are moderately deep to deep and clayey textured. They are gravelly to very gravelly in the soil profile. They have thin (1-2 in) surface horizons that range from sandyloam to loam in texture. They lack vertic soil properties. They usually have well developed covers of surface gravels and cobbles. Surface soils (10 in) are noncalcareous, but some soils have calcic horizons below the argillic horizon. Soil series mapped on areas of this site include Eba, Nahda, Continental, and Topowa variant.

The native potential plant community on this ecological site is grassland with a scattering of desert shrubs and cacti. Annual forbs and grasses, of both winter and summer seasons, are very important in the plant community in their respective (wet) seasons. Tobosa is the dominant perennial grass with lesser amounts of vine mesquite.

Clayey Swale, 12-16 in. precipitation zone
This ecological site is characterized by deep soils which have formed in clayey alluvium from basic igneous sources. They are very dark colored and have high shrink-swell potentials. Churning and cracking cause very rough surfaces. Plant-soil moisture relationships are very good due to extra water the site receives. Soils mapped on this site include; Guest, Elfrida, and Bonita (flooded).

The potential plant community on this ecological site is dominated by warm season perennial grasses, mainly tobosa and vine mesquite. The major perennial grasses on the site are well dispersed over areas of the site. The aspect is open grassland.

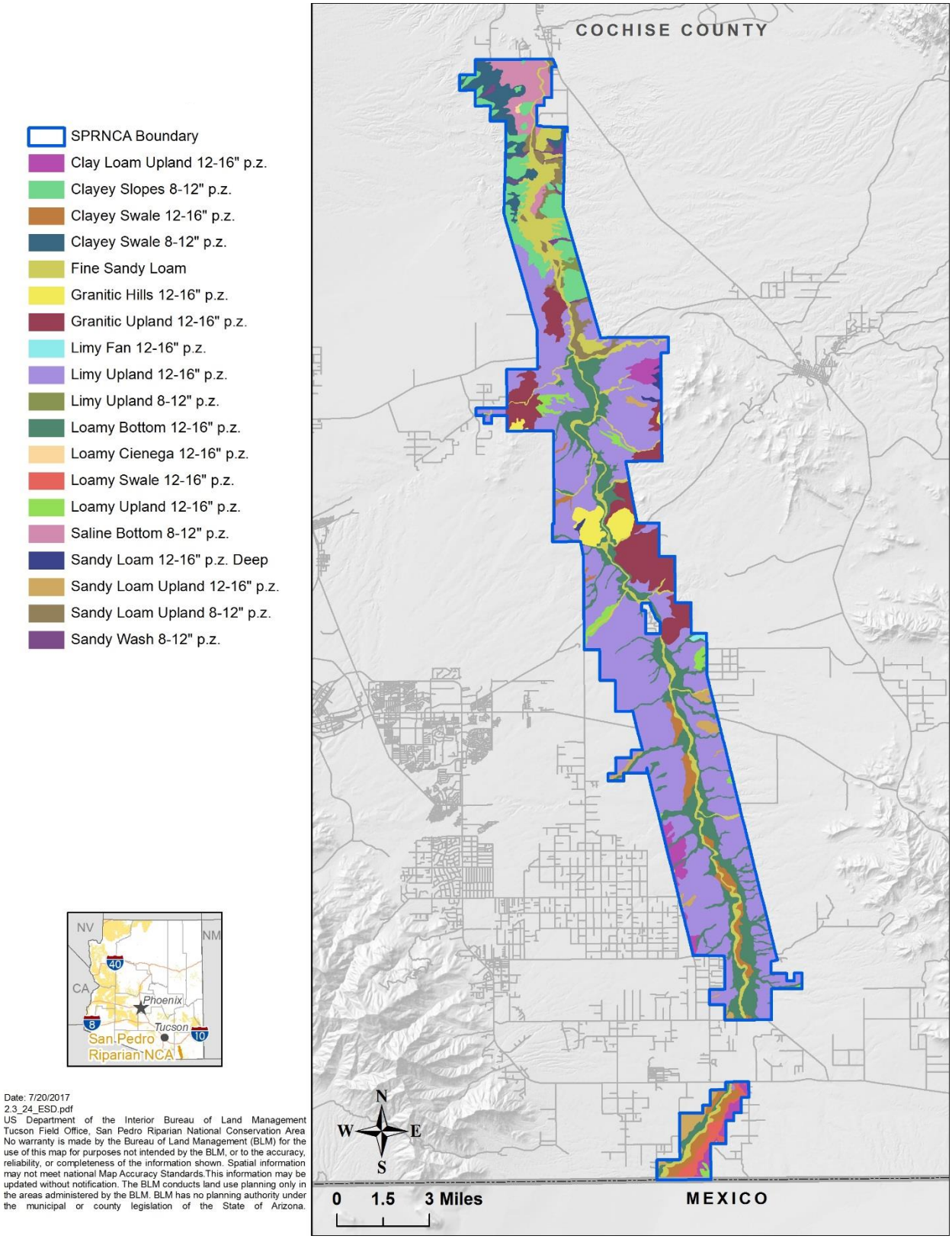


Figure 2.3-24. Ecological Site Description-Soil Groups

Table 2.3-8. Ecological Site Description-Soil Groups

Name of Ecological Site Description	Acres	Dominant plants	Slope
Clay Loam Upland (12-16 in. precipitation zone)	1,426	Fairyduster (*Calliandra eriophylla)*, tobosagrass, sideoats grama (*Bouteloua curtipendula*)	1-15%
Clayey Slopes (8-12 in. precipitation zone)	2,847	Tobosa	0-6%
Clayey Swale (12-16 in. precipitation zone)	1,639	Tobosagrass	0-2%
Clayey Swale (8-12 in. precipitation zone)	1,589	Tobosa	0-6%
Fine Sandy Loam	4,906	Fremont cottonwood, Goodding willow, deergrass, yerba mansa	0-2%
Granitic Hills (12-16 in. precipitation zone)	1,157	Shrubby buckwheat (*Atraphaxis muschketowi*), false mesquite, sideoats grama (*Bouteloua curtipendula*), Louisiana sagewort (*Artemisia ludoviciana*)	15-70%
Granitic Upland (12-16 in. precipitation zone)	4,572	Fairyduster, Littleleaf ratany (*Krameria erecta*), slender grama (*Bouteloua repens*), black grama (*Bouteloua eriopoda*)	1-15%
Limy Fan (12-16 in. precipitation zone)	61	Creosote bush (*Larrea tridentate)*, bush muhly (*Muhlenbergia porter*)	1-5%
Limy Upland (12-16 in. precipitation zone)	26,025	Creosote bush, whitethorn acacia (*Vachellia constricta*), bush muhly, threeawn	1-40%
Limy Upland (8-12 in. precipitation zone)	123	Creosote bush, bush muhly, threeawn (*Aristida*)	1-15%
Loamy Bottom (12-16 in. precipitation zone velvet mesquite and western honey mesquite)	8,103	Velvet mesquite (*Prosopis velutina)*, western honey mesquite (*Prosopis glandulosa*), big sacaton (*Sporobolus wrightii*)	0-3%
Loamy Cienega (12-16 in. precipitation zone)	24	Big sacaton	0-2%
Loamy Swale (12-16 in. precipitation zone)	611	Blue grama (*Bouteloua gracilis*), sideoats grama	0-2%
Loamy Upland (12-16 in. precipitation zone)	847	False mesquite, range ratany (*Krameria erecta*), sideoats grama, sprucetop grama (*Bouteloua chondrosioides*)	1-15%
Saline Bottom (12-16 in. precipitation zone)	1,696	Mound saltbush (*Atriplex obovata*), alkali sacaton (*Sporobolus airoides*)	0-3%
Sandy Loam (12-16 in. precipitation zone)	165	Bastardsage (*Eriogonum wrightii*), sideoats grama, Arizona cottontop (*Digitaria californica*)	1-8%
Sandy Loam Upland (12-16 in. precipitation zone)	995	Bastardsage, fairyduster, black grama, sideoats grama	1-8%
Sandy Loam Upland (8-12 in. precipitation zone)	1,152	Honey mesquite, soaptree yucca (*Yucca elata*), desert Mormon tea (*Ephedra viridis*), bush muhly, black grama	1-15%

Name of Ecological Site Description	Acres	Dominant plants	Slope
Sandy Wash (8-12 in. precipitation zone)	317	Mesquite, catclaw acacia (*Senegalia greggii*), spiny hackberry (*Celtis ehrenbergiana*)	0-3%

Granitic Hills, 8-12 in. precipitation zone
This ecological site is characterized by soils that are shallow and very shallow; developed in place on granite and related rocks. They are very gravelly both in the profile and on the surface. They have moderately rapid infiltration rates with low water-holding capacity. Plant-soil moisture relationships are good due to runoff from the adjacent rock outcrops. Soil series mapped to date on this site include Cellar, Anklam, Lajitas, and Chiminea.

This ecological site has a historic climax plant community dominated by grass. The small trees and shrubs give it a slight brushy aspect.

Granitic Upland, 12-16 in. precipitation zone
This ecological site is characterized by soils that have developed in place on various types of acid igneous to sedimentary parent material. They are shallow to very shallow and noncalcareous. The underlying bedrock is fractured and weathered and may be calcareous in places. Soil surfaces are well covered by small gravels. Plant-soil moisture relationships range from fair to poor for shallow and very shallow soils respectively. Soils mapped on this site include Chiricahua, Oracle, Romero, Lampshire, Schrap, Atascosa, and Brunkcow.

The potential plant community on this ecological site is dominated by warm season perennial grasses and several species of low shrubs. Perennial forbs and annuals are of minor importance on this site. The aspect is shrub-dotted grassland. All of the major perennial grasses and shrubs on the site are well dispersed throughout the plant community. Drought and/or fire can open up the grass community for a few years, but the major species of short gramas will quickly recover. The dominant half shrubs on the site are vigorous sprouters after fire. Shrubby buckwheat (*Atraphaxis muschketowi*) can diminish in severe drought.

Limy Upland, 8-12 in. precipitation zone
This ecological site is characterized by soils that are well drained, coarse-textured, stratified and high in calcium carbonates. They are shallow and underlain by lime and/or silica-cemented pans or very gravelly, lime-cemented, conglomerate. They have formed in old fan deposits. Soil series mapped on this site include Cave, Delnorte, Tencee, and Greyeagle.

The historic climax plant community on this ecological site is dominated by creosote bush. Annual grasses and forbs are an important part of the plant community in wet seasons. Perennial grasses and forbs are minor components in the potential plant community. Cryptogams are common on this site, often colonizing areas with low gravel covers.

Limy Upland, 12-16 in. precipitation zone
This ecological site is characterized by soils that are variable. They are all calcareous throughout—light colored in the surface and low in organic matter. They formed on mixed gravelly and/or loamy alluvium and conglomerate. Some soils are deep; some soils have cemented lime pans or conglomerate at shallow depths. Soil surfaces are usually well covered

with gravels or pan fragments. Plant-soil moisture relationships are poor. Soil series mapped on this site include Luckyhills, Bella, Mule, Vana, Blakeney, Kimrose, Grizzle, Buntline, Zapalote, Surge, and Karro.

The potential plant community on this ecological site is a diverse mixture of desert shrubs, half shrubs and perennial grasses and forbs. Most of the major perennial grasses on the site are well dispersed throughout the plant community. Black grama occurs in patches which are small in size and appear to be well dispersed over large areas of the site. The aspect is shrub-land. Cryptogam cover (moss and lichen) can be considerable in the plant community, but diminishes as the surface cover of gravel increases.

Loamy Bottom, 12-16 in. precipitation zone
This ecological site is characterized by soils that are young and have formed in loamy or silty alluvium of mixed origin. Plant-soil moisture relationships are excellent for deep-rooted trees due to the presence of shallow ground water. Soil may be calcareous or even slightly saline. Soil series mapped on this site include Riveroad, Ubik, and Ustic torrifluvents.

The historic climax plant community for this ecological site is a mixed plant community with an over-story of mesquite and an under-story of perennial grasses, shrubs and annuals. Other tree species usually occur in clumps or along the banks of stream channels. Mesquite leafs out in mid-to-late spring after the last frost, flowers in early summer, and has mature fruits ready to drop by early July. The trees lose their leaves with the first hard freeze in the fall. The aspect is deciduous woodland.

Loamy Swale, 12-16 in. precipitation zone
This ecological site is characterized by young soils on loamy to clayey alluvium of mixed origin. They are deep and dark-colored. They do not have vertic properties. Soil churning and cracking are not features of this site. Plant-soil moisture relationships are excellent. Soils mapped on this site include; Ubik, Riveroad, Tenneco and Forrest (flooded).

The potential plant community for this ecological site is dominated by warm season perennial grasses. Occasional trees and shrubs occur in the plant community. The major perennial grasses like blue grama, sideoats grama, tobosa, creeping muhly (*Muhlenbergia repens*) and vine mesquite, occur in large patches throughout the plant community. Giant sacaton (*Sporobolus wrightii*) can occur at about 10 percent cover in the plant community. Annual forbs and grasses can produce heavy stands in wet seasons following drought and/or fire. With continuous grazing, tall and mid grasses are replaced by short grasses like blue grama and creeping muhly. With grazing management, the mid to tall species can resume dominance in the plant community. The aspect is grassland.

Loamy Upland, 12-16 in. precipitation zone
This ecological site is characterized by deep soils which have formed in loamy alluvium of mixed origin. Soil surfaces range from very gravelly sandy loam to loam. Sandy loam surfaces can be no thicker than four in (eight in for GRV-SL) and not less than one in. They are not calcareous in the upper 20 in. These soils have argillic horizons near the surface. They may have calcic horizons at moderate depths (20 to 40 in). Plant-soil moisture relationships are fair to

good. Soil surfaces are dark colored. Soils mapped on this site include; Whitehouse, Bernardino, Caralampi, Sasabe, Forrest, McAllister, Elgin, Baboquivari, Libby, and Sierravista.

The potential plant community on this ecological site is dominated by warm season perennial grasses. All the major perennial grass species on the site are well dispersed throughout the plant community. Perennial forbs and a few species of low shrubs are well represented on the site. The aspect is open grassland.

Saline Bottom, 8-12 in. precipitation zone
This ecological site is characterized by soils that are of various depth and textures. They have all formed in strongly saline and/or alkaline, basin floor alluvium. Plant-soil moisture relationships are fair to poor due to infrequent flooding. Soils mapped on this site include Gothard, and saline phases of Guest, Glendale and Hantz.

The potential plant community on this ecological site is dominated by a warm perennial grass; alkalai sacaton. Scattered trees give the site a savannah appearance. Several species of shrubs and perennial and annual forbs are unique to this site.

Sandy Loam Upland, 8-12 in. precipitation zone
This ecological site is characterized by soils that are deep and loamy textured. They have thick (four-16 in.) surface horizons that are sandy loam in texture, over an argillic horizon. Surface soils (10 in.) are noncalcareous, but some soils have calcic horizons below the argillic horizon. Soil series mapped on areas of this site include Mohave, Tubac, Sonoita, Pinaleno, Tres Hermanos, Bucklebar, and Topowa.

The native potential plant community on this ecological site is a mixture of perennial grasses and desert shrubs and cacti. Annual forbs and grasses, of both the winter and summer seasons, are very important in the plant community in their respective wet seasons. Black grama and bush muhly are the dominant perennial grasses, with lesser amounts of threeawns. The cover of shallow rooted grass species, like Rothrock grama (*Bouteloua rothrockii*) fluctuate widely from wet to dry years. Lehmann lovegrass (*Eragrostis lehmanniana*) can invade and persist in this plant community, but will fluctuate (in amounts) with climate and not become dominant.

Sandy Loam Upland, 12-16 in. precipitation zone
This ecological site is characterized by deep soils which have formed in loamy alluvium of mixed origin. Surface textures range from sandy loam to very gravelly sandy loam and must be at least four in. or thicker, (eight in. for Grv-SL). These soils have clayey (argillic) horizons at shallow depths. They are not calcareous in the upper 20 in. Soil surfaces are dark colored. Plant-soil relationships are good. Soil series mapped on this site include; Whitehouse, Caralampi, Sasabe, Courtland, Elgin, Forrest, Baboquivari, Perilla, Ruins and Naco.

The potential plant community on this ecological site is dominated by warm season perennial grasses. All the major perennial grass species on the site tend to be well dispersed throughout the plant community. Perennial forbs and shrubs are minor on the site. The aspect is open grassland.

Sandy Loam, 12-16 in. precipitation zone
This ecological site is characterized by deep soils which have formed in recent sandy alluvium, usually, of granitic origin. They are sandy loam throughout at least to moderate depths (40 in.).

Surface textures range from loamy sand to gravelly sandyloam. Soil surfaces are thick and dark-colored. Plant-soil moisture relationships are good. Soil series mapped on this site include, Combate, Diaspar, Mallet, Altar, and Swisshelm.

The potential plant community on this ecological site is dominated by warm season perennial grasses. The major perennial grass species on the site tend to be well dispersed throughout the plant community. Several species of half-shrubs are well represented in the plant community. The aspect is grassland with occasional clumps of desert hackberry (Celtis ehrenbergiana), catclaw acacia, or mesquite.

Indicators

Land Health

The BLM monitors the current condition of its vegetative communities using the *BLM Arizona Standards and Guidelines*. Land health data was collected within the SPRNCA in 2013. Land health is evaluated using three standards. Standards are goals for the desired condition of the biological and physical components and characteristics of rangelands. Upland sites, riparian-wetland areas, and desired resource conditions area each addressed by a standard and associated guideline. The three standards are discussed in more detail in Section 2.4.3, Livestock Grazing Management and Appendix A.

State and Transition Model

Ecological dynamics describe the changes to vegetation and soils, and the causes of those changes that can occur on an "ecological site." Details on the alternative states, ranges of variability within states, and the processes that cause plant community shifts within states as well as transitions among states are described in Appendix B. State and Transition Models synthesize literature and the knowledge tied to particular ecological sites to distinguish changes in vegetation and soils that are easily reversible versus changes that are subject to thresholds beyond which reversal is costly or impossible. They are a means of communicating about plant succession, ecological thresholds, nonequilibrium dynamics, and functional and structural change in response to disturbances and management actions. State and Transition Models describe the following:

- All possible states, community phases (i.e., easily-reversible variants of states); and transitions between communities and states;
- Patterns, causes, and indicators of transitions between communities within an ecological site;
- Relationships between vegetation, soil, animals, hydrology, disturbance (e.g., fire, lack of fire, grazing and browsing, drought, unusually wet periods, insects and disease), and management actions; and
- Existing soil-vegetation relationships.

State and Transition Models also document historical vegetation and dynamics as well as restoration outcomes, and measurements of ecosystem properties and processes occurring within

states (e.g., cover, soil aggregate stability, erosion rates, net primary production). They also provide a conceptual understanding of:

- Ecological dynamics that can occur on an Ecological Site;
- Drivers and disturbance mechanisms of ecosystem change, such as impacts of animals, wildland fire or lack of fire, recreation activities, etc.; and
- Management actions that can influence change.

Current Conditions

The ecological site descriptions and associated map show the plant community that the site has the potential to support based on the characteristics of the site such as the physiography, the climate, the soil, and water features. Often because of various historic land use practices this is not the plant community that is currently present at the site. It may be in one of the other states from that ecological site state and transition model.

As of 2014, vegetation communities as they are currently expressed in the SPRNCA are shown below in Figure 2.3-25 and Table 2.3-9.

Land Health Assessment

The land health assessment is a qualitative assessment that uses biological and physical components as indicators of the functional status of ecological processes and site integrity. The product of the qualitative land health assessment is not a single rating of land health, but an assessment of three components called attributes. There are three interrelated attributes that each has more specific qualitative indicators (litter amount) associated with it. The definitions of these three interrelated indicators are:

Soil/Site Stability: The capacity of an area to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water.

Hydrologic Function: The capacity of an area to capture, store, and safely release water from rainfall, run-on, and snowmelt (where relevant); to resist reduction in this capacity; and to recover this capacity when a reduction does occur.

Biotic Integrity: The capacity of the biotic community to support ecological processes within the normal range of variability expected for the site, to resist a loss in the capacity to support these processes, and to recover this capacity when losses do occur. The biotic community includes plants, animals, and microorganisms occurring both above and below ground.

Table 2.3-9. SPRNCA Vegetation

Name	Description	Acres
Barren	Devoid of vegetation	916
Bee bush/Acacia	Co-dominated by bee bush and acacia (whitethorn and cat's claw) shrubs	1,883
Built-Up Land	Significant anthropogenic modification	212
Cottonwood	Overstory dominated by cottonwood trees, understory open, herbaceous, or dominated by shrubs	1,441
Creosote-Tarbush	Co-dominated by creosote and tarbush shrubs	21,609
Desert Willow/Rabbitbrush	Co-dominated by desert willow and rabbitbrush shrubs	32
Johnson grass	Dominated by Johnson grass	412
Lehman's Lovegrass	Dominated by Lehman's lovegrass	308
Mesquite Shrubland (upland)	Dominated by mesquite shrubs	8,383
Mesquite Woodland (floodplain)	Overstory dominated by mesquite trees, understory open, herbaceous, or dominated with shrubs	879
Mesquite Forest (floodplain)	Dominated by mesquite trees	688
Mesquite/Sacaton	Co-dominated by mesquite shrubs and sacaton grass	2,481
Mixed Forbs	Dominated by multiple forb species	2,113
Mixed Graminoids	Dominated by multiple herbaceous species	1,620
Mixed Grass-Scrub	Dominated by multiple shrub and grass species	494
Mixed Upland Shrubs	Multiple co-dominate shrubs	4,441
Rabbitbrush	Dominated by rabbitbrush shrubs	219
Sacaton	Dominated by sacaton grass	2,351
Sacaton/Tobosa	Dominated by sacaton grass and tobosa grass	364
Salt cedar	Dominated by salt cedar trees	412
Spiny Aster	Dominated by spinyaster	24
Tobosa	Dominated by tobosa grasses	196
Water	Open water in the form of a river or ponds	223
Whitethorn	Dominated by whitethorn shrubs	4,228
Willow	Overstory dominated by willow trees, understory open or herbaceous	23
Total		**57,917***

*Includes some private inholding acres.

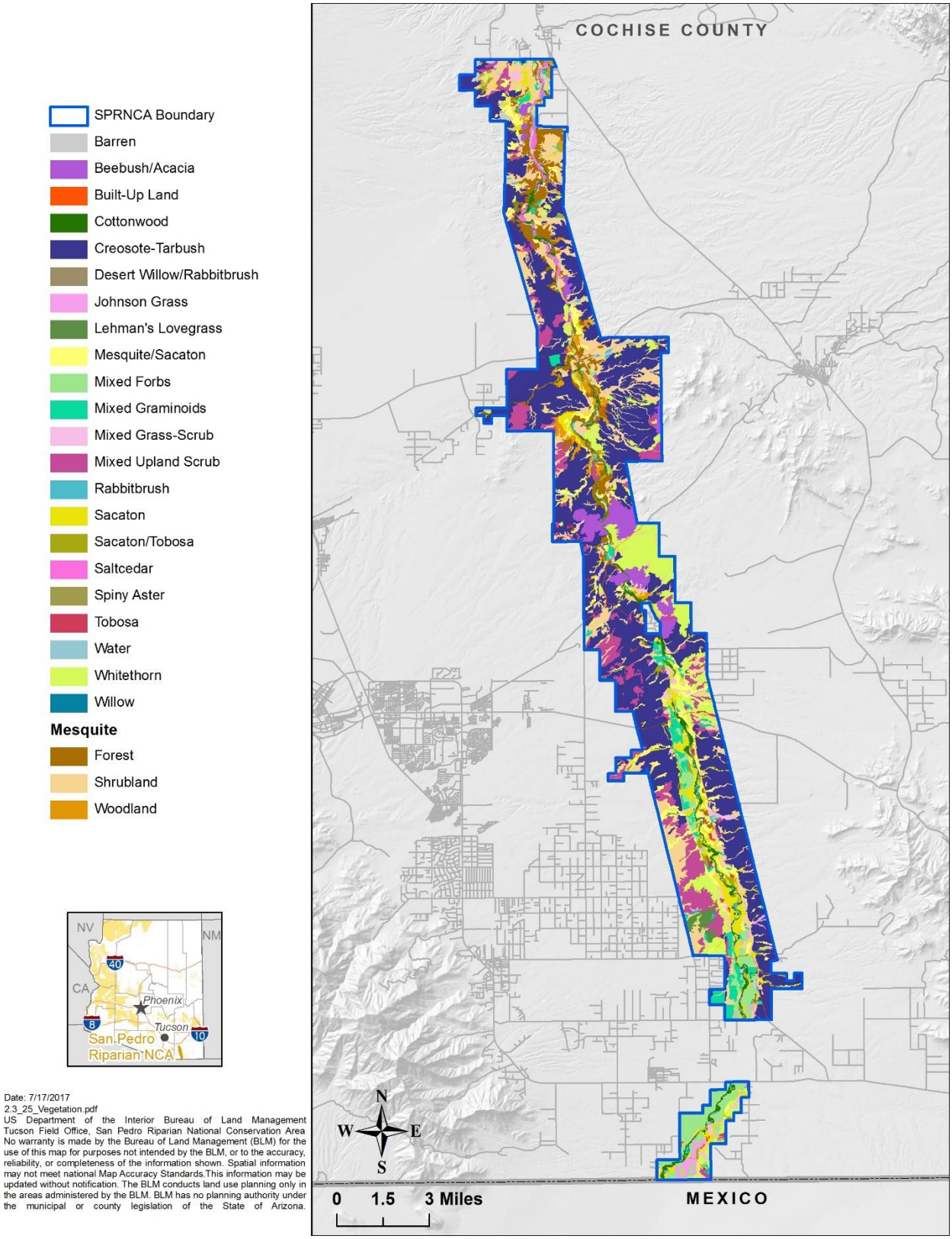


Figure 2.3-25. SPRNCA Vegetation

For biotic integrity, there are nine more specific qualitative indicators that are evaluated to reach a conclusion for the biotic integrity land health attribute category. The nine more specific qualitative indicators for biotic integrity include:

- Soil surface resistance to erosion;
- Soil surface loss or degradation;
- Compaction layer;
- Functional/structural groups;
- Plant mortality/decadence;
- Litter amount;
- Annual production;
- Invasive plants; and
- Reproductive capability of perennial plants.

Each of these indicators were evaluated at each of the 29 different sites where these land health standard evaluations were conducted. The 29 different sites represent evaluations for most of the different ecological sites in the SPRNCA as described above. Some of the more dominant ecological sites were evaluated more than once in different locations.

Table 2.3-10 and Figure 2.3-26 summarizes the different qualitative indicators for biotic integrity across all 29 of the sites. The land health standard evaluations were conducted for the level of departure from the Ecological Site Description. Results are discussed below.

Table 2.3-10. SPRNCA Land Health Assessments

Land Health Attribute	**Departure from Ecological Site Description**				
	None to Slight	Slight to Moderate	Moderate	Moderate to Extreme	Extreme to Total
Biotic Integrity	137[1] (53%)	53[1] (20%)	36[1] (14%)	23[1] (9%)	12[1] (4%)

[1] Out of 261 total attributes.

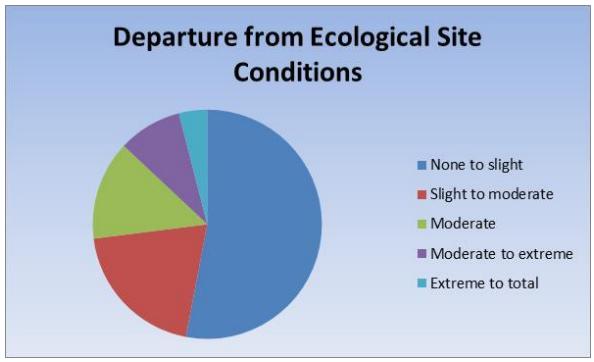


Figure 2.3-26. Departure from Ecological Site Conditions

- Fifty-three percent of all indicators were a *none to slight* departure from what is expected based on the ecological site for each respective site (of the 29 sites, where land health evaluations were conducted).
- Twenty percent of all indicators were *slight to moderate* departure from what is expected based on the ecological site for each respective site, with slightly more or less litter cover, mortality, and reproductive capability than expected for the site.
- Fourteen percent of all indicators were at *moderate* departure from what is expected based on the ecological site for each respective site. Invasive plants scattered throughout the site as well as 40-60 percent of potential production for the site based on recent weather.
- Nine percent of all indicators were at *moderate to extreme* departure from what is expected based on the ecological site for each respective site. Invasive plants were common throughout the site and greatly reduced capability to produce seed or vegetative tillers.
- Four percent of all indicators were at *extreme to total* departure from what is expected based on the ecological site for each respective site. This includes severe reduction of reproductive capability and invasive plants dominating the site. This also includes a much higher than expected bare ground for the site. Functional structural groups differ for that expected for the site and have dominant groups drastically altered. The number of extreme to total indicators was due to the presence of invasive species. For each ecological site, there are listed species; most sites list Lehman's lovegrass, mesquite, acacia as well as others that very easily dominate some sites within the SPRNCA.

Trends

The standard for upland vegetation is to maintain or improve vegetation productivity so that soils exhibit permeability and infiltration rates and produce healthy diverse stands of vegetation consistent with site potentials. Land Health Assessments have been performed on 29 sites within the SPRNCA. Upland vegetation in the SPRNCA is generally in fair to good health.

Poor to fair vegetation conditions can be attributed to historic overgrazing, invasive species, drought, some agricultural use, and overuse of groundwater for various purposes. Catastrophic wildfires in the surrounding mountain ranges have contributed to excessive erosion and sediment deposition in the SPRNCA. All of these factors have led to loss of topsoil on ecological sites and limitations on potential plant communities.

For each ecological site state and transition model, there are different states that vegetation communities can move into, due to various drivers. In some states, the vegetation community cannot return to some of the other states without intensive management intervention. This can include the potential plant community. Some of the upland vegetation communities in the SPRNCA are likely in these states.

Forecast

Invasive brush species have increased compared to historical conditions. These shrubs have increased due to historic overgrazing, periodic drought, human use, soil erosion, and possibly changing climate trends. Without intervention, shrub cover and density would continue to increase, thereby further reducing perennial grasses, wildlife values, and soil protection. In shrub

encroached upland ecological sites, restoration through mesquite and shrub removal will likely improve the health of this vegetative community over time and potentially restore some of the native grasslands where soil conditions will allow. These areas are experiencing brush density increases at the expense of perennial grass species over time. NRCS state and transition models show that areas with this encroachment will not return to perennial grass-dominated vegetation type without intervention (NRCS 2005).

2.3.8 Fish and Wildlife Habitat

Terrestrial Wildlife

Indicators

Depending upon species, indicators for wildlife and their habitat may be as diverse as the species themselves. An ecological component may be essential for one species, but not important for another species. However, general indicators for health of individual species may include demographic information such as population numbers, density, distribution, age structure, recruitment into the population, and condition of individuals that make up populations. The population's distribution relative to its historic range may be considered. In addition, the presence, distribution, and density of introduced invasive species may be considered as indicators for future trends or successful reintroduction or augmentation of native species. Other indicators may include the presence and density of prey species or other necessary components related to a specific ecological role.

Traditional indicators for wildlife habitat include substrate, slope, elevation, vegetation frequency, plant composition and structure, amount of cover, percent utilization, and plant recruitment and vigor. Again, it may be important to identify specific ecological components that are indicators specific to individual species. For example, Multiple Indicator Monitoring is a protocol designed to primarily monitor impacts of livestock grazing in riparian areas to gather information that is critical for managing these important resources. Indicators measured for Multiple Indicator Monitoring include stubble height, streambank alteration, woody browse use, greenline composition, streambank stability and cover, age class and height of woody species, greenline to greenline width, substrate, and residual depth.

Current Conditions

Habitat

The "river of green" is the cottonwood/Goodding willow gallery forest, which occurs along the entire length of the SPRNCA but is invaded in increasing numbers by tamarisk from roughly Fairbank north to Land Corral. Mesquite forest or "bosque" occurs in transition from cottonwood gallery forest to terrace vegetation, and these terraces may include netleaf hackberry (*Celtis reticulata*), graythorn (*Ziziphus obtusifolia*), littleleaf sumac (*Rhus microphylla*), four-wing saltbush (*Atriplex canescens*), and golden eye (*Viguiera dentata*). Big sacaton grasslands cover large areas of the terraces in areas not previously cleared for agriculture, but is voluntarily returning in many fields where it has not already been seeded. Mesquite and sacaton uplands occur in many locations throughout the SPRNCA and occur in combination with each other in many places. Mesquite bosques may have variable amounts of tree canopy cover with corresponding inverse amounts of sacaton in open areas. Chihuahuan desertscrub vegetation

covers the largest area within the SPRNCA, and is characterized by long-lived shrubs such as creosote, acacia, and tarbush (*Flourensia cernua*). Semidesert grassland of native perennial grasses such as side-oats grama covers remnant areas as fingers in the uplands where topsoil has not been eroded away. This very diverse habitat mix comes from the transition of the Sonoran Desert to the northwest, the Chihuahuan Desert to the southeast, the Sierra Madre Mountains to the south, and the Rocky Mountains to the north.

Riparian Habitat

Habitat types associated with riparian habitat in the SPRNCA consist primarily of Fremont cottonwood, Goodding willow, forest and mesquite forest. A small number of unauthorized livestock utilize areas along the river and in some sections unauthorized grazing is slowing recovery of riparian habitat (BLM 2012a) (see section 2.3.6).

Freemont Cottonwood-Goodding Willow Forest

Less than 1 percent of the western US is covered with riparian vegetation (Knopf et al. 1988). However, the Fremont cottonwood-Goodding willow forest is important to wildlife for vegetation composition and structure. The nearness of a permanent water source in many river reaches in the SPRNCA results in food, cover, and water available in close proximity to wildlife. Anderson and Ohmart (1978) found that more than 60 percent of vertebrates in the Southwest were obligates to riparian ecosystems. Although some species may not prefer riparian habitat, the water source in the river attracts many species from the surrounding upland areas. The higher diversity and productivity of the riparian zone, when compared to surrounding uplands, are the primary factors that make these areas focal points for the management of fishery and wildlife resources (Kauffman and Krueger 1984). In 1846, a portion of the San Pedro River was described by the Johnston expedition as “covered with a dense growth of mesquite, cottonwood, and willow, through which it is hard to move without being unhorsed” (Bryan 1928).

The SPRNCA is recognized as the largest and best example of Fremont cottonwood gallery riparian forest remaining in the southwestern United States. Up to five million migratory songbirds use the San Pedro River annually for migration between northern breeding grounds and southern wintering areas and for breeding (Commission for Environmental Cooperation 1999). Using the Arizona Coordinated Bird Monitoring Survey protocol for riparian bird surveys (Bart et al. 2010), 37-acre plots contained as many as two pairs of gray hawk, three pairs of mourning dove, 12 pairs of Gila woodpecker, three pairs of northern beardless-tyrannulet, eight pairs of vermilion flycatcher, four pairs of Bell’s vireo, 12 pairs of yellow warbler, five pairs of Lucy’s warbler, one pair of varied bunting, four pairs of Abert’s towhee, and three breeding pairs of yellow-billed cuckoo, in addition to many other species of nesting birds (Radke pers. obs.).

Of major importance to migrating and nesting birds in the SPRNCA cottonwood-willow forest is the annual spring southwestern tent caterpillar (*Malacosoma incurva*) emergence. These caterpillars eat the leaves of cottonwood and willows, and in places may defoliate large areas along the river. The trees leaf out again later in the season after the number of caterpillars decrease once they pupate. However, the hundreds of thousands of caterpillars present provide a rich food source for nesting yellow warblers, summer tanager, yellow-billed cuckoo, migrating warblers such as Wilson’s warbler, millions of other neotropical migrants, and other species. The spring tent caterpillar hatch appears to be closely timed with the spring bird migration period. Once the caterpillars pupate and turn into moths, the moths likely provide food for other birds,

bats, bears, and other wildlife. Other invertebrates on the San Pedro River also provide necessary food for nesting and migrating birds.

Across the landscape, key risk factors for this habitat type include phreatophyte (mesquite) control, recreation (Latta et al. 1999, Saab 1998), altered surface hydrology (AZGFD 2012a), clearing for agriculture or development, wood cutting, exotic plant species invasions, contaminants (Latta et al. 1999), improper cattle grazing (Krueper et al. 2003, Latta et al. 1999) and fire.

Intense, hot fire which results in cottonwood mortality and no recruitment may also threaten the cottonwood forest (NRST 2012). These fires have decreased the number of cottonwood through direct mortality in some locations (e.g., Hereford area and north of Highway 90). Although willow will readily resprout in locations that have had fire, and cottonwood has some genotypes that will resprout (Northern Arizona University 2010), fire in these locations has resulted in virtually no recruitment of cottonwood. This may be due to competition by existing plants, such as seep willow, Johnson grass, and Bermuda grass, which rapidly come back by roots after fire and quickly provide ground cover. Cottonwood recruitment may also be limited by the lack of appropriate substrates (sandbars) for seed germination and recruitment, and almost annual monsoonal scouring.

Diverse post-fire age classes may not result in bird species richness, and a landscape scale perspective is important when evaluating the utility of fire management strategies to benefit biodiversity (Taylor et al. 2012).

In addition, woody debris that is necessary for PFC of riverine function (BLM 1998) may be lost through intense, hot fires. Following flood recession, woody debris and associated sediment provides focal points for decomposition and secondary production. Woody debris provides an important substrate for insects and other invertebrates, reptiles, and small mammals, which in turn provide a food source for other wildlife in the SPRNCA.

Recreational use at road crossings (e.g., Highways 82, 90, and 92; Hereford Road; and Charleston Road) has resulted in a network of social and even unauthorized “wildcat” (i.e., worked) trails along the river with associated increased disturbance to wildlife. The amount and timing of human activity influences the distribution and behavior of wildlife (Griffiths and van Schaik 1993). Human recreational disturbance with relatively low visitor pressure can have negative impacts on some bird species and groups of species, and should be considered in management with recreational activities (Kangas et al. 2010). Along the upper San Pedro River, enough relatively pristine riparian ecosystem remains to support stable populations of riparian avian specialists, but only if human disturbance and its associated impacts are held in check (BLM 1988b).

Groundwater and surface water depletion continues to threaten the cottonwood-willow forest on the SPRNCA. Altered surface hydrology was identified as a stressor (AZGFD 2012a), and could result from groundwater depletion and modification in the amount or location of water available for nesting or migrating birds. Loss of cottonwood-willow vegetation, because of its shallower rooting depths and physiological requirements for water, may occur with altered surface

hydrology. Loss of the riparian component in the southwestern states could potentially result in the loss of 78 (47 percent) of the 166 avian species that breed in the region (Johnson et al. 1977).

Removing cattle from the SPRNCA had profound benefits for breeding birds, with the largest increases in riparian species, open-cup nesters, neotropical migrants, and insectivores (Krueper et al. 2003). This may be because species composition and structure of herbaceous and understory vegetation is affected by grazing, which may then also affect the invertebrate food population (Earnst et al. 2004, Krueper et al. 2003).

Mesquite Forest (Bosque)

Mesquite forests, or bosques, historically represented one of the most abundant riparian communities in the Southwest, but are now reduced to remnant status (Stromberg 1993). SPRNCA contains some of these remnant bosques (Makings 2006) that were not removed during the historical mining and agriculture period for wood products or land clearing. An expedition in 1846 documented "the mesquite grows thick for a hundred yards, some of it being two ft. in diameter, but low in altitude" on the lower San Pedro River (Bryan 1928).

Native wildlife species utilize this habitat type so heavily because they are adapted to it. Foliage height diversity, patchiness, and high tree densities in mesquite woodland were some of the highest measured in the SPRNCA (Duncan 1989), and may explain why this habitat type had the highest native amphibian and reptile richness (BLM 1988b). Mesquite flowers, seed pods, leaves, and bark support an abundance and diversity of invertebrates, providing food for amphibians, reptiles, birds, and small mammals. In turn, the abundance of invertebrates, amphibians, reptiles, birds, and small mammals in mesquite woodlands provides an abundant food source for predators and other wildlife.

Mesquite-associated habitats have moderate avian densities and species richness (BLM 1988b). Mature mesquite bosques support the second highest densities of birds in the Southwest (Ohmart et al. 1988, Rosenberg et al. 1991). The loose bark and cavities on older mesquite provide important nesting locations for species such as Lucy's warbler and Bewick's wren (*Thryomanes bewickii*). Other shrubs, forbs, and grasses in the bosque, such as desert honeysuckle (*Anisacanthus thurberi*), Mexican passion flower (*Passiflora mexicana*), virgin bower (*Clematis drummondii*), wolfberry (*Lycium spp.*), greythorn (*Zizyphus obtusifolia*), hackberry (*Celtis reticulate*), crownbeard (*Viguiera dentata*), and giant sacaton also provide nectar, fruit, and seeds for wildlife, including nectar eating birds. Fruit-eating birds are also abundant in mesquite bosques, where they forage on plants such as wolfberry, greythorn, mistletoe (*Phoradendron spp.*) (Cowles 1936, Anderson and Ohmart 1978), and hackberry. Annual and perennial grasses and forbs in the bosque, such as crownbeard (*Viguiera dentata*), provide a food source for seed-eating birds.

Key risk factors for this habitat type include removal of wood or firewood or other wood products; tamarisk invasion (Minckley and Clark 1984); undercutting and collapse caused by bank erosion (Minckley and Clark 1984); and severe flooding (Minckley and Clark 1984).

Another key risk factor for the mesquite bosque is intense, hot fire, which removes snags, bark, cavities, and downed wood, all of which are needed as habitat for nesting birds. Snags, rough bark, and wood on the ground probably explains the highest native amphibian and reptile

richness (BLM 1988b). In addition, hot fire causes the above-ground portion of mesquite to die back while not controlling the roots. The result after intense fire is a shrubby, thorny mesquite that no longer provides the important avian habitat of the mature bosque.

Abandoned Agricultural Fields

SPRNCA contains hundreds of acres of abandoned agricultural fields in the area from the International Boundary to Highway 90. Some of these fields were seeded with native plants, and others naturally began the slow process of conversion back to sacaton grassland and mesquite bosque.

Weedy species, such as Russian thistle (*Salsola kali*), pigweed (*Amaranthus sp.*), and Johnson grass initially dominated the sites and were mowed in some scattered locations to encourage native perennial grass growth. Results from pace frequency transects (BLM Tucson Field Office unpublished data, 1987-2017) indicate that statistically significant increases in native perennial grasses, including greesand dropseed (*Sporobolus cryptandrus*), green sprangletop (*Leptochloa dubia*), and giant sacaton, have occurred on abandoned agricultural fields in the SPRNCA since BLM retired the fields. However, active habitat enhancement could still be accomplished in the form of seedings, plantings, irrigation or water manipulation (dependent upon water availability in BLM wells), prescribed fire, or other management. The majority of this habitat is artificial, therefore, APIF (Arizona Partners in Flight) does not list any priority species for this habitat type, even though some species may now prefer it (Latta et al. 1999). Potential habitat for black-tailed prairie dog and burrowing owl does exist in retired fields.

Wetland Habitat

Habitat types associated with increased subsurface and/or surface water in the SPRNCA may be broken down into big sacaton grassland, marshland/cienega, and aquatic (open water) habitat types. The change in vegetation from types growing in areas of shallow groundwater to types of vegetation growing in areas of deeper groundwater is a good confirmation that cottonwood, sacaton, and mesquite are essentially phreatophyes (Stromberg and Tellman 2009). Each of these habitat types is important to different assemblages of wildlife species. A small number of unauthorized livestock utilize areas along the river, and in some sections, unauthorized grazing is slowing recovery of wetland habitat (BLM 2012a).

Interior Marshland (Cienega)

The scarcity of marsh habitat in the arid Southwest makes this habitat type disproportionately valuable for wildlife (Latta et al. 1999). Much of this habitat type has diminished in size or has been lost entirely due to groundwater pumping and gully erosion. Marsh habitat in the SPRNCA consists of areas of permanent to semipermanent fresh water, characterized by relatively shallow depths and extensive coverage of submergent and emergent plants such as chairmaker's bulrush, clustered field sedge (*Carex praegracilis*), wire rush (*Juncus arcticus var. balticus*), desert saltgrass (*Distichlis spicata*), beaked spike rush (*Eleocharis rostellata*), and cattail. Within the SPRNCA, cienegas occur along the Babocomari River, Lewis Springs and the cienega complex south of Lewis Springs, narrow edges along the San Pedro River, Murray Springs, and at the St. David Cienega. Deergrass occurs in small areas at scattered locations. Manmade wetlands are associated with artesian springs at Dunlevy wetlands.

The cienega edge habitat had the highest mammal relative density in the SPRNCA (Duncan 1989), which provides an important food source for many other wildlife species such as raptors and carnivores. National Marsh Bird Monitoring (Conway 2009) at the St. David Cienega and Dunlavy Wetlands noted at least five, vocalizing Virginia rail, as well as breeding common yellowthroat (Geothlypis), song sparrow (Melospiza melodia), and mallard (Radke pers. obs.). The assemblage of breeding avian species in the habitat immediately adjacent to the cienega includes Bell's vireo, vermilion flycatcher, summer tanager, white-winged dove (Zenaida asiatica), mourning dove, yellow-breasted chat, northern mockingbird (Mimus polyglottos), house finch (Haemorhous mexicanus), Scott's oriole, ash-throated flycatcher (Myiarchus cinerascens), yellow warbler, lesser goldfinch (Spinus psaltria), Gila woodpecker, Bewick's wren, red-winged blackbird (Agelaius phoeniceus), brown-headed cowbird (Molothrus ater), western kingbird (Tyrannus verticalis), Gambel's quail, Abert's towhee, and great-horned owl (Bubo virginianus).

The St. David Cienega is one of the two substantial remaining cienegas on the SPRNCA, and is located in the northern end approximately 0.2 miles west of the San Pedro River. This rare, southwestern wetland habitat is maintained by an artesian spring source (Martin 1979). The saturated soils of the cienega result in an organic muck that precludes colonization of all but specialized organisms and some invasive species, with the native plant components primarily being aquatic and semi-aquatic graminoids (Makings 2006). Dominant vegetation of the St. David Cienega includes chairmaker's bulrush, clustered field sedge, wire rush, desert saltgrass, beaked spike rush, and yerba mansa, but also includes many other plant species which are unique to the ciénega habitat (Makings 2006). These unique and specialized plant species do not compete well with introduced invasive plant species, such as tamarisk or Johnson grass.

The other cienega complex in the SPRNCA occurs south of Lewis Springs, where water from the up-gradient watershed is forced to the ground surface. The alkalai marsh aster (Almutaster pauciflorus), California loosestrife (Lythrum californicum), and rare Arizona eryngo occur in this area.

Key risk factors for cienegas include altered hydrology from groundwater pumping or surface flow modifications, water quality, erosion of adjacent uplands and improper grazing management (Oring et al. 2013). Fire suppression is another risk factor which is important in maintaining the ecology of wetlands.

Aquatic (Open water)

Aquatic habitat in the SPRNCA occurs within both riparian and wetland habitat types associated with springs, streams, rivers and cienegas along the San Pedro and Babocomari rivers; at Green Kingfisher and Black Phoebe Ponds; at the SV Ready Mix Detention Pond; at Lewis (Government Draw), Murray, Horsethief, and Escapule Springs; at very small isolated springs (e.g., Contention and Ben Springs); and at artesian wells (e.g., Kolbe and Dunlavy). Historically, the St. David Cienega had a small amount of open water (less than three acres). Little Joe Spring supports a wetland that was artificially impounded for a water tank; it has been restored from a small drying cienega to a marsh with open water. A small number of unauthorized livestock use areas along the river and in some sections unauthorized grazing is slowing recovery of wildlife habitat (BLM 2012a). The spring quickly filled up the excavated depression and now the wetland covers 0.1 to 0.3 acres depending on hydrologic conditions. Green Kingfisher and Black Phoebe

Ponds are gravel pits that have historically received enough surface and subsurface water so that they contain water year around. However, Green Kingfisher Pond dried for the first time in approximately 25 years in 2013 due to sedimentation from San Pedro River flood events. The SV Ready Mix Pond was historically a gravel pit that contains only ephemeral water from rain events.

Key risk factors for this habitat type include groundwater depletion, modification, and loss of flow of surface water, vertical erosion (headcuts), sedimentation of ponds, water contaminants, disruption of stream and wetland forming and maintaining processes, and disturbance caused by recreationists. Fishing line and hooks are frequently found at Green Kingfisher and Black Phoebe Ponds, creating a hazard for wildlife. Sealing of seasonal recharge ponds by fine sediments over time may result in ponds with surface water available over longer periods. However, aquifer recharge may not occur when most water is lost to evaporation

Big Sacaton Grassland

Big sacaton grasslands have declined historically in Arizona (Webb and Bock 1990), and occupy approximately 5 percent of the former range (Tiller et al. 2013). Alluvial riparian grasslands dominated by sacaton were once widely distributed in the intermountain basins of the Madrean Archipelago (Tiller et al. 2013). Other subdominant perennial grasses may include sideoats grama, blue grama, and vine mesquite.

In the SPRNCA, sacaton grasslands now cover large areas of lower alluvial terrace not previously cleared for agriculture (Makings 2006). Healthy sacaton grassland generally occurs where depth to the water table is less than 20 ft. (Tiller et al. 2013). Sacaton and mesquite bosque occur frequently in the SPRNCA in conjunction with one another on the same loamy bottom soil type, but mesquite bosque may be present when the water table is more than 20 ft. deep. Sacaton usually occurs where soils may be loamy to clayey, and mesquite bosque may occur on more of a sandy or silty loam (see NRCS Ecological Site Descriptions R041XC312AZ and R041XC310AZ). In the SPRNCA, higher canopy cover of the mesquite bosque usually results in lower amounts of giant sacaton cover. Sacaton grassland and mesquite bosque states transition between each other along successional trajectories (Tiller et al. 2013).

Sacaton grasslands play a key role in maintaining wetlands and streamside vegetation. Sacaton grass and mesquite bosques adjacent to riparian vegetation on river margins prevent secondary overflow channel from proliferating and decrease the rate at which flood water returns to the river following storm events. Sacaton is a large, statured grass that grows in dense thickets, which causes flood water to pass slowly between plants, sequestering large volumes into the soil column before releasing it back to the river. These are critical processes in aquifer recharge that sustain base flows and high soil moisture in banks. Soils with sacaton thickets also receive large amounts of organic matter that increase porosity and water storage much like wetlands and wooded riparian areas.

While the cottonwood-willow edge held a higher density of birds during the summer months, the mesquite-sacaton habitat held a higher density of birds in the winter months (BLM 1988b). It should be noted that in many cases in the SPRNCA, sacaton and mesquite are closely correlated, often occurring in the same soil type. Continued growth of mesquite may culminate in a variable

canopy cover of mesquite bosque interspersed with sacaton. Sacaton with mesquite contains higher species richness and abundance of avian species than just sacaton alone.

Key risk factors include dropping water tables where the roots no longer reach adequate moisture for survival (Bryan 1928). Other risk factors include removal for wood, firewood or other wood products, declining groundwater (Stromberg et al. 1992), tamarisk invasion (Minckley and Clark 1984), undercutting and collapse caused by bank erosion (Minckley and Clark 1984), and severe flooding (Minckley and Clark 1984).

Studies indicate that fire may actually result in sacaton mortality (Cox and Morton 1986), or conversely that fire is beneficial to plants and wildlife of sacaton communities (Bock and Bock 1978). Nonetheless, high intensity fires in sacaton grassland are important in limiting shrub and mesquite invasion (plant community conversion). On the Babocomari Ranch, fire is used periodically to "refresh" sacaton to increase palatability for livestock. These have been described as some of the healthiest sacaton stands in southern Arizona (Robinett, pers. comm.). Wild and prescribed fire in sacaton grasslands in the SPRNCA may result in an increase in Johnson grass, if it results in significant mortality.

Sandy Wash (Xeric Riparian)

Xeric riparian habitats are distributed throughout the SPRNCA in the form of tributary washes from the surrounding higher elevations from the Mule, Dragoon, Whetstone, Mustang, and Huachuca Mountains. This habitat type normally does not have standing or flowing water except for periods after rain, although some tributary washes contain permanent springs (e.g., Contention, Ben, Horsethief, Murray, Lewis, Escapule). Xeric riparian habitat is generally more distinctive from surrounding vegetation because of higher water availability, which results in different plant species composition and/or structure (e.g., larger size, increased canopy). For example, species composition may change from surrounding uplands with the presence of desert willow (*Chilopsis linearis*), Arizona walnut (*Juglans major*), littleleaf sumac, netleaf hackberry, and desert-thorn (*Lycium pallidum*). These species and mesquite may grow quite large along sandy washes because of increased availability of surface and ground water. This difference in plant species composition and structure results in a different assemblage of avian species which utilize this habitat.

Sandy washes also provide for important wildlife movement corridors between surrounding uplands and mountains and the San Pedro River. Wildlife genetic connectivity is provided in at least twelve washes from the Huachuca Mountains alone to the San Pedro River, including Memorial, Hunter, Carr, Miller, Ramsey, Slaughterhouse, Blacktail, Babocomari, Garden, Huachuca, Soldier's, and Woodcutter's (Hass 2000). The most suitable washes for wildlife connectivity include Hunter, Carr, Miller, and Ramsey Washes, with the next most suitable washes were those draining Fort Huachuca (Hass 2000). Memorial, Hunter, Carr, Miller, and Ramsey are mostly on private land, and rapid development has occurred along these washes in the last few years. Therefore, washes draining Fort Huachuca may currently be more suitable for wildlife connectivity, and the Babocomari River and tributaries may become even more important. Ecological linkages proposed by Hass include Memorial Wash, Hunter Wash, and the Babocomari River (Hass 2000).

Wildlife linkages proposed by Hass only include movement corridors between the Huachuca Mountains and the San Pedro River (Hass 2000). Other tributary washes also provide important wildlife corridors between the Mule, Dragoon, Mustang, and Whetstone Mountains and the San Pedro River. Some of the major washes include California, Sacaton, and Middle Canyon Washes from the Whetstone Mountains; Escalante, Curtis, Clifford, and Willow Washes; Walnut Gulch, and Government Draw from the Dragoon Mountains; Slavin Gulch, Banning Creek, Spring Creek from the Mule Mountains; and Greenbush Draw from the San Jose Mountains in Mexico. In addition, the Babocomari River drains the watershed from the west of the San Pedro River from the Mustang and Huachuca Mountains. Other wildlife movement corridors exist from the undeveloped east range of Fort Huachuca, and scattered Arizona State Trust Land on both sides of the river.

Key risk factors include erosion, groundwater and surface water depletion, construction of retention and detention dams, surrounding urbanization, and hardscaping leading to increased water runoff events with erosion. A small number of unauthorized livestock utilize areas along the river and in some sections unauthorized grazing is slowing recovery of sandy wash and upland habitats (BLM 2012a).

Upland Habitat

Upland habitat in the SPRNCA may be broken down into Chihuahuan Desert, Semidesert Grassland, and rocky outcroppings. These upland habitat types are important to different assemblages of wildlife species. A small number of unauthorized livestock utilize areas along the river and in some sections unauthorized grazing is slowing recovery of sandy wash and upland habitats (BLM 2012a).

Chihuahuan Desertscrub

This vegetation type covers the largest area within the SPRNCA (Makings 2006). Dominant shrub species include acacias, tarbush, and creosote. Other important plant species include the nectar-producing ocotillo (Fouquieria splendens), soap tree yucca, and Palmer's century plant (Agave palmeri). Other shrubs present include mariola (Parthenium incanum), desert sumac (Rhus microphylla), rosemallow (Hibiscus spp.), and the shrubby xerophytic form of mesquite. In the SPRNCA, Chihuahuan desertscrub habitat contained the highest snake richness of all habitat types (BLM 1988b).

In the SPRNCA, foliage volume was high at the ground layer on upland transects, with avian species richness reflecting this characteristic with ground-feeding and understory specialists found at relatively higher numbers compared to higher canopy feeders (BLM 1988b) (Krueper et al. 2003). Ocotillo occurs only in this habitat type, and provides an essential annual nectar food source for migrating hummingbirds and other species (Waser 1979), as does the flowering yucca and agave that also occur only in this habitat type. In many areas, topsoil is no longer present as needed to support native perennial grasses, and invasive species such as acacia occur instead.

Key risk factors for this habitat type include historic and ongoing erosion and loss of top soil. Even low use from livestock grazing may cause impacts when overall land health is poor (Bestelmeyer 2006, Sasaki et al. 2009, Searle et al. 2009). Use of broadcast herbicide treatments over large tracts of land may cause mortality to all shrub species, even species beneficial as food

sources to migratory birds such as ocotillo, little-leaf sumac, and wolfberry (Hereford NRCD 2016).

Semidesert Grassland

Semidesert grassland occurs above, adjacent to, or as enclosed drainages within the Chihuahuan Desertscrub, and once covered vast areas of the San Pedro River Valley, where now only remnants remain (Latta et al. 1999). Originally composed of native perennial grasses, historic land management actions have changed the composition to woody invasive species, and to annuals where summer rainfall is low (Turner et al. 2003). Extensive grassland once occurred in semidesert regions of the southwestern US, but mesquite has invaded many semidesert grassland areas in southern Arizona (Cable and Martin 1973). As a result, vegetation often varies from open grassland to mixed grass-shrub savannah (Yavitt and Smith 1983). Native perennial grasses of desert grassland may include sideoats grama, blue grama, vine mesquite, tobosa, cane beardgrass (*Bothriochloa barbinodis*), Arizona cottontop, and threeawns. Invasion of grassland by Chihuahuan desertscrub is also a widely documented trend in the Southwest (Humphrey 1958), but creosote or other plants may have always been an important shrub on shallow calcareous soils (Stein and Ludwig 1979). Wildlife assemblages change in response to scrub invasion (Bock et al. 1986), and shifts in the relative abundance of species has occurred with shrub invasion (Mendelson and Jennings 1992). Very small areas of desert grassland occur in the SPRNCA as fingers in the upper Chihuahuan Desert terrace, and most are invaded with mesquite and broom snakeweed (*Gutierrezia sarothrae*). Semidesert grassland in the SPRNCA had the highest small mammal species richness, with common species including harvest mice (*Micromys minutus*), deer mice (*Peromyscus keeni*), and white-footed mice (*Peromyscus leucopus*) (Duncan 1989).

Key risk issues include fragmentation, habitat loss, and alteration from poor grazing management, brush encroachment, agricultural conversion of grasslands, loss of natural fire regimes, and increasing human development (Latta et al. 1999). Land management practices that reduce grass species richness and cover and increase tree canopy cover may reduce habitat quality and availability (Bristow and Ockenfels 2006). Another threat to semidesert grassland is the introduction of exotic grasses, resulting in displacement of native plant species (Bock et al. 1986). Historic top soil loss has occurred and is ongoing in some areas. Semidesert grasslands may be susceptible to greater runoff and erosion compared to unburned grasslands following late spring burning (O'Dea and Guertin 2003).

General stressors to wildlife in Arizona are discussed in the AZGFD SWAP (AZGFD 2012a). Some of the general stressors to wildlife over all habitat types in the SPRNCA planning area include border effects, climate change, drought, grazing, groundwater depletion and springhead use, invasive species, off-road motorized recreation, roads for motorized vehicles, rural development, shrub invasion, unnatural fire regimes, urban growth, and air traffic overflights, contaminants, livestock infrastructure (e.g., roads and fences), dispersed camping, off-trail foot, bike, or equine use, and recreational sites and facilities (AZGFD 2012a).

Table 2.3-11. Priority Fish and Wildlife Habitats and Associated Fish and Wildlife in SPRNCA

Habitat	Priority Fish and Wildlife
Riparian	
Fremont cottonwood-Goodding willow forest	Arizona giant sedge, yellow-billed cuckoo, southwestern willow flycatcher, northern gray hawk, white-winged dove, Gila woodpecker, yellow warbler, Abert's towhee, Gould's turkey, Coues whitetail deer, and western red bat.
Mesquite Forest (Bosque)	Yellow-billed cuckoo, northern gray hawk, Arizona Bell's vireo, northern beardless-tyrannulet, Lucy's warbler, varied bunting, mourning dove, collared peccary, and mountain lion.
Wetland	
Marsh (Cienega)	Huachuca water umbel, Canelo Hills ladies' tresses, Wright's marsh thistle, Arizona eryngo, Virginia rail, lowland leopard frog, northern Mexican gartersnake, desert pupfish, Gila topminnow, Gila chub, and Bats (watering location).
Big Sacaton Grassland	Arizona Botteri's sparrow, and collared peccary.
Aquatic Lentic (ponded water associated with wetlands) and Lotic (streams)	American beaver, belted kingfisher, green kingfisher, great blue heron, breeding Mexican mallard, black-bellied whistling-duck, and wintering northern pintail, canvasback, redhead, bufflehead, gadwall, green-winged teal, blue-winged teal, northern shoveler, wood duck, black-necked stilt, American avocet, spotted sandpiper, western sandpiper, least sandpiper, Sonoran mud turtle, northern Mexican gartersnake, lowland leopard frog, Chiricahua leopard frog, desert pupfish, Gila topminnow, desert sucker, longfin dace, spikedace, loach minnow, Gila chub, roundtail chub, Sonoran sucker, and Huachuca water umbel.
Sandy Wash (Xeric Riparian)	
Sandy Wash (Xeric Riparian)	Canyon towhee, Gambel's quail, jaguar, ocelot, mountain lion and black bear (genetic connectivity between mountain ranges).
Uplands	
Chihuahuan Desertscrub	San Pedro River wild buckwheat, regal horned lizard, Gila monster, black-throated sparrow, lesser long-nosed bat, cave myotis, Townsend's big-eared bat, greater western mastiff bat, mule deer, and collared peccary.
Semidesert Grassland	San Pedro River wild buckwheat, ornate box turtle, regal horned lizard, Gila monster, northern aplomado falcon, western burrowing owl, Arizona Botteri's sparrow, scaled quail, lesser long-nosed bat, Mexican long-tongued bat, mule deer, American pronghorn, black-tailed prairie dog, and Mexican gray wolf.
Bat Roosts/Rocky outcropping	lesser long-nosed bat, Mexican long-tongued bat, cave myotis, western red bat, Townsend's big-eared bat, greater western mastiff bat, and other roosting species if documented.

Rocky Outcrops
Rocky outcroppings provide important substrate for many reptile, bird, and mammal species in the SPRNCA. Outcroppings may provide roosting crevices for bats, crevices, or faces for nesting birds (e.g., rock wren, some raptors), and hibernacula or areas for thermoregulation for reptiles.

Species
As a result, native species richness within the SPRNCA is very high with an unknown number of invertebrates, 11 fish (four native and seven introduced species), 10 amphibians, 49 reptiles, more than 389 bird species, and 86 mammals historically documented within the SPRNCA as indicated in Table 2.3-12. See Appendix C for a complete list of amphibians, reptiles, birds, and mammals for the SPRNCA.

While the current number of native species has declined for many taxa from historic accounts, the number of non-native species (Table 2.3-12) has increased to include at least two invertebrates (crayfish), 11 fishes, two amphibians, six reptiles, five birds, and 12 mammals (including domesticated animals). Lists of amphibians, reptiles, birds, and mammals are given in Appendix C. All migratory birds and priority bird species are discussed in the migratory bird section. All federally listed, proposed, candidate, and BLM sensitive species are discussed in the special status species section.

Table 2.3-12. Species Richness by Taxon within The SPRNCA of Historic Native, Current Native, and Documented Non-Native Species

Taxanomic Group	Number of Historic Native Species	Number of Current Native Species	Number of Documented Non-native Species
Invertebrates	unknown	2,905+	2+
Fish	11	4	7
Amphibians	10	9	2
Reptiles	49	46	6
Birds	389+	389+	5
Mammals	86	76	12

Fish and wildlife populations in Arizona are managed by the Arizona Game and Fish Department (AZGFD). The United States Fish and Wildlife Service (USFWS) has jurisdiction over migratory birds and federally listed species. Although fish and wildlife populations are managed by AZGFD, fish and wildlife habitat is managed by the BLM on public lands. The AZGFD and BLM coordinate management through implementation of a Master MOU (2007) between the BLM Arizona State Office and the Arizona Game and Fish Commission. This section discusses the existing conditions of fish and wildlife habitat on BLM land in the SPRNCA.

AZGFD's State Wildlife Action Plan
The AZGFD's State Wildlife Action Plan (SWAP) identifies Species of Greatest Conservation Need (SGCN) based on vulnerability of populations, of which there are eight criteria (AZGFD 2012a). Species that rated high on the vulnerability category were designated to have the highest priority for directed conservation management. Vulnerable species require conservation actions aimed at improving conditions for those species through intervention at the population or habitat level. Vulnerable species were further separated into three priority tiers of 1a, 1b, and 1c, which are listed as A, B, or C in Table 2.3-13. Species in Tier A and B are in most immediate need of

conservation. Tier A includes federally listed species, candidate species, species with a signed conservation agreement, species that require monitoring following delisting, or closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories (AZGFD 2012a). Tier C species have insufficient information available to fully assess their status, but the species needs to be watched. Common names used are those used in the 2012 SWAP, and the SWAP also lists scientific names. See Section 2.3.10, Special Status Species for a discussion on federally listed and proposed (Tier A), candidate, and BLM sensitive species. See Section 2.3.9, Migratory Birds for a discussion on all migratory birds, including migratory game birds (e.g., doves).

Invertebrates

It is unknown what species of invertebrates other than insects live in the SPRNCA. Over 2,900 species of insects have been documented in the Cochise County lowland area (Olson and Moore 2013). Insects provide a rich food source for other invertebrates, fish, amphibians, reptiles, birds, and mammals in the SPRNCA. For example, primary consumers such as crickets consume freshly fallen leaves and in turn provide a bridge between the leaves and higher trophic levels (e.g., spiders, lizards, birds, mammals) on the San Pedro River (Sabo et al. 2008).

Reptiles

A total of 49 native and six non-native reptile species have been documented in the SPRNCA. Of the native reptile species, 11 are listed as SGCN (Table 2.3-14). See Section 2.3.10, Special Status Species, for federally listed and proposed (Tier A), candidate, and BLM sensitive species. Aquatic turtles are discussed in Section 2.3.8.2, Aquatic Wildlife. Of the lizards on the SGCN list that occur in the SPRNCA, canyon spotted whiptail (*Aspidoscelis burti*) occur only in specific localities and in small numbers (BLM 1988b). Habitat for canyon spotted whiptail in the SPRNCA consists of semidesert grassland and sandy washes. The regal horned lizard (*Phrynosoma solare*) has been documented in Chihuahuan desertscrub habitat in the SPRNCA (BLM 1988b). Gila monsters (*Heloderma suspectum*) are observed in Chihuahuan desertscrub and semidesert grassland in the SPRNCA, and usually overwinter in south-facing rocky hillsides (Brennan and Holycross 2006).

Snakes on the SGCN list that have been documented in the SPRNCA include the Sonoran coralsnake (*Micruroides euryxanthus*), which was documented in semidesert grassland, rocky areas, and areas with mesquite, while habitat for the Yaqui black-headed snake (Tantilla yaquia) occurs in areas with mesquite and rocky areas (BLM 1988b). The Sonoran whipsnake (Coluber bilineatus) is more common, and may be found in semidesert grassland (Brennan and Holycross 2006) and in Chihuahuan desertscrub and rocky areas in the SPRNCA (BLM 1988b). The massassauga (Sistrurus catenatus) appears to be extirpated in the southern San Pedro Valley, perhaps due to grassland degradation or development (Brennan and Holycross 2006).

Ground litter and fallen trees are essential for hiding, foraging, egg laying and escape cover for many snake species in the SPRNCA (BLM 1988b), but also for invertebrates, lizards, and small mammals. Risk factors for reptiles may include intense, hot fire in the riparian area or mesquite bosques which removes ground litter and woody debris.

Table 2.3-13. AZGFD's Reptile SGCN with Current and Historic Habitat in the SPRNCA

Species	SGCN Tier	Current/Historic
canyon spotted whiptail	B	C
regal horned lizard	B	C
Gila monster	A	C
Sonoran coralsnake	B	C
Yaqui black-headed snake	B	C
Sonoran whipsnake	B	C
black-necked gartersnake	C	C
massasauga	A	H
Ornate box turtle (Terrapene ornata ornate)	A	C

Historic: *Species has historically occurred in the SPRNCA but is not present now.*
Current: *Species currently occurs in the SPRNCA.*

Species in Tier A and B are in most immediate need of conservation. Tier A are federally listed species, candidate species, species with a signed conservation agreement, a species that require monitoring following delisting, or a closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories. Tier C species have insufficient information is available to fully assess their status, but the species needs to be watched.

Mammals

A total of at least 85 native and 12 non-native mammal species have been documented in the SPRNCA. Of the native mammal species, 36 are listed as SGCN (Table 2.3-13). Historically, at least eight other mammal species occurred in the SPRNCA or watershed, but now do not occur in the SPRNCA (American pronghorn [*Antilocapra americana*], jaguar, ocelot, Mexican gray wolf [*Canis lupus baileyi*], grizzly bear [*Ursus arctos*], black-tailed prairie dog [*Cynomys ludovicianus*], spotted ground squirrel [*Xerospermophilus spilosoma*], and common muskrat [Ondatra zibethicus]). Appropriate habitat does exist in the SPRNCA for many of these species, and it is possible some of these species do occur but have not been recently documented (e.g., long-tailed weasel (Mustela frenata), spotted ground squirrel, jaguar, and ocelot). See Section 2.3.10, Special Status Species for federally listed and proposed (Tier A), candidate, and BLM sensitive species. Game species are discussed in the Arizona Game and Fish section.

Rodents are important as material processors within the ecosystem and as a prey base, capable of supporting a large biomass in higher trophic levels (Anderson 1994). Spotted ground squirrels occurred historically near Tombstone, Fairbank and west of Hereford, where they prefer habitat of semidesert grassland with sandy soils, but were not documented during the SPRNCA mammal inventory (Duncan 1989). Harris' antelope squirrel (*Ammospermophilus harrisii*) has been documented in the SPRNCA in mixed grass-mixed scrub habitat near Charleston and Boquillas (Duncan 1989).

The American beaver was reintroduced on the SPRNCA, after having been extirpated by fur trappers by 1894 (Bailey 1971). A total of 15 beaver were reintroduced from 1999 to 2002 (Fredlake 2004). By 2008, the estimated beaver population in the SPRNCA was at least 100, based on about 20 colonies with 33 dams (Radke pers. obs.), and an average of 5.2 beaver per colony (Rosell and Parker 1995).

Table 2.3-14. AZGFD's Mammal SGCN with Historic, Current, or Potential Habitat in the SPRNCA

Species	SGCN Tier	Occurrence (Historic/ Current/Potential)
American river otter	B	H
American beaver	B	C
spotted ground squirrel	C	H
black-tailed prairie dog	A	H
Harris' antelope squirrel	B	C
rock pocket mouse	C	C
banner-tailed kangaroo rat	B	P
northern grasshopper mouse	C	C
southern grasshopper mouse	C	C
plains harvest mouse	C	C
tawny-bellied cotton rat	C	P
yellow-nosed cotton rat	C	C
antelope jackrabbit (*Lepus alleni*)	B	C
Cockrum's desert shrew	B	C
lesser-long nosed bat	A	C
Mexican long-tongued bat	C	P
California leaf-nosed bat (*Macrotus californicus*)	B	C
cave myotis	B	C
Arizona myotis	B	P
Yuma myotis (*Myotis yumanensis*)	B	P
southwestern myotis (*Myotis auriculus*)	C	C
western red bat (*Lasiurus blossevillii*)	B	C
western yellow bat	B	P
spotted bat (*Euderma maculatum*)	B	P
pale Townsend's big-eared bat	B	C
pocketed free-tailed bat (*Nyctinomops femorosaccus*)	B	P
Mexican free-tailed bat (*Tadarida brasiliensis*)	B	C
greater western mastiff bat (*Eumops perotis*)	B	C
long-tailed weasel	C	P
jaguar	A	H
ocelot	A	H
kit fox	B	C
hog-nosed skunk	C	C
western spotted skunk	C	C
Coues whitetail deer	B	C
American pronghorn	B	H

Current: *Species currently occurs in the SPRNCA.*
Historic: *Species has historically occurred in the SPRNCA or watershed but is not present now.*
Potential: *Species does not currently occur in the SPRNCA but has the potential to occur.*

Species in Tier A and B are in most immediate need of conservation. Tier A are federally listed species, candidate species, species with a signed conservation agreement, a species that require monitoring following delisting, or a closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories. Tier C species have insufficient information is available to fully assess their status, but the species needs to be watched.

The purposes of beaver reintroduction in the SPRNCA were many. As a keystone species (Collen and Gibson 2001, Davic 2003), beaver may have a large influence on community diversity and ecosystem structure through their tree-felling and dam-building behavior (Pollack et al. 1995). Beaver dams may increase storage capacity and lead to greater flows during dryer

periods (Parker 1986), which may result in enhanced flow in intermittent streams (Yeager and Hill 1954, Rutherford 1955). Beaver impoundments may increase the area of riparian habitat, and elevate water tables through groundwater recharge (Bergstrom 1985, Johnston and Naiman 1987). By functioning as sediment traps, beaver ponds accumulate organic matter (Pollock et al. 1995), and also reduce erosion potential (Parker 1986). By doing so, beaver dams may reduce the sediment carrying capacity of the stream and deposition (Naiman et al. 1988). In addition, beaver ponds may store more nitrogen in sediments than riffle areas (Naiman and Melillo 1984). Removal of large trees that serve as bank armor near the entrenchment channel may allow the river to meander and become more sinuous in the future, slowing run-off and thereby possibly allowing more water storage in the shallow aquifer. Beaver herbivory may provide large woody material, which in turn may increase organic matter in the soil. Soils that are higher in organic material are able to hold more water than soils without organic matter. Beaver affect stream habitats and riverine processes (such as hydrology, water quality, and geomorphology) in warm deserts in essentially the same manner as they do in cooler, more mesic environments (Anderson et al. 2011).

Other small rodents on the SGCN list documented by Duncan (1989) in the SPRNCA included rock pocket mouse (*Chaetodipus intermedius*), northern and southern grasshopper mouse (*Onychomys leucogaster* and *Onychomys torridus*), plains harvest mouse (*Reithrodontomys montanus*), and yellow-nosed cotton rat (*Sigmodon ochrognathus*). Banner-tailed kangaroo rat (*Dipodomys spectabilis*) and tawny-bellied cotton rat (*Sigmodon fulviventer*) occur on range maps for the SPRNCA area (Reid 2006), and appropriate grassland habitat exists for these species in places in the SPRNCA. Crawford's desert shrew (*Notiosorex crawfordi*) was documented in the SPRNCA by Duncan (1989).

Bats are valuable members of ecosystems, consuming many tons of insects that would otherwise consume valuable crops and forests, or otherwise threaten human health. Many species of bats are also required for the pollination of plants and dispersal of plant seeds.

Roosting habitat for bats occurs in many areas because of current and historic mining activity, and because rocky outcroppings and crevices occur throughout the planning area. For example, the area in the SPRNCA near Tombstone contains a high density of mining shafts and adits. Many of these probably provide appropriate roosting habitat for some bat species, both during the summer and during winter hibernation. Species on the SGCN list, such as Allen's big-eared bat (*Idionycteris phyllotis*), cave myotis (*Myotis velifer*), and Townsend's big-eared bat (*Corynorhinus townsendii*), may use mines for summer roosts, while Arizona myotis (*Myotis occultus*) may use mines for winter roosts. Surveys of mines in the Charleston-Brunckow area in the SPRNCA in 2007-2008 indicated at least 14 mine features which were potential bat habitat and require resurvey (Wolf 2008). This was only a small sample of the possible bat roosts in mines in the SPRNCA. Moreover, some bat SGCN may roost in buildings (e.g., pale Townsend's big-eared bat [*Corynorhinus townsendii*], pocketed free-tailed bat [*Nyctinomops femorosaccus*]) such as the historic buildings at Fairbank and Boquillas, or in trees (e.g Allen's big-eared bat, western yellow bat [*Lasiurus xanthinus*]) along the riparian area. The riparian area in the SPRNCA provides not only snags and tree cavities for roosting by some bat species, but also supplies a rich invertebrate food source for bats and open surface water for drinking. Chihuahuan desertscrub provides plants, such as agave, which provide a food source for nectar-

eating bats, such as lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae)* and Mexican long-tongued bat (*Choeronycteris mexicana*).

Risk factors may include: demolition of buildings not of historic value that contain either current or seasonal bat roosts; closure of buildings so that bats can no longer access roosts; filling in of mine shafts and adits for human health and safety reasons; and removal of tree snags with cavities or other trees with roosting structure (e.g., dead bark, dead branches). Other key risk factors may include: intense, hot fire in the riparian area that removes roosting structure; contaminants in water sources; insecticides that kill bat's invertebrate food source; vegetation treatments that remove agave; and human disturbance near bat roosts that may cause abandonment of roosts (USFWS 2011).

Kit fox (*Vulpes macrotis*) were documented through tracks and scat in the SPRNCA in 1987-88 (Duncan 1989). Hass (2000) also documented several areas in the SPRNCA with kit fox tracks. In the SPRNCA, habitat consists of arid shrubby grassland and Chihuahuan desertscrub.

Hog-nosed and spotted skunks (*Conepatus, Spilogale*) have both been documented in the SPRNCA (Duncan 1989). Spotted skunks prefer dens under rocks, buildings, or dens made by other mammals, and hog-nosed skunks utilize crevices in rock for dens (Reid 2006). Habitat in the SPRNCA for spotted skunks includes desert washes and the riparian area, while hog-nosed skunks utilize areas with mesquite, semidesert grassland, or Chihuahuan desertscrub.

Arizona Game and Fish Department Game Species

Priority big game species in the SPRNCA include Gould's turkey (*Meleagris gallopavo mexicana),* Coues whitetail deer (*Odocoileus virginianus couesi*), mule deer (*Odocoileus hemionus*), and collared peccary (*Pecari tajacu*). Priority small game species include scaled quail (*Callipepla squamata*), Gambel's quail (*Callipepla gambelii*), cottontail rabbit (*Sylvilagus*), and black-tailed jackrabbit (*Lepus californicus*). Game species and other priority species managed by the AZGFD are discussed below.

Big Game Species

Gould's Turkey

Gould's turkey occurs in the San Pedro River riparian area, and may have emigrated from riparian areas near Cananea, Sonora, Mexico less than 60 miles to the south (Heffelfinger et al. 2000).

Gould's turkey and signs of Gould's turkey have been observed throughout the SPRNCA since at least 1986 (Corman and Krueper pers. obs.). In the *American Birds Report for Spring 1991*, five observers reported turkey observations, tracks, or gobbles near Highway 90, south of Charleston, north of Highway 90, near Hereford Bridge, and three miles south of St. David, all in the span of 20 days covering 30 miles from north to south in the SPRNCA (BLM San Pedro Project Office files). At least one of these observers believed the one male and two females flushed near Hereford Bridge on May 16, 1981 were Gould's turkey, based on the white-tipped tail feathers (Rosenberg pers. obs.). It was doubtful that all the turkey observations in 1991 were escapees, domestic birds, or releases, based on observations of behavior (roosting high in a tree) and morphology. Turkey tracks and feathers have been observed in several locations from Hereford to Fairbank since 2008, and a nest in dense Johnson grass was discovered south of

Palominas in 2010 (Radke pers. obs.). Habitat for Gould's turkey in the SPRNCA includes areas near water with large trees for roosting. The local range of turkey flocks appears to expand both north past Fairbank and south of Palominas along the San Pedro River with available surface water.

Coues Whitetail Deer

Whitetail deer were thought to number fewer than mule deer in the late 1980s (Duncan 1989). However, Coues whitetail deer are now the predominate deer species present in the SPRNCA, and are commonly observed near water sources at the cottonwood forest riparian zone. Whitetail deer are considered an edge species (Williamson and Hirth 1985), using areas between major habitat types with the availability of cover, food, and water in close proximity (Suring and Vohs 1979). Whitetail deer are expanding their range and in many areas are encroaching into what at one time was mule deer habitat (Baker 1984). Habitat changes favoring whitetail deer are likely the cause of this expansion, and this expansion is of concern in areas where mule deer are limited in number (Ockenfels et al. 1991). For whitetail deer, the level of human disturbance caused by roads during critical periods of the year is concerning and is particularly important during drought conditions and fawning season (Ockenfels et al. 1991). Also of concern may be direct competition between whitetail deer and cattle for browse and forbs during periods of drought (Knipe 1977, Ockenfels et al. 1991).

Mule Deer

Mule deer were estimated to number 420 in the SPRNCA during the late 1980s (Duncan 1989). The population of mule deer in the SPRNCA has decreased in just the past few years, with steadily decreasing herd sizes. Now only remnant populations of mule deer remain in a few scattered localities. Habitat consists of mostly upland grassland or Chihuahuan desert, which allow mule deer adequate visibility. Mule deer may also be found on floodplains adjacent to the river, which they utilize as a water source (AZGFD 2015).

Mule deer are currently observed only in a few localities in the SPRNCA where permanent water is available and where human disturbance is low. Permanent water sources in some areas of the SPRNCA have been lost due to groundwater depletion and subsequent drying of some reaches of the river in the Palominas area and north of Charleston Road. Wildlife water sources other than the San Pedro River have been developed at four wells in the SPRNCA near Palominas, Fairbank, Contention, and Summers Well. Loss and fragmentation of usable habitat due to human encroachment and associated activities may displace mule deer from otherwise suitable habitat (Heffelfinger et al. 2006). Increased development has occurred adjacent to the SPRNCA, with associated human disturbance and habitat fragmentation. The pedestrian fencing along the International Boundary has made it impossible, except at the river's edge where vehicle fencing exists, for mule deer and other large wildlife to cross back and forth into Mexico as habitat conditions and human disturbance dictate. Proximity to roads and trails has a greater correlation with deer distribution than mean road densities (Johnson et al. 2000), with roads and trails in some areas of usable mule deer habitat becoming loop trails in close proximity to other roads and trails (e.g., Palominas area and Charleston Hills). Since designation, the SPRNCA has had varying levels of impacts to wildlife habitat from border-related activities including smuggling and related enforcement. These impacts are most evident at the southern end of the SPRNCA from the border to Highway 92 (BLM 2012a). Recreational activities in the SPRNCA in the form of increasing numbers of hikers, equestrians, mountain bikers, and unauthorized OHV users are

creating localized disturbance and impacts to habitat (Radke pers. obs.). Areas impacted by man-made features are utilized less by mule deer than they are available (deVos et al. 1984). Presently mule deer are no longer common in the SPRNCA, and occur in fewer numbers than Coues whitetail deer.

Collared Peccary

Collared peccary, or javelina, are common throughout the SPRNCA in most habitat types, with their trails commonly observed from upland areas to water sources. Duncan (1989) estimated that between 160 to 253 javelina occurred in the SPRNCA, based on habitat types present at the time of the initial inventory. Javelina are thought to be of tropical origin, having only recently arrived in the desert Southwest, because their bones are not found in archeological sites and settlers did not record observations of javelina. Javelina may have extended their range northward from Mexico as desert grassland became invaded by scrub and cactus. Preferred habitat for javelina in the SPRNCA includes semidesert grassland and Chihuahuan desertscrub with cactus and other succulents as their favored food source.

American Pronghorn

Pronghorn historically occupied the upper San Pedro River Valley (Davis 1982). Pronghorn are not currently found in the SPRNCA, but do occur in the watershed on Fort Huachuca to the west. A small herd has utilized habitat on the southeast side of Fort Huachuca near the Huachuca Mountains, and may be observed on windy days in the large retention basins adjacent to the Buffalo Soldier Trail south of the City of Sierra Vista. At least some reproduction does occur in this area, with twin fawns observed (Radke pers. obs.). Some pronghorn could utilize habitat on Fort Huachuca's East Range, which lies between Highway 90, the SPRNCA and south of the Babocomari River. Currently, the majority of the pronghorn's semidesert grassland habitat in the SPRNCA is invaded by woody invasive species such as mesquite. However, collaborative grassland restoration efforts on Fort Huachuca's East Range and in the SPRNCA could create conditions conducive to expansion of pronghorn into restored habitat and as a movement corridor to the SPRNCA.

Black Bear

Tracks of black bear (*Ursus americanus*) have been observed within the SPRNCA (Hass 2000, Radke pers. obs.), but this species is uncommon. Habitat for black bear exists along the cottonwood forest riparian area but, more importantly, the SPRNCA and surrounding tributaries provide corridors for movement between the neighboring mountain ranges and Mexico, and thus provides for genetic connectivity for this species (Atwood et al. 2011, López-Hoffman et al. 2009). In the upper San Pedro River watershed, corridors for black bear genetic connectivity were identified as areas between the Huachuca and Mule Mountains, between the Dragoon and Whetstone Mountains, and between the Huachuca Mountains and Whetstone Mountains (Atwood et al. 2011). López-Hoffman et al. (2009) identified important movement corridors for black bear along the San Pedro River between Mexico and the US.

Mountain Lion

Because of their abundant prey base (e.g., javelina and Coues whitetail deer), sign of lion kills and tracks indicate that mountain lion (*Puma concolor*) are found in small numbers throughout the SPRNCA. Mountain lions are important predators, helping to control their ungulate prey

populations (AZGFD 2007a), which might otherwise become overabundant and impact habitat and other wildlife species (Cote et al. 2004). Stream courses are frequently used as travel corridors and hunting routes for mountain lions, and riparian vegetation provides cover for movement (AZGFD 2007a). The San Pedro River between Mexico and the US has been identified as important movement corridor for mountain lions (López-Hoffman 2009). Large tracts of roadless habitat are necessary to maintain individual populations, and the corridors that connect these tracts are required for dispersal of lions between populations (AZGFD 2007a).

Small Game Species

Desert Cottontail and Black-tailed Jackrabbit

Both desert cottontail (*Sylvilagus audubonii*) and black-tailed jackrabbit have been documented in the SPRNCA, with antelope jackrabbit occurring infrequently on the northern end of the SPRNCA (BLM 1988b). Desert cottontail are found in various brushy habitats in the SPRNCA, including Chihuahuan desert scrub, semidesert grassland, sandy washes, and the riparian area. Black-tailed jackrabbit prefer more open areas in the SPRNCA in semidesert grassland, Chihuahuan desertscrub, and abandoned agricultural fields.

Gambel's and Scaled Quail

Gambel's quail are found in most habitats in the SPRNCA, but are less common in the Chihuahuan desert uplands and monotypic grasslands away from desert washes and other riparian habitats.

Scaled quail are found in the SPRNCA primarily in semidesert grassland and mixed mesquite habitats. Scaled and Gambels' quail may be found in the same habitat where grasslands merge with mesquite and riparian habitat. Number of scaled and Gambel's quail may vary considerably annually due to rainfall patterns, winter severity, and other factors, but scaled quail are more sensitive of livestock grazing pressure than Gambel's quail.

Other Game Species

Many other wildlife species occur in the SPRNCA, and include white-face coati, gray fox, bobcat (*Lynx rufus*), and coyote (*Canis latrans*) among others. Proper habitat management in the SPRNCA for priority game species will likely result in appropriate habitat conditions for other wildlife species as well.

Trends

Residential and commercial real estate development are key factors in the economic health and growth of southeast Arizona, most particularly Cochise County. As such, urbanization in the watershed continues in the form of both planned (e.g., Tribute) and unplanned subdivisions near the SPRNCA, with a general increase in fragmentation and disturbance caused by human activities. Increased human activity outside of the SPRNCA creates a state where the wildlife habitat within the SPRNCA becomes even more valuable to fish and wildlife, however, increased urbanization also leads to higher recreational demand in the SPRNCA.

Density of herbaceous vegetation in riparian and mesquite grassland, population density of some bird species, and avian species richness (numbers of species) increased following the 1987 removal of cattle from the SPRNCA. These increases were likely caused by the change in local

conditions, as regional trends for most species did not follow the same pattern (Krueper et al. 2003).

Recreational activities in the SPRNCA in the form of increasing numbers of hikers, equestrians, mountain bikers, and unauthorized OHV users are creating localized disturbance and impacts to habitat (BLM 2012a). Since designation, the SPRNCA has had varying levels of impacts to wildlife habitat from border-related activities including smuggling and related enforcement. These impacts are most evident at the southern end of the SPRNCA from the border to Highway 92 (BLM 2012a). A small number of unauthorized livestock utilize areas along the river, and in some sections, unauthorized grazing is slowing recovery of wildlife habitat (BLM 2012a). In addition, modeling indicates groundwater depletion in 10-30 years for the SPRNCA within the Sierra Vista subwatershed (USGS 2013), which will have significant impacts to wetland habitat types within the SPRNCA. Long-term drought continues to impact vegetation and wildlife habitat.

Collaboration between local fire departments and communities has created a demand for reduction in fuels in the SPRNCA that may conflict with habitat objectives.

Key trends that impact fish and wildlife habitat within the SPRNCA include:

- Groundwater depletion caused by pumping and long term drought, with potential future loss of surface water used by wildlife;
- Impacts to xeric riparian habitat due to water diversion, hardscaping, vegetation conversion to grassland, and retention/detention basins;
- Water quality issues and unknown impacts from emerging contaminants, heavy metals, and E. coli;
- Use of the SPRNCA for border activities, including smuggling and Border Patrol enforcement, with corresponding disturbance to wildlife, for which some species are especially vulnerable (e.g., mule deer, nesting raptors);
- Recreational activities in the SPRNCA in the form of increasing numbers of hikers, equestrians, mountain bikers, and unauthorized OHV users will likely increase localized disturbance and impacts to habitat;
- Loss, modification, and fragmentation of habitats on adjacent private and state land due to urbanization, border activities, and recreational use;
- A small number of unauthorized livestock utilizing areas along the river and in some sections unauthorized grazing slowing recovery of wildlife habitat (BLM 2012a);
- Continuing impacts to soils and vegetation from historic uses, especially in riparian areas;
- Changes in the vegetation community towards a shrub dominated vegetation community in the “uplands;”
- Impacts to habitat and food sources from invasive species such as Johnson grass, bermuda grass, and Lehmann lovegrass; and
- Impacts to migration corridors other than the San Pedro River, such as tributary washes used by species to travel between mountain ranges.

Forecast

Trends are expected to continue with negative impacts to fish and wildlife habitat with decreases in surface and groundwater through the combination of drought and groundwater pumping, impacts to habitat and food sources from invasive species, and changes in the vegetation community toward a shrub dominated vegetation community.

Aquatic Wildlife

Indicators

Traditional indicators for fish habitat in rivers and streams include such things as stream substrate, macrohabitat types and abundance, instream cover, overhanging cover, aquatic invertebrates, and water quality. For pond and wetlands, common indicators include aquatic vegetation, surface area, depth, substrate, benthic invertebrates, zooplankton, and water quality. Because riparian and wetland plant communities influence fish habitat, indicators of riparian and wetland health are often important as well. As with wildlife, it may be important to identify specific ecological components that are indicators specific to individual species. Nonnative aquatic invasive species are a key component that influences the viability of habitat for fish and other aquatic wildlife species, especially frogs and reptiles which are susceptible to predation and displacement by more aggressive species.

Current Conditions

Invertebrates

As discussed above, it is unknown what species of invertebrates, other than insects, occur in the SPRNCA. There are probably species of protozoans, flatworks, segmented worms, mollusks (e.g., snails [*Gastropoda*], clams [*Bivalvia*]), arachnids (e.g., spiders [*Araneae*], scorpions [*Scorpiones*]), crustaceans (e.g., fairy shrimp [*Anostraca*], amphipods [*Amphipoda*], isopods [*Isopoda*]), centipedes [*Chilopoda]*, and millipedes [*Diplopoda*] that occur in the SPRNCA that have not been inventoried or had their ecological role described. However, invertebrates provide essential ecological roles in ecosystem stabilization, energy and nutrient transfer, maintenance of trophic structures, plant pollination, plant protection, and the provision of major habitats for other organisms, among other processes (Kellert 1993). What little is known about some individual invertebrate taxa in the SPRNCA is discussed below.

The California floater is Arizona's only native freshwater mussel, and is listed as a Tier A SGCN (Table 2.3-15). This species has only prehistoric (AD 700-1100) and historic (1880s) documentation within the SPRNCA (AZGFD 2012b), and no longer occurs in the SPRNCA. Approximately nine terrestrial and five aquatic native mollusks may occur in the upper San Pedro River (Haynes and Huckell 2007), but it is unknown if any native mollusks occur currently at Murray Springs or other wetlands in the SPRNCA. Locations in the SPRNCA other than Murray Springs are also possible sites for native mollusk species. For example, Lewis Springs, Ben Spring, Frog Spring, Contention Spring, and St. David Cienega could contain native mollusks but have not been inventoried. The mollusks from the St. David Cienega have not been thoroughly studied (Haynes and Huckell 2007).

Table 2.3-15. AZGFD's Invertebrate SGCN with Historic or Current Habitat in the SPRNCA

Species	SGCN Tier	Current/Historic
California floater (*Anodonta californiensis*)	A	H

Historic-Species has historically occurred in the SPRNCA or watershed but is not present now.
Species in Tier A and B are in most immediate need of conservation. Tier A are federally listed species, candidate species, species with a signed conservation agreement, a species that require monitoring following delisting, or a closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories. Tier C species have insufficient information is available to fully assess their status, but the species needs to be watched.

The non-native virile crawfish (*Orconectes virilis*) and red swamp crawfish (*Procambarus clarkii*) have been introduced in the SPRNCA (Moody and Taylor 2012). Native fairy shrimp species are described in Dexter (1953). Fairy shrimp do occur in the San Pedro River and in ephemeral pools caused by summer precipitation, but it is unknown what these species are. Fairy shrimp do provide food for other wildlife, such as spadefoot toads (*Scaphiopodidae*) (MacKay et al. 1990).

Fish

Of the 13 native fish species that occurred historically on the upper San Pedro River, only two remain in the river, the longfin dace and desert sucker (Table 2.3-16). Two more species, desert pupfish and Gila topminnow, have been reintroduced into Murray Spring, Horsethief Draw and Ben Spring. The assemblage of native fish species has been lost due to a variety of factors including severe habitat degradation beginning in the 1890s, and replaced through predation and competition by non-native fishes, such as the black bullhead, large mouth bass, western mosquitofish (*Gambusia affinis*), and green sunfish. In addition, the non-native Northern crayfish (*Orconectes virilis*) and red swamp crawfish (*Procambarus clarkii*) have been introduced in the SPRNCA and occur throughout the area where perennial and intermittent water exists. Both longfin dace and desert sucker are listed as Bureau Sensitive and SGCN. See Section 2.3.10, Special Status Species for a full description of these species.

A study was conducted on the San Pedro River and Babocomari River through the conservation area to determine changes in habitat availability for fish in the San Pedro River as a function of changes in streamflow (Miller 2006). The objective of this study was to provide a framework for assessing changes in physical habitat in the river as a function of flow for the species of interest and to provide a tool to assess streamflow needed to preserve and enhance the aquatic species. The Instream Flow Incremental Methodology (Bovee 1982, Bovee et al. 1998) study combined fish habitat preference data, two-dimensional, open channel hydraulics, a Geographic Information System (GIS) habitat model, and hydrologic data to produce a habitat time series to estimate the amount of suitable habitat for longfin dace, desert sucker, spikedace, and loach minnow.

Table 2.3-16. Fish Species Occurrence in the San Pedro River (Main Stem) within the SPRNCA to the confluence with the Gila River from 1850 through 2000

Native Species	1850	1880	1900	1940	1950	1960	1970	1980	2010#	Introduced Species
Colorado Squawfish (*Ptychocheilus lucius*) (E) (A)	←	← →	→	→	→	→	→	→	→	Common Carp*
Razorback Sucker (*Xyrauchen texanus*) (E) (A)	←	←		→	→	→	→	→	→	Black Bullhead*
Flannelmouth Sucker (*Catostomus latipinnis*) (A)	←	←		→	→	→	→	→	→	Green Sunfish*
Roundtail Chub (*Gila robusta*) (A)	←	←		→	→	→	→	→	→	Mosquitofish*
Gila Chub (*Gila intermedia*) (E) (A)	←	←				→	→	→	→	Goldfish (*Carassius auratus*) *
Speckled Dace (*Rhinichthys osculus*) (B)	←	←	←				→	→	→	Fathead Minnow (*Pimephales promelas*) *
Loach Minnow (T) (A)	←	←	←	←	←		→	→	→	Yellow Bullhead (*Ameiurus natalis*)
Desert Pupfish (E)*(A)	←	←	←	←	←		→	→	→	Channel Catfish*
Spikedace (T) (A)	←	←	←	←	←	←	→	→	→	Bluegill (*Lepomis macrochirus*) *
Gila Topminnow (E)* (A)	←	←	←	←	←	←	← →	→	→	Largemouth Bass*
Sonoran Sucker (*Catostomus insignis*) (B)	←	←	←	←	←	←	←	←	← →	Red Shiner (*Cyprinella lutrensis*)
Longfin Dace * (B)	←	←	←	←	←	←	←	←	← →	Flathead Catfish (*Pylodictis olivaris*)
Desert Sucker * (B)	←	←	←	←	←	←	←	←	← →	Redear Sunfish (*Lepomis microlophus*)

Source: this is a combination of Miller 2006 and Stefferud and Stefferud 2010.
(T), (E) – Federally listed.
(A), (B) - SGCN
* These species currently occur on the conservation area
Species in Tier A and B are in most immediate need of conservation. Tier A are federally listed species, candidate species, species with a signed conservation agreement, a species that require monitoring following delisting, or a closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories. Tier C species have insufficient information is available to fully assess their status, but the species needs to be watched.

Nearly 4,000 fish were collected during the study. Longfin dace were found from Hereford to Fairbank (all study areas). The longfin dace is an adept early colonizer and is able to colonize areas that are dewatered at some portion of the year and rewatered later in the year, such as areas

near Palominas and the reach downstream of Fairbank. Desert sucker were found from Lewis Springs to Fairbank. No loach minnow or spikedace were collected; however, both had designated critical habitat at the time (USFWS 2000). In the Babocomari River, longfin dace was the only species collected.

Murray Springs is downstream of the Sierra Vista Environmental Operations Park (i.e., wastewater treatment facility) and water discharge at Murray Springs has been increasing since at least 2003 (Paretti and Gungle n.d.). Water discharge at Horsethief Spring and Moson Spring (i.e., Escapule Spring) down-gradient of the wastewater facility has also been increasing. While the water discharge meets current water quality laws and regulations, pesticides, household chemicals (e.g., prescription drugs and cleaning products), industrial by-products, and biogenic hormones (e.g., hormone replacement therapy) are not completely removed in the wastewater treatment process, and Paretti and Gungle have detected organic compounds common to wastewater contamination in Murray Springs (Paretti and Gungle n.d.). It is unknown what effect wastewater contamination may have had not only on any fish, but also on plants, other invertebrates, and vertebrates at Murray Spring, Horsethief Spring, and Moson Spring.

Lewis Springs Channel Type Modelling Results

The habitat versus discharge relationship for desert sucker shows that the peak habitat for desert sucker adults occurs at approximately 12 cubic ft. per second. Most of the optimum habitat occurs between 7 and 20 cubic ft. per second for both adults and juveniles. Longfin dace habitat versus discharge shows a pattern somewhat similar to desert sucker, although longfin adults have habitat availability similar to desert sucker juvenile, with the majority of optimal habitat occurring in the 10-30 cubic ft. per second range. Habitat versus discharge for spikedace shows peak habitat for adults at 12 cubic ft. per second, and optimal juvenile habitat occurs from six to eight cubic ft. per second. Habitat for both lifestages gradually decreases as flow increases above 16 cubic ft. per second. The spikedace juvenile and adult relationships have a very similar pattern for both lifestages but a difference in scale. Loach minnow habitat versus discharge has a similar response between habitat and flow for both adult and juvenile, with a slight difference in the amount of habitat available. There is a bimodal peak for loach minnow at the Lewis Springs site. The first peak occurs at approximately four cubic ft. per second, and the second peak occurs at about 16 cubic ft. per second. This double peak may be due to the inundation of low bars as flows increase up to the 15-16 cubic ft. per second range. This inundation results in depths and velocities that maximize both adult and juvenile loach minnow habitat, since they require a faster velocity than the other three species (Miller 2006).

Charleston-Mesquite Channel Type Modelling Results

Desert sucker juvenile in this channel type have the most habitat of all lifestages, and habitat does not decline as flows increase. The reason for this is likely the flatter, wider channel that provides habitat at the channel margins. As flows increase in this channel type, wetted channel width increases, but depths and velocities remain within the optimal range for desert sucker juveniles. Desert sucker adult habitat peaks at approximately 16-18 cubic ft. per second and gradually decrease as flows increase above 20 cubic ft. per second. Longfin dace adult habitat is the most abundant of all lifestages at flows greater than 12 cubic ft. per second. This is similar to the desert sucker juvenile habitat estimates at this site. Both the desert sucker juvenile and longfin dace adult have similar habitat use patterns for depth and velocity. Longfin dace juvenile

and young-of-the-year both analysis suggests their habitat versus discharge relation shows that available habitat decreases as flows increase above 10 cubic ft. per second (Miller 2006).

Fairbank Channel Type Modelling Results

Desert sucker habitat versus discharge relationships show that habitat is not substantially limited at high flows for any of the lifestages. This is likely due to the wide channel type associated with the Fairbank channel and the availability of appropriate depths and velocities throughout that channel type. The least abundant habitat is for desert sucker adults, which is generally found at areas where depth is greater than one ft. deep and velocity is greater than 0.7 ft. per second. As the channel becomes inundated at higher flows, the low velocity habitat over the wide sandy areas provides rearing areas for juveniles and young-of-the-year, but does not provide the velocities needed in areas where adults are usually found. These areas are usually associated with some sort of cobble or woody debris with algae for feeding suckers. Longfin dace adult habitat also shows a monotonic increase of habitat versus discharge as seen with desert sucker, although juvenile and young-of-the-year longfin dace habitat is stable or slightly decreases as flows increase above 20 cubic ft. per second. Adult habitat does not decrease, which may be due to their ability to use the higher velocities at moderate depths than the juvenile and young-of-the-year.

Spikedace habitat versus discharge at the Fairbank channel type shows a relationship similar to desert sucker adults with habitat increasing with flow, as this species also is able to occupy the wide channel type with moderate velocities and depth. Loach minnow habitat versus discharge for Fairbank shows the same pattern as the previous species of increasing habitat with increasing flow and no dropoff of habitat as flows increase. Again, this is likely due to the wide channel and inundation of areas with depths and velocities suitable for occupation by this species (Miller 2006).

Babocomari River Modelling Results

The habitat discharge relationship for all species and lifestages modeled for the Babocomari River, except desert sucker juvenile, are similar. There is a gradual increase in habitat with flow. Desert sucker juvenile habitat peaks from three to four cubic ft. per second and then begins to decrease (Miller 2006).

Palominas Hydrology

Channel types within this reach are a mix of the channel types described above. The majority of this hydrology reach consisted of Lewis Springs channel type followed by Fairbank and a small portion of Charleston-Mesquite channel type in the most upstream area of the reach. May, June, July and October have nearly no flow availability and, thus, very little habitat (Miller 2006). Longfin dace, however, can persist in very small habitats and poor water quality. Desert sucker, loach minnow and spikedace are not likely to survive here under current conditions.

Charleston Reach Hydrology

In general, habitat is more abundant in the Charleston reach than in the previous Palominas reach due to several factors. First is the difference in channel type. The Charleston hydrology reach is predominantly Mesquite channel type, which has a much different flow response than the Lewis Springs channel type upstream. The minimum habitat available with time for all species and

lifestages approaches zero infrequently in this reach (Miller 2006). Some years the flow approach end reaches zero (2005) in this reach for long periods of time (weeks). Nonetheless, desert sucker and longfin dace persist in this reach. Spikedace and loach minnow may not fare as well as the other two species at extreme low flows.

Tombstone Reach Hydrology

There is total loss of flowing habitat in the month of June (and part of July depending on when the rainy season begins). The modeling indicates it is likely to equate to a loss of all species within the reach and the need to recolonize the reach in July and August as monsoons occur and water again returns to the system. This is likely the reason for the predominant species occurring in this reach being early colonizers, such as longfin dace for natives and western mosquitofish and green sunfish as nonnatives. This lack of streamflow in the month of June represents more than 12 miles of river that is dewatered and lacks habitat value for at least a portion of most years (Miller 2006).

Management Implications

The management implications from this habitat modeling study are important. The San Pedro River still supports physical habitat suitable for longfin dace, spikedace, loach minnow and desert sucker. The habitat is far below its capability that existed at and prior to congressional designation.

The longfin dace is an early colonizer that is able to colonize areas that are dewatered and later rewatered, as long as, there is some surface water (e.g., deep pools). Nonnative, invasive species (e.g., western mosquito fish, black bullhead, green sunfish, carp, and crayfish) would likely continue to persist as well. These species have led to the demise of native fish throughout Arizona.

A segment of the San Pedro River below Government Draw was inventoried in 2013 for aquatic habitat with the purpose of determining habitat conditions in support of desert sucker, loach minnow, longfin dace, and spikedace at flows approaching three cubic ft. per second (Figures 2.3-27 and -28). The greatest length of habitat type of the 69 inventoried was run (63.5 percent) followed by pool (23.8 percent) and riffle (12.8 percent). The habitat composition by area was similar: run (63.0 percent) followed by pool (26.1 percent) and riffle (10.9 percent).

Glide and run habitats had substrates dominated by sand, small gravel and large gravel. Glides, being the slower deeper counterpart to runs, tended to have either large or small gravel as its dominant substrate, and these habitats were far more frequent than runs; 25 of the 35 sites were glides rather than runs. The average maximum depth for glides and runs was 1.1 ft. The average depth of pools was 1.1 ft. and the average max depth was 2.0 ft. About a third of the pools had woody cover and undercut bank. The substrate was typically sand and gravel with small amounts of cobble observed. High gradient riffles are the most abundant type of riffle along the Lewis Creek stretch of the San Pedro River. They are characterized by large substrate such as small boulders, large gravel and rubble. There are a few low gradient riffles which are characterized by small gravel substrate. The average depth of the riffles is 0.24 ft. and an average length is 32 ft. The data indicates that the riffle habitat in this reach, which extends nearly to the Charleston Bridge, has suitable habitat for desert sucker and loach minnow, a distance of 4.25 miles. The reach from the Charleston Bridge to Government Draw supports populations of both longfin

dace and desert sucker (BLM files 2006). This same habitat would likely support loach minnow and spikedace. Much less habitat (runs) for spikedace was encountered than for loach minnow but suitable habitat is still available (Miller 2006). In addition, contaminant concerns currently exist for the reclaimed wastewater.

In addition, the surface water in the Charleston reach is in jeopardy of becoming intermittent in the foreseeable future (Figure 2.3-29) (USGS 2015). The black trend line indicates the average low flow and the red trend line represents the minimum low flow; this line shows the impact to fish and other aquatic wildlife in the Charleston reach of the San Pedro River. By 2020, it is likely that base flows during June and July will cease for at least seven days. The trend may not hold if reclaimed waste water continues to be injected into the aquifer upstream near Curry Draw. However, the water is not dedicated to augmentation of this reach in perpetuity.

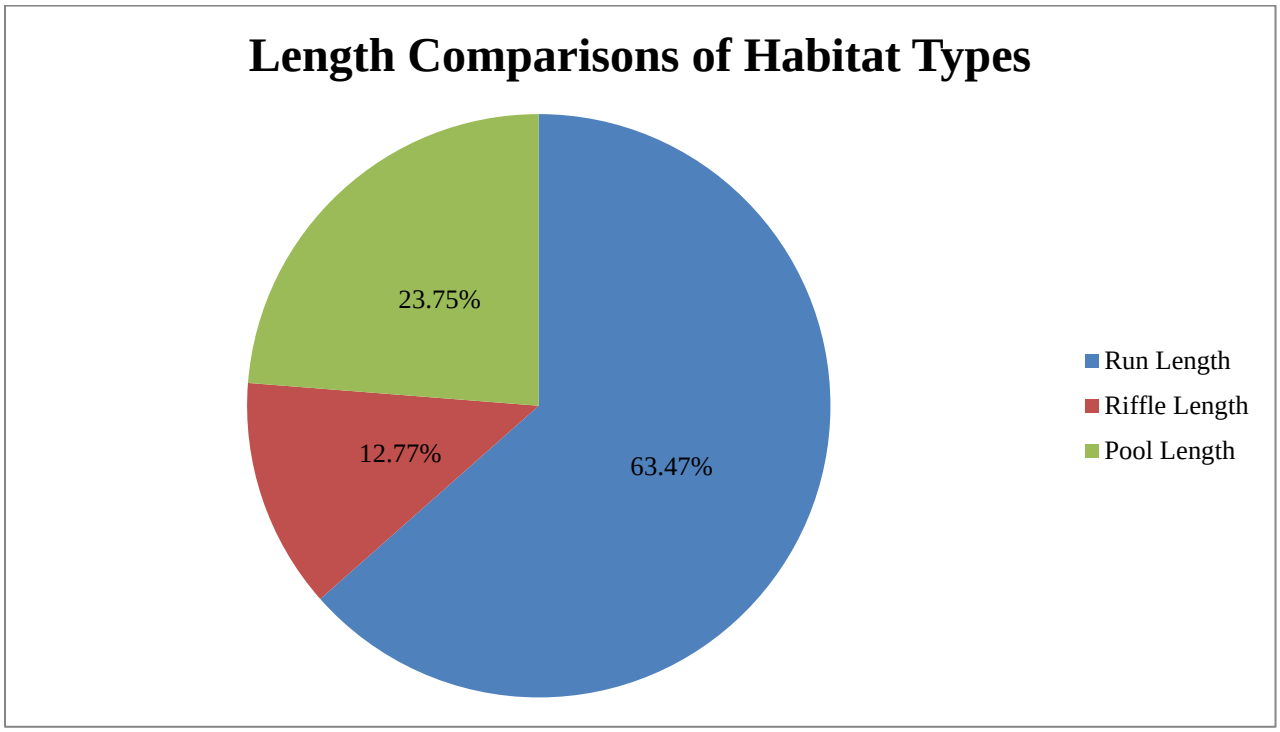


Figure 2.3-27. Linear Comparison of River Habitat Composition Below the Confluence with Government Draw.

Water temperature regimes have also been studied on the San Pedro River at three locations: Hereford Bridge, Escapule Wash, and Charleston Bridge (Figure 2.3-30). Temperature recording probes were set in flowing water for 10 to 20 days prior to monsoon storms. The temperature profiles for each site were compared. Temperatures above 30°C can cause stress (e.g., low dissolved oxygen, diminished growth, susceptibility to disease, etc.) in some of the least tolerant native fishes (Armor 1991, Widmer et al. 2006, Carveth et al. 2006, and Carveth et al. 2007).

Temperatures at the Charleston site have reached 34°C (range 14.0 to 34.3°C). At the Escapule Wash site, temperatures were somewhat less but still exceeded 30°C while temperatures at the Hereford site rarely exceeded 25°C. The thermal suitability of habitat in the Charleston and

Escapule reaches may be compromised by the daily high temperatures. Since the probes were generally removed well before the monsoons came to prevent losing them to floods, the highest water temperatures of the year were likely missed. Average and maximum water temperatures are generally highest when there is a combination of high humidity and high air temperature. On the other hand, water temperatures can vary greatly in individual pool habitats with a cool layer near the bottom and warmer layers above (Deacon and Minckley 1974). These cool layers can be attributed to water movement through the bed where it discharges into pools without being exposed to the warming influence of the air. If the warm surface flow is modest, the water stratifies in pools rather than mixing.

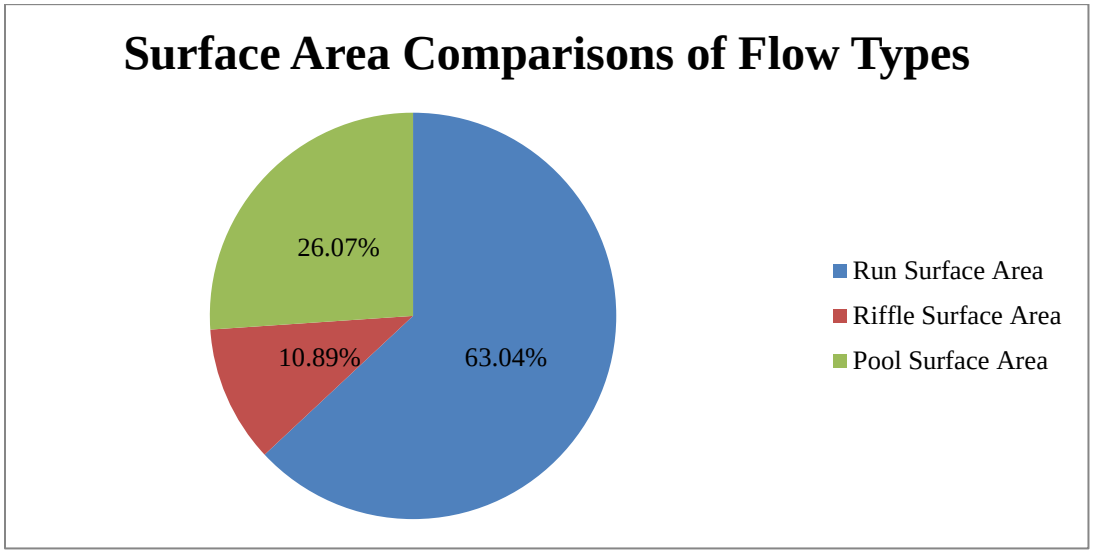


Figure 2.3-28. Comparison of River Habitat Area Below the Confluence with Government Draw

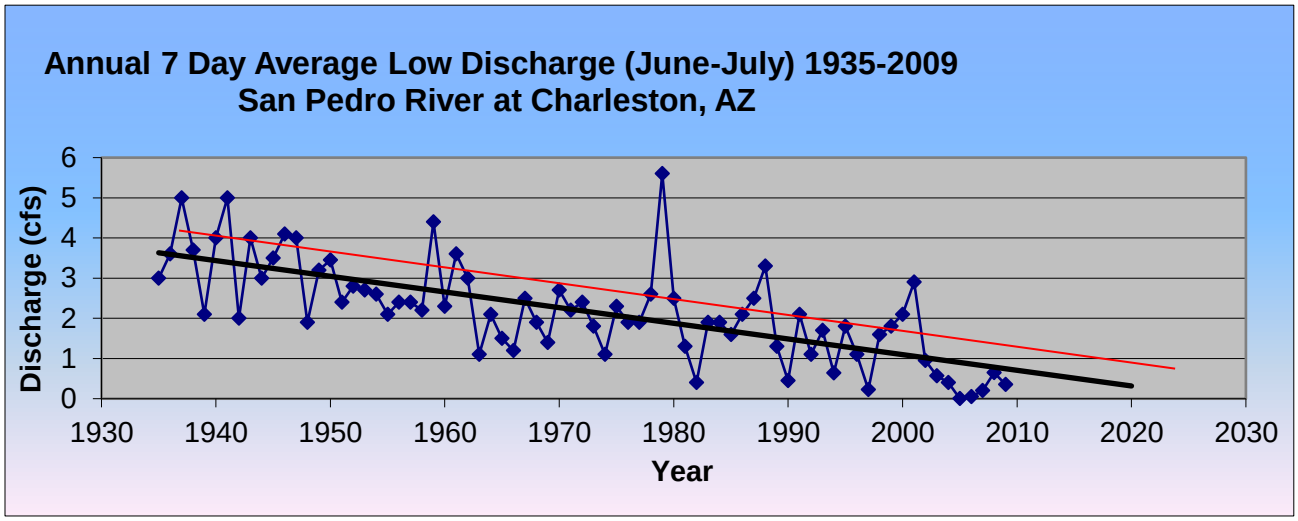


Figure 2.3-29. Annual 7 Day Low Stream Discharge at the Charleston Gage, San Pedro River 1935 to 2009

In summary, the water temperature regime above Charleston had high temperatures sufficient to cause physiological stress in native fishes that can lead to disease, reduced growth and mortality. It is also evident that there is a temperature gradient from lower temperatures where ground water is being supplied to the system above Escapule Wash to higher temperatures near the Charleston Bridge. Much of the fish habitat from the community of Escapule to Charleston, a little over three miles, has a summer thermal regime that reduces the habitat suitability for native fishes such as desert sucker, spikedace and loach minnow. However, the existence of thermal refugia in deep pools that access cooler ground water was not investigated and may provide local areas of protection for some part of the fish community during hot summer days.

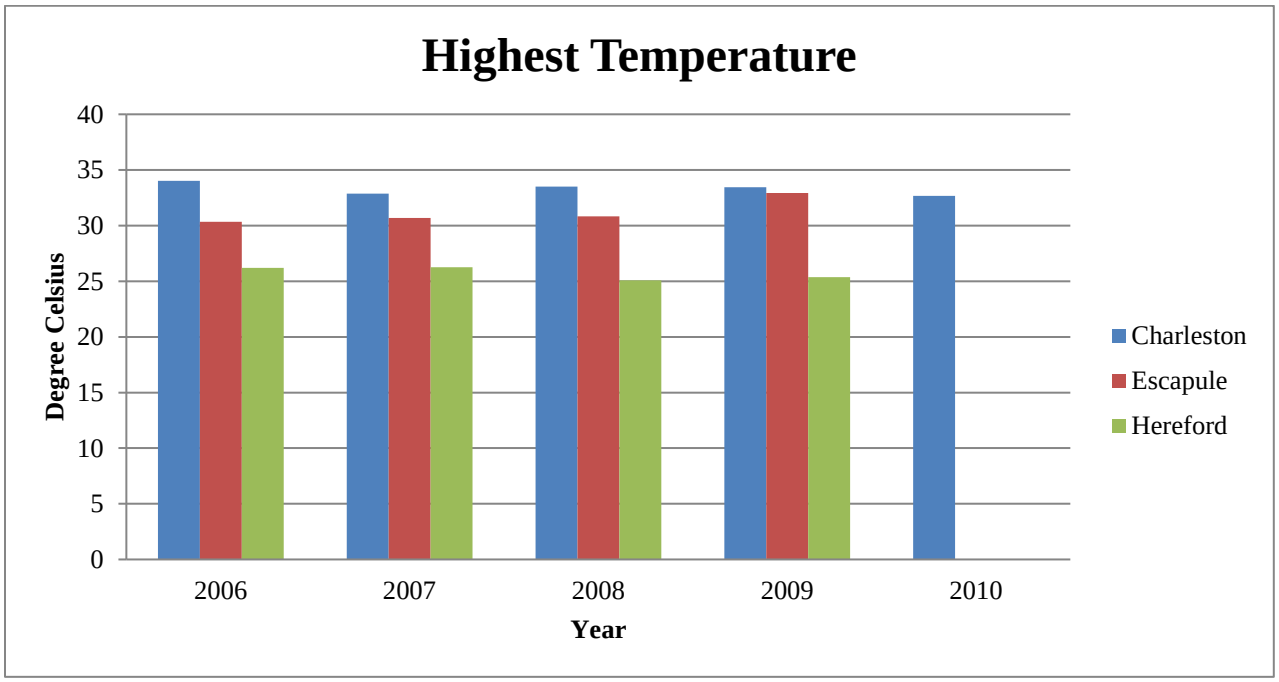


Figure 2.3-30. Water Temperature Regimes

Amphibians

Of the 10 amphibian species that occurred historically on the upper San Pedro River, nine species remain (see Appendix C for the SPRNCA amphibian and reptile list). Of the remaining amphibian species, three are listed as SGCN (Table 2.3-17). See the Section 2.3.10, Special Status Species for federally listed and proposed (Tier A), candidate, and BLM sensitive species. The endangered Chiricahua leopard frog (*Lithobates chiricahuensis*) has been extirpated within the US reach, but may still occur in Mexico (Rosen 2005). Lowland leopard frogs (*Lithobates yavapaiensis*) may still occur in isolated locations with shallow water where bullfrogs are not present (e.g., Dunlavy Wetlands). Although rare, the Sonoran desert toad has been documented in the SPRNCA at Fairbank (BLM 1988b). However, surveys during 2013 did not document Sonoran desert toad (*Incilius alvarius*) in the SPRNCA. Habitat for the Sonoran desert toad includes Chihuahuan desertscrub and semidesert grassland (Brennan and Holycross 2006).

In Section 2.3.6, Riparian and Wetlands, habitats with surface water that can be occupied by amphibians are listed. Most of the wetlands have thick vegetation which limits reproduction of leopard frogs and predatory bullfrogs. Little Joe Wetland was renovated by excavating an open pond. Desert pupfish and Gila topminnow have been introduced and the Chiricahua leopard frog is proposed for introduction here. The habitat has a bullfrog proof fence that protects these species. Leopard frogs could persist indefinitely in open, protected habitat such as this.

As discussed for fish above, habitat for amphibians is abundant in some river reaches as perennial flow, which is especially important for native leopard frogs. Fishes in the SPRNCA require more water and better water quality to reproduce and survive, but base flow conditions that support fish will also support amphibians. Even with an abundance of physical habitat, native amphibians are subject to a heavy predator load by invasive fishes, bullfrogs and crayfish. This has led to the demise of native leopard frogs and other riparian-aquatic species.

Table 2.3-17. AZGFD's Amphibian SGCN with Historic or Current Habitat in the SPRNCA

Species	SGCN Tier	Current/Historic
Sonoran desert toad	B	C
Chiricahua leopard frog	A	H
lowland leopard frog	A	C

Current – Species currently occurs in the SPRNCA.
Historic-Species has historically occurred in the SPRNCA or watershed but is not present now.
Species in Tier A and B are in most immediate need of conservation. Tier A are federally listed species, candidate species, species with a signed conservation agreement, a species that require monitoring following delisting, or a closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories. Tier C species have insufficient information is available to fully assess their status, but the species needs to be watched.

Reptiles

The Sonora mud turtle (*Kinosternon sonoriense*) occurs throughout the SPRNCA in the permanent water reaches of the San Pedro and Babocomari Rivers, in intermittent reaches of the San Pedro River where pools remain before monsoon season, and in isolated springs (e.g., Little Joe). Several exotic turtle species have been more recently introduced in the SPRNCA, including painted, red-eared, spiny softshell, and false map turtles. It is unknown how competition with non-native species may affect Sonora mud turtles.

Black-necked gartersnake (*Thamnophis cyrtopsis*) are usually found near water, but may be found far from water (Brennan and Holycross 2006). This gartersnake was the second most common snake in the 1970s, and was last observed in 2008 (T. Miscione pers. comm.). The northern Mexican gartersnake (*Thamnophis eques megalops*) is a federally listed threatened species, last documented in the SPRNCA in 2007 (T. Miscione, pers. comm.), and critical habitat is proposed in the SPRNCA for this species (Table 2.3-18). Even with an abundance of suitable physical habitat, native aquatic reptiles (e.g., northern Mexican gartersnake, black-necked gartersnake, checkered gartersnake (*Thamnophis marcianus*), and Sonora mud turtle) are subject to a heavy predator load by invasive fishes, bullfrogs, and crayfish. This has led to the demise of reptiles (e.g., checkered gartersnake and northern Mexican gartersnake) throughout Arizona and the conservation area.

Table 2.3-18. AZGFD's Reptile SGCN with Historic or Current Habitat in the SPRNCA

Species	SGCN Tier	Current/Historic
northern Mexican gartersnake	A	C[1]
Sonora mud turtle	B	C
black-necked gartersnake	C	C

Current: *Species currently occurs in the SPRNCA.*
Historic: *Species has historically occurred in the SPRNCA or watershed but is not present now.*
[1] Although the habitat is present, it is currently unsuitable due to the presence of invasive, non-native species that prey on amphibians.
*Other fishes have occurred in San Pedro main-stem in the past. Occurrences of brook trout, rainbow trout recorded in the 1960s and 70s were attempts to establish these species that failed (transient occurrences).
*A single flathead catfish was recorded at the Charleston Bridge in 1997 (BLM files). Threadfin shad and red shiner have been recorded from the lower San Pedro River only.
*Goldfish are a common aquarium fish that are occasionally released into the wild but generally do not persist in the SPRNCA or other locations in free flowing rivers (transient).
Species in Tier A and B are in most immediate need of conservation. Tier A are federally listed species, candidate species, species with a signed conservation agreement, a species that require monitoring following delisting, or a closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories. Tier C species have insufficient information is available to fully assess their status, but the species needs to be watched.

Trends and Forecasts

Key trends and forecasts for aquatic species include the following:

- Continued impacts from ground water extraction on aquatic habitat suitability (depth, velocity, and temperature) for the native fish community and fish survival. Key fishes include spikedace (*Meda fulgida*) and loach minnow (*Rhinichthys cobitis*), both native to the San Pedro River but now only found in tributaries off the SPRNCA. Others include the desert sucker (*Catostomus clarkia*) and longfin dace (*Agosia chrysogaster chrysogaster*) and sportfish community. Fish kills may become more frequent and widespread; and
- Impacts from introduced aquatic species (e.g., sunfish, bullfrog and crayfish) to native amphibians and reptiles and subsequently as food sources for other wildlife; and
- Modeling indicates impacts to groundwater and subsequent baseflow in the Upper San Pedro River that are outside of BLM purview. Even so, baseflow in the San Pedro River may continue to decline after groundwater withdrawals are modified (USGS 2013). If flows can be returned to those present at the time of SPRNCA designation, then fish habitat will improve greatly in some reaches. Conversely, should flows decrease, suitable habitat will decrease and some will become completely unsuitable, resulting from a lack of any base flow. Longfin dace will likely persist under most any flow conditions.

2.3.9 Migratory Birds

Indicators

Depending on species, indicators for migratory birds and their habitat may be as diverse as the species themselves. An ecological component may be essential for one species, but not important for another species. However, general indicators for health of individual species may include

demographic information such as population numbers, density, distribution, age structure, recruitment into the population, and condition of individuals that make up populations. The population's distribution relative to its historic range may be considered. In addition, the presence, distribution, and density of introduced invasive species may be considered as indicators for future trends or successful reintroduction or augmentation of native species. Other indicators may include the presence and density of prey species or other necessary components related to a specific ecological role.

Indicators for migratory birds include such parameters as climate, temperature, humidity, precipitation, length of day, altitude, slope, fire regime, vegetation height, vegetation composition and structure, ground cover, patch size, human disturbance, competition with conspecifics or other species, and presence of food sources such as invertebrates, seeds, fruits, and mast. In the SPRNCA, priority habitats for focal species are discussed in the Priority Habitat section and include some of the above listed indicators. Indicators vary among species, as each species is adapted to its particular habitat.

Current Conditions

The San Pedro River is one of the last perennially flowing waterways in the Southwest and, along with its cottonwood gallery forest, appears as a ribbon of green amidst the arid Chihuahuan Desert. The highest avian species richness and density on the SPRNCA occurs in this riparian habitat type (BLM 1988b). The SPRNCA is home to approximately 100 species of breeding birds, and provides invaluable habitat for about an additional 250 species of migrant and wintering birds (Appendix C), largely because of permanent water sources in the river and because of the various niches and food sources provided by the diversity of habitat within the SPRNCA.

Vegetation along the river is composed of primarily Fremont cottonwood, Goodding willow, and an understory of seep willow. Extending away from the river are mesquite bosques interspersed with sacaton grasslands, Chihuahuan desert scrub, and one of few remaining marshlands at the St. David Cienega.

Honored as a GIBA by the American Bird Conservancy, the SPRNCA provides essential habitat for many species of breeding and nonbreeding birds, contains vulnerable, threatened or endangered species, endemic species, species representative of the biome, and concentrations of raptors and migratory landbirds. The San Pedro River is one of only four major north-south migratory bird corridors of the southwestern United States, along with the Rio Grande, Santa Cruz, and Colorado Rivers. The GIBA designation was bestowed in order to recognize the river's importance to millions of migrating neotropical birds, as well as many rare breeding birds such as Bell's vireo, and illustrates the vital link the river provides for migratory birds between their breeding grounds in Canada and Alaska, and their wintering habitat in Central and South America. In addition, the SPRNCA contains some of the densest remaining breeding populations of the western race of the yellow-billed cuckoo, a subspecies declining throughout most of its range and a federally listed threatened species with proposed critical habitat in the SPRNCA under the Endangered Species Act (ESA). Since 1999, the BLM has participated in the Monitoring Avian Productivity and Survivorship program.

Birds of Conservation Concern

Species of concern "refers to those species listed in the periodic report, *Birds of Conservation Concern;* priority migratory bird species documented in the comprehensive bird conservation plans (North American Waterbird Conservation Plan, US Shorebird Conservation Plan, Partners in Flight Bird Conservation Plans); species or populations of waterfowl identified as high, or moderately high, continental priority in the North American Waterfowl Management Plan (NAWMP); listed threatened and endangered bird species in 50 CFR 17.11; and game birds below desired condition as identified by the Service's Division of Migratory Bird Management."[1]

The SPRNCA planning area contains land within middle elevations of the Madrean Basin and Range province, in the Sierra Madre Occidental Bird Conservation Region (BCR) 34 (USFWS 2008). Table 2.3-19 lists those migratory Birds of Conservation Concern from BCR 34.

Table 2.3-19. Birds of Conservation Concern from Region 34

Species	Status	Potential to Occur
bald eagle (*Haliaeetus leucocephalus*)	(b)	Casual
common black-hawk (*Buteogallus anthracinus*)		Rare
peregrine falcon (*Falco peregrinus*)	(b)	Rare
yellow-billed cuckoo	(W.US DPS) (c)	Common
flammulated owl (*Psiloscops flammeolus*)		Transient
elf owl (Micrathene whitneyi)		Uncommon
blue-throated hummingbird (*Lampornus clemenciae*)		Casual
elegant trogon		Transient
Lewis's woodpecker (*Melanerpes lewis*)		Casual
Arizona woodpecker (*Picoides arizonae*)		Casual
northern beardless-tyrannulet (*Camptostoma imberbe*)		Common
buff-breasted flycatcher (*Empidonax fulvirfons*)		Transient
rose-throated becard (*Pachyramphus aglaiae*)		Transient
Bell's vireo (*Vireo bellii*)		Common
gray vireo (*Vireo vicinior*)		Transient
pinyon jay (*Gymnorhunys cyanocephalus*)		Irregular
Bendire's thrasher (*Toxostoma bendirei*)		Rare
Sprague's pipit (*Anthus spragueii*)	(a)(nb)	Rare
Phainopepla (*Phainopepla nitens*)		Uncommon
Lucy's warbler (*Oreothlypis luciae*)		Common
yellow warbler (*Setophaga petechial*)		Common
black-throated gray warbler (*Setophaga graciae*)		Transient
Grace's warbler (*Setophaga graciae*)		Transient
red-faced warbler (*Cardellina rubrifrons*)		Transient
canyon towhee (*Melozone fusca*)		Common
rufous-winged sparrow (*Peucaea carpalis*)		Casual
Botteri's sparrow (*Peucaea botterii*)		Common
five-striped sparrow (*Amphispiza quinquestriata*)		Not observed
black-chinned sparrow (*Spizella atrogularis*)		Rare

[1] Per the 2010 MOU (BLM-MOU-230-2010-04) between the BLM and FWS, the BLM shall, at the project level, evaluate the effects of the BLM's actions on migratory birds during the NEPA process, focusing first on species of concern, priority habitats, and key risk factors (Section VII.F).

Species	Status	Potential to Occur
lark bunting (*Calamospiza melanocorys*)	(nb)	Uncommon
grasshopper sparrow (*Ammodramus savannarum*)		Rare
Baird's sparrow (*Ammodramus bairdii*)	(nb)	Rare
chestnut-collared longspur (*Calcarius ornatus*)	(nb)	Rare
varied bunting (*Passerina versicolor*)		Common

(a) ESA candidate and discussed under special status species
(b) ESA delisted and discussed under special status species
(c) Threatened or Endangered species and discussed under special status species, (nb) nonbreeding in this BCR.

(Potential to Occur) Irregular – erratic pattern of occurrence; transient – migrant with few records; casual – few records or not of annual occurrence; rare – annually present but very local or in small numbers; uncommon – occurs annually in small numbers or locally; common – normally seen on an annual basis in appropriate habitat.

North American Waterfowl Management Plan

The NAWMP identifies Waterfowl Conservation Regions (WCRs); the SPRNCA is within WCR 34 (NAWMP 2004). None of the waterfowl in WCR 34 are identified as having breeding importance or need. However, mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), canvasback (*Aythya valisineria*), bufflehead (*Bucephala albeola*), gadwall (*Anas strepera*), green-winged teal (*Anas carolinensis*), and northern shoveler (*Anas clypeata*) are identified as having nonbreeding (wintering) importance and need in the SPRNCA. Continental prioritization of ducks is based on two factors—continental population trend and combined continental harvest data (NAWMP 2004). For example, species with decreasing population trend and high harvest are rated a high continental priority. Scores for threats to breeding and nonbreeding waterfowl habitat within WCRs are developed using the criteria in Table 2.3-20.

Table 2.3-20. NAWMP Threat Scores to Waterfowl Habitat (Breeding and Nonbreeding)

Score	Threat
Very Low	Expected future conditions better than historical conditions.
Low	Expected future conditions similar to historical conditions – no known threats.
Moderate	Slight to moderate decline in future habitat abundance or quality, but current conditions similar to historical conditions; or, future conditions expected to be stable but significant habitat losses have already occurred.
Moderately High	Severe past or expected future deterioration or decline in habitat quality or availability.
High	Extreme past or expected future deterioration or decline in habitat quality or availability.

Source: NAWMP 2004.

Each species' continental priority, nonbreeding importance, and nonbreeding need is given in Table 2.3-21. Of the species within the SPRNCA, mallard and northern pintail have the highest continental priority and nonbreeding habitat need.

Table 2.3-21. NAWMP with Continental Priority, Nonbreeding Importance, and Nonbreeding Need

Species	Continental Priority	Nonbreeding Importance	Nonbreeding Need
Mallard	High	Mod Low	Moderate
Northern pintail	High	Mod Low	Moderate

Species	Continental Priority	Nonbreeding Importance	Nonbreeding Need
Canvasback	Mod High	Mod Low	Mod Low
Bufflehead	Moderate	Mod Low	Mod Low
Gadwall	Moderate	Mod Low	Mod Low
Green-winged teal	Moderate	Mod Low	Mod Low
Northern shoveler	Moderate	Mod Low	Mod Low

Source: NAWMP 2004.

North American Waterbird Conservation Plan

The North American Waterbird Conservation Plan (NAWCP) (Kushlan et al. 2002) established conservation status and distribution of colonial and solitary-nesting waterbirds, based on population trends, conservation issues, and threats. BCRs are used, and the SPRNCA is within BCR 34. Table 2.3-22 depicts the definition of each category of conservation concern.

Some colonial nesting species listed in the NAWCP have been documented within the SPRNCA, although most occur accidentally (Krueper 1999, Table 2.3-23 below). Few species have appropriate nesting habitat. Nesting species may include black-crowned night heron (*Nycticorax nycticorax*) and great-blue heron (*Ardea herodias*) (Krueper 1999). There have been at least three great blue heron rookeries in the SPRNCA in the past (between Highway 90 and Hereford Road, north of Contention, and south of Charleston). The rookery north of Contention is no longer active (probably due to drying of the river and lack of fish as a food source), although there are remaining nests in two cottonwood trees. Currently, only one rookery is active on an annual basis south of Charleston Road (Arizona Bird Conservation Initiative Colonial Bird Survey, Radke pers. obs.).

Table 2.3-22. NAWCP 2004: Categories and Definitions for Colonial and Solitary-Nesting Waterbirds

Category	Definition
Highly Imperiled	Species with significant population declines and either low populations or some other high risk factor.
High Concern	Species that are not Highly Imperiled. Populations known or thought to be declining and have some other known or potential threat as well.
Moderate Concern	Species that are not Highly Imperiled or High Concern. Populations are either a) declining with moderate threats or distributions; b) stable with known or potential threats and moderate to restricted distributions; or c) relatively small with relatively restricted distributions.
Low Concern	Species that are not Highly Imperiled, High Concern or Moderate Concern. Populations are either a) stable with moderate threats and distributions; b) increasing but with known or potential threats and moderate to restricted distributions; or c) of moderate size with known or potential threats and moderate to restricted distributions.
Not Currently at Risk	All other species for which information was available.
Information Lacking	Inadequate information available to assess risk.

Source: NAWCP 2004.

Table 2.3-23. NAWCP 2004: Category for Colonial Nesting Species Documented within the SPRNCA

Species	Category
magnificent frigatebird (*Fregata magnificens*), little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), wood stork (*Mycteria americana*), least tern (*Sternula antillarum*)	High Concern
Western grebe (*Aechmophorus occidentalis*), eared grebe (*Podiceps nigricollis*), brown pelican (*Pelecanus occidentalis*), neotropic cormorant (*Phalacrocorax brasilianus*), great cormorant (*Phalacrocorax carbo*), black-crowned night heron, California gull (*Larus californicus*), Bonaparte's gull (*Chroicocephalus philadelphia*), black tern (*Chlidonias niger*), Forster's tern (*Sterna forsteri*)	Moderate Concern
Clark's grebe (*Aechmophorus clarkii*), green heron (*Butorides virescens*), white-faced ibis (*Plegadis chihi*), common tern (*Sterna hirundo*), herring gull (*Larus argentatus*)	Low Concern
Double-crested cormorant (Phalacrocorax auritus), great blue heron, cattle egret (*Bubulcus ibis*), great egret (*Ardea alba*), ring-billed gull (*Larus delawarensis*)	Not Currently at Risk

Source: NAWCP 2004.

The following solitary-nesting species listed in the NAWCP have been documented within the SPRNCA, although not in high numbers (Krueper 1999) (Table 2.3-24). Pacific loon, common loon, least grebe, least bittern, purple gallinule, and sandhill crane are of casual or accidental occurrence. Species of rare or uncommon occurrence include pied-billed grebe, American bittern, sora, and common moorhen. American coot are more common in appropriate open water habitats in the SPRNCA during winter. Nesting species may include pied-billed grebe, common moorhen, and Virginia rail (Krueper 1999). Virginia rail are common breeding birds in appropriate marsh habitat at St. David Cienega and Dunlavy Wetlands (Radke pers. obs.).

Table 2.3-24. NAWCP (2004) Category of Concern for Solitary-Nesting Species Documented Within the SPRNCA

Species	Category
least grebe (*Tachybaptus dominicus*), pied-billed grebe (*Podilymbus podiceps*), least bittern (*Ixobrychus exilis*), American bittern (*Botaurus lentiginosus*), sora (*Porzana carolina*), purple gallinule (*Porphyrio martinicus*)	High Concern
Pacific loon (*Gavia pacifica*), common loon (*Gavia immer*), common moorhen (*Gallinula chloropus*), Virginia rail (*Rallus limicola*)	Moderate Concern
American coot (*Fulica americana*), sandhill crane (*Grus canadensis*)	Low Concern

Source: NAWCP 2004.

Game Birds Below Desired Condition

The following species represent game birds that have been documented in the SPRNCA (Krueper 1999), whose populations are below long-term averages or management goals, or for which there is evidence of declining population trends (USFWS 2008): mourning dove (*Zenaida macroura*), canvasback, ring-necked duck (*Aythya collaris*), redhead (*Aythya americana*), greater and lesser scaup (*Aythya marila*, *Aythya affinis*), America widgeon (*Anas americana*), wood duck (*Aix sponsa*), northern pintail, mallard, and greater white-fronted goose (*Anser albifrons*). Only the mourning dove and mallard are known to nest in the SPRNCA; all other

species occur during winter and are nonbreeding. Mallards, which breed along the San Pedro River, are Mexican ducks (*Anas diazi*), and hybridization between the two forms has been noted. However, Mexican ducks are more closely related to mottled ducks than mallard (Webster 2006). Breeding Mexican ducks have greatly increased in numbers with the recovery of riparian habitat within the SPRNCA (Krueper 1999), and pairs are commonly observed on the river during breeding season.

US Shorebird Conservation Plan

The US Shorebird Conservation Plan provides a scientific framework to determine species, sites, and habitats that most urgently need conservation action. Main goals of the plan are to ensure that adequate quantity and quality of shorebird habitat is maintained at the local level and to maintain or restore shorebird populations at the continental and hemispheric levels. The SPRNCA is within the Chihuahuan Desert shorebird BCR, which hosts modest numbers of transient shorebirds of numerous species and small numbers of overwintering and breeding shorebirds of several species. Shorebird habitat in this region is largely riparian, ephemeral or man-made (Mellink et al. 1997).

The five highest ranked species, include birds of four types (Oring et al. 2013): (1) species ranked of top conservation concern by the US Shorebird Conservation Plan, where a high proportion of the North American population breeds in the Intermountain West (IMW) region (snowy plover [Charadrius nivosus], long-billed curlew [Numenius americanus]); (2) common species where the IMW region is the primary breeding area (American avocet [Recurvirostra americana], black-necked stilt [Himantopus mexicanus]); (3) common species where a high proportion of the total population is transient in IMW (Wilson's phalarope [Phalaropus tricolor], long-billed dowitcher [Limnodromus scolopaceus]); and (4) species ranked of top concern by the US Shorebird Conservation Plan because IMW includes a large proportion of the population in winter (Table 2.3-25). There are four additional transient species ranked, i.e., very important in the IMW, including marbled godwit (Limosa fedoa), western sandpiper (Calidris mauri), least sandpiper (Calidris minutilla), and red-necked phalarope (Phalaropus lobatus)

Table 2.3-25. IMW Conservation Values for the Chihuahuan Desert Bird Conservation Region, Life Cycle Stage Importance, and IMW Overall Importance Score for Species Documented in the SPRNCA

Species	Chihuahuan Desert	Life Cycle Stage	IMW Overall Score
black-bellied plover (*Pluvialis squatarola*)	1	MW	4
snowy plover	2	MW**B**	5
semipalmated plover (*Charadrius semipalmatus*)	1	MW	3
Killdeer (*Charadrius vociferus*)	1	MWB	3
black-necked stilt	2	MW**B**	5
American avocet	2	MW**B**	5
greater yellowlegs (*Tringa melanoleuca*)	1	MW	3
lesser yellowlegs (*Tringa flavipes*)	2	mw	2
solitary sandpiper (*Tringa solitaria*)	1	m	3
willet (*Tringa semipalmata*)	1	MWB	4
spotted sandpiper (*Actitis macularius*)	2	MW**B**	3
long-billed curlew	2	MW**B**	5
whimbrel (*Numenius phaeopus*)	1	m	1
marbled godwit	1	MWb	4

Species	Chihuahuan Desert	Life Cycle Stage	IMW Overall Score
ruddy turnstone (*Arenaria interpres*)	1	m	1
sanderling (*Calidris alba*)	1	m	1
semipalmated sandpiper (*Calidris pusilla*)	1	m	1
western sandpiper	1	**M**W	4
least sandpiper	2	**M**W	4
Baird's sandpiper (*Calidris bairdii*)	1	m	1
pectoral sandpiper (*Calidris melanotos*)	1	m	1
dunlin (*Calidris alpina*)	1	MW	2
stilt sandpiper (*Calidris himantopus*)	2	m	1
short-billed dowitcher (*Limnodromus griseus*)	1	m	1
long-billed dowitcher (*Limnodromus scolopaceus*)	2	**M**W	5
common snipe (*Gallinago gallinago*)	1	MWB	3
Wilson's phalarope	2	**M**B	5
red-necked phalarope	1	**M**	4
red phalarope (*Phalaropus fulicarius*)	1	m	1

M=migrant, important; W=wintering, important; B=breeding, important;
Bolding=very important; lower case letters= minor importance
5=critically important; 4=very important; 3=important; 2=slightly important; 1=unimportant

Conservation values by shorebird species in the Chihuahuan Desert BCR are rated as 1 and 2, unimportant and slightly important respectively. However, for some species (e.g., black-bellied plover, snowy plover, black-necked stilt, America avocet, willet, long-billed curlew, marbled godwit, western and least sandpipers, long-billed dowitcher, Wilson's phalarope, and red-necked phalarope), the overall IMW conservation scores are listed as 4 or 5 (very important to critically important). Migration habitat is important in the Chihuahuan Desert BCR for black-bellied plover, snowy plover, semipalmated plover, killdeer, black-necked stilt, American avocet, greater yellowlegs, willet, spotted sandpiper, long-billed curlew, marbled godwit, dunlin, and common snipe. Migration habitat is very important for western and least sandpipers, long-billed dowitcher, Wilson's phalarope, and red-necked phalarope. Wintering habitat is important for black-bellied plover, snowy plover, semipalmated plover, killdeer, black-necked stilt, American avocet, greater yellowlegs, willet, spotted sandpiper, long-billed curlew, marbled godwit, dunlin, western and least sandpipers, and long-billed dowitcher. Possible breeding species within the SPRNCA include historic accounts, include killdeer, black-necked stilt, and common snipe, with these species' breeding habitat listed as important or very important.

Sonoran Joint Venture

A comprehensive national species assessment for landbirds and ducks has been conducted for the US region of the Sonoran Joint Venture (SJV), which includes the SPRNCA. The process identified several landbird species that have declining population trends and/or high threats including Bendire's thrasher, Brewer's sparrow (*Spizella breweri*), Bell's vireo, black-throated sparrow (*Amphispiza bilineata*), verdin (*Auriparus flaviceps*), curve-billed thrasher (*Toxostoma curvirostre*), white-throated swift (*Aeronautes saxatalis*), and Baird's sparrow. The SJV also has stewardship responsibility to maintain another group of birds which have their centers of abundance in or are characteristic species of the SJV's habitats, such as phainopepla (*Phainopepla nitens*), Lucy's warbler (*Oreothlypis luciae*), and elf owl.

Arizona Partners in Flight

In 1990, the National Fish and Wildlife Foundation brought together federal, state, and local government agencies, foundations, conservation groups, industry and the academic community to form a program to address continental and local declines in many bird populations. Partners in

Flight was conceived as a voluntary, international coalition dedicated to "keeping common birds common" and "reversing the downward trends of declining species" (Latta et al. 1999). Arizona Partners in Flight (APIF) developed a conservation plan as part of the National Partners in Flight effort. This plan identifies priority species and habitats, and establishes objectives for bird populations and habitats in Arizona (Latta et al. 1999). The plan focuses on microhabitat requirements of priority species, but also identifies landscape scale requirements. Conservation actions are recommended and partnerships are identified to accomplish the objectives.

Priority species from APIF, which are found in the SPRNCA include common black-hawk, aplomado falcon (*Falco femoralis*), yellow-billed cuckoo, southwestern willow flycatcher, Lucy's warbler, Botteri's sparrow, Cassin's sparrow (*Peucaea cassinii*), Baird's sparrow, and grasshopper sparrow.

National Audubon Society

The Important Bird and Biodiversity Area (IBA) is a global program founded by Bird Life International. The IBA partner for the US is the National Audubon Society, which established and oversees all of the state-level IBA Programs. The Arizona IBA Program is co-administered by Audubon Arizona and the Tucson Audubon Society.

The SPRNCA was first identified in 1995 as an IBA, and in 2013 as a GIBA. The IBA criteria are divided into four categories based on vulnerability and/or responsibility. By definition, IBAs are sites that support species of conservation concern (e.g., threatened and endangered species), range-restricted species (species vulnerable because they are not widely distributed), species that are vulnerable because their populations are concentrated in one general habitat type or biome, or species, or groups of similar species (such as waterfowl or shorebirds), that are vulnerable because they occur at high densities due to their congregatory behavior.

The criteria used for global recognition included the Bell's vireo as a species of global conservation concern. Species with state criteria include gray hawk (*Buteo plagiatus*), Mississippi kite (*Ictinia mississippiensis*), yellow-billed cuckoo, Cassin's sparrow, Botteri's sparrow, and as a migration bottleneck for spring warblers, Wilson's and yellow warbler (*Cardellina pusilla* and *Setophaga petechial*), and olive-sided flycatcher (*Contopus cooperi*). Also using the San Pedro River migration corridor are osprey (*Pandion haliaetus*), common black-hawk, gray flycatcher (*Empidonax wrightii*), and MacGillivray's warbler (*Geothlypis tolmiei*). Nesting species of conservation status include green kingfisher (*Chloroceryle Americana*), Abert's towhee (*Pipilo aberti*), elf owl, gilded flicker (*Colaptes auratus*), northern beardless-tyrannulet (*Camptostoma imberbe*), tropical kingbird (*Tyrannus melancholicus*), crissal thrasher (*Toxostoma crissale*), and varied bunting. Belted kingfisher (*Megaceryle alcyon*) and red-naped sapsucker (*Sphyrapicus nuchalis*), both species of conservation status, regularly over-winter along the river. Historically, both the aplomado falcon and the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum)* nested in the river valley. Mississippi kite nest just north of the SPRNCA.

American Bird Conservancy

The United States Watch List is a joint project between the American Bird Conservancy and the National Audubon Society, and reflects a comprehensive analysis of all the bird species in the United States. The Watch List reveals those species in greatest need of immediate conservation

attention to survive environmental challenges, including habitat loss, invasive species, and global warming. Inclusion criteria for the Watch List includes vulnerability based on range size, population size, and population trend.

Species on the Watch List which occur in the SPRNCA on more than an accidental or irregular basis include gilded flicker, Bendire's thrasher, black-chinned sparrow (*Spizella atrogularis*), Baird's sparrow, scaled quail (*Callipepla squamata*), Swainson's hawk (*Buteo swainsoni*), long-billed curlew, western sandpiper, elf owl, Costa's hummingbird (*Calypte costae*), calliope hummingbird (*Selasphorus calliope*), olive-sided flycatcher, willow flycatcher, thick-billed kingbird (*Tyrannus crassirostris*), gray vireo, Sprague's pipit, Virginia's warbler (*Leiothlypis virginiae*), Lucy's warbler, hermit warbler (*Setophaga occidentalis*), Abert's towhee, Brewer's sparrow, sage sparrow (*Artemisiospiza nevadensis*), lark bunting, chestnut-collared longspur (*Calcarius ornatus*), varied bunting, and painted bunting (*Passerina ciris*). More information can be found in Section 2.3.8, Fish and Wildlife.

AZGFD Species of Greatest Conservation Need (SGCN)

The AZGFD's SWAP identifies SGCN, based on vulnerability of populations, of which there are eight criteria (AZGFD 2012a). Species that rated high on the vulnerability category are SGCN and were designated to have the highest priority for directed conservation management. Vulnerable species require conservation actions aimed at improving conditions for those species through intervention at the population or habitat level. Vulnerable species were further separated into three tiers of priorities of 1a, 1b, and 1c, which are listed as A, B, or C in Table 2.3-26. Species in Tier A and B are in most immediate need of conservation.

Table 2.3-26. AZGFD's Bird SGCN

Species	SGCN Tier
Clark's grebe	C
western grebe	C
eared grebe	C
double-crested cormorant	C
American bittern	B
great egret	C
snowy egret	C
cattle egret	C
Canada goose (*Branta canadensis*)	C
black-bellied whistling duck (*Dendrocygna autumnalis*)	C
wood duck	C
northern pintail	C
American wigeon (*Anas americana*)	C
northern shoveler	C
blue-winged teal (*Anas discors*)	C
canvasback	C
common merganser (*Mergus merganser*)	C
bald eagle	A
golden eagle (*Aquila chrysaetos*)	B
osprey	B
Mississippi kite	B
northern goshawk (*Accipiter gentilis*)	B

Species	SGCN Tier
northern harrier (*Circus cyaneus*)	C
northern gray hawk (*Buteo plagiatus*)	B
ferruginous hawk (*Buteo regalis*)	B
common black-hawk	C
Harris's hawk (*Parabuteo unicinctus*)	C
Swainson's hawk	C
northern aplomado falcon	A
American peregrine falcon	A
prairie falcon (*Falco mexicanus*)	C
scaled quail	C
common moorhen	C
Virginia rail	C
sora (Porzana carolina)	C
Gould's turkey	B
American avocet	C
western yellow-billed cuckoo	A
western burrowing owl (*Athene cunicularia*)	B
elf owl	C
western screech owl (*Megascops kennicottii*)	C
common nighthawk (*Chordeiles minor*)	B
common poorwill (Phalaenoptilus nuttallii)	C
white-throated swift	C
violet-crowned hummingbird (*Amazilia violiceps*)	B
Costa's hummingbird	C
belted kingfisher	B
green kingfisher	C
acorn woodpecker (*Melanerpes formicivorus*)	C
Gila woodpecker (*Melanerpes uropygialis*)	B
Arizona woodpecker	B
red-naped sapsucker	C
gilded flicker	B
greater pewee (*Contopus pertinax*)	C
dusky-capped flycatcher (*Myiarchus tuberculifer*)	B
olive-sided flycatcher	C
southwestern willow flycatcher	A
dusky flycatcher (*Empidonax oberholseri*)	C
gray flycatcher (*Empidonax wrightii*)	C
Cordilleran flycatcher (*Empidonax occidentalis*)	C
vermilion flycatcher (*Pyrocephalus rubinus*)	C
brown-crested flycatcher (*Myiarchus tyrannulus*)	C
thick-billed kingbird	B
tropical kingbird	B
tree swallow (*Tachycineta bicolor*)	C

Species	SGCN Tier
western purple martin (*progne subis arboricola*)	C
desert purple martin (*progne subis hesperia*)	B
bridled titmouse (*Baeolophus wollweberi*)	C
marsh wren (*Cistothorus palustris*)	C
winter wren (*Troglodytes hiemalis*)	C
black-tailed gnatcatcher (*Polioptila melanura*)	C
ruby-crowned kinglet (*Regulus calendula*)	C
Swainson's thrush (*Catharus ustulatus*)	B
sage thrasher (*Oreoscoptes montanus*)	C
Bendire's thrasher	C
Sprague's pipit	A
phainopepla	C
Arizona Bell's vireo	B
gray vireo	C
MacGillivray's warbler	B
orange-crowned warbler (*Vermivora celata*)	C
yellow warbler	B
Lucy's warbler	C
black-throated gray warbler	C
Virginia's warbler	C
yellow-breasted chat (*Icteria virens*)	C
painted redstart (*Myioborus pictus*)	C
summer tanager (*Piranga rubra*)	C
indigo bunting (*Passerina cyanea*)	C
lazuli bunting (*Passerina amoena*)	C
varied bunting	C
green-tailed towhee (*Pipilo chlorurus*)	C
Abert's towhee	B
black-chinned sparrow	C
sage sparrow	C
Brewer's sparrow	C
savannah sparrow (*Passerculus sandwichensis*)	B
Arizona grasshopper sparrow (*Ammodramus savannarum ammolegus*)	B
western grasshopper sparrow (*Ammodramus savannarum*)	B
Arizona Botteri's sparrow	B
Cassin's sparrow	C
Baird's sparrow	C
Lincoln's sparrow (*Melospiza lincolnii*)	B
white-crowned sparrow (*Zonotrichia leucophrys*)	C
chestnut-collared longspur	C
eastern meadowlark (*Sturnella magna*)	C
Bullock's oriole (*Icterus bullockii*)	C
hooded oriole (*Icterus cucullatus*)	C

Species	SGCN Tier
Scott's oriole (*Icterus parisorum*)	C

Species in Tier A and B are in most immediate need of conservation. Tier A are federally listed species, candidate species, species with a signed conservation agreement, a species that require monitoring following delisting, or a closed season species. Tier B species do not match the criteria for A, but are vulnerable in at least one of the eight vulnerability categories. Tier C species have insufficient information is available to fully assess their status, but the species needs to be watched.

Trends

As one of the few major north-south river corridors remaining for migration in the Southwest, increased human activity outside of the SPRNCA creates a state where the habitat within the SPRNCA becomes even more valuable for migrating and nesting birds. However, modeling indicates groundwater depletion in 10-30 years for the SPRNCA within the Sierra Vista subwatershed (USGS 2013).

Intensive inventories for biological resources were initiated in May 1986 for vegetation, amphibian, reptile, avian, and mammals to determine population status and distribution of the plant and animal communities (Krueper 1999). This monitoring continued after the last cattle were removed from the SPRNCA in 1987. From 1986 to 1990, they monitored vegetation density and abundance of birds during the breeding season in riparian, mesquite grassland, and Chihuahuan desert-scrub communities in the SPRNCA. The density of herbaceous vegetation increased four- to six-fold in riparian and mesquite grassland communities from 1986 to 1992. Little change appeared to occur after 1992 in these communities (Krueper et al. 2003).

Little change occurred in herbaceous vegetation in desert scrub, or in the density of shrubs or trees in any of the communities.

Of 61 bird species for which sufficient data was collected, mean detections per kilometer increased for 42 species, 26 significantly, and decreased for 19 species, eight significantly. The number of individuals of all avian species detected on surveys increased each year from 103/kilometer in 1986 to 221 per kilometer in 1991, an average annual increase of 23 percent ($p < 0.001$). The largest increases occurred in riparian species, open cup nesters, neotropical migrants, and insectivores. Species of the Chihuahuan desert-scrub, in which vegetation changed the least, showed the smallest increases. Only a few of the species showed increasing regional trends for the same period, as demonstrated by the North American Breeding Bird Survey; thus, leading to the conclusion that increases on the SPRNCA were likely caused by the change in local conditions, not by regional effects (Kreuper et al. 2003).

In areas where reintroduced beavers colonized in the SPRNCA, there is higher bird abundance and richness of bird groups, such as all breeding birds, insectivorous birds, and riparian specialists, and higher relative abundance of many individual species—including several avian species of conservation concern—even after accounting for environmental factors (Johnson and van Riper 2012).

Trends for migratory bird habitat include a general increase in fragmentation and disturbance caused by human activities both within and outside of the SPRNCA. A small number of unauthorized livestock use areas along the river, and in some sections, unauthorized grazing is slowing recovery of wildlife habitat (BLM 2012a). Since designation, the SPRNCA has had varying levels of impacts to wildlife habitat from border-related activities, including smuggling

and related enforcement (Radke pers. obs.). These impacts are most evident at the southern end of the SPRNCA from the border to Highway 92 (NRST 2013).

Key trends in migratory bird habitat within the SPRNCA include:

- Increases in the overall number of avian species in the years immediately after cattle were removed, as well as increases in the density of herbaceous vegetation in riparian and mesquite communities during the same period (Krueper et al. 2003);
- Habitat created through reintroduction of beaver has improved conditions for all bird species;
- Groundwater depletion caused by pumping and long term drought has resulted in loss of surface water for use by birds during nesting and migration;
- Impacts to all wetland vegetation types and bird nesting and migration habitat (including food sources) due to decreased groundwater levels;
- Impacts to surface water availability in the watershed and impacts to xeric riparian habitat due to water diversion, hardscaping, and retention/detention basins;
- Use of the SPRNCA for border activities, including smuggling and Border Patrol, and recreational activities in the form of increasing numbers of hikers, equestrians, mountain bikers, and unauthorized OHV users, are creating localized disturbance and impacts to habitat;
- Loss and modification of habitats on adjacent private and state land due to development.;
- A small number of unauthorized livestock using areas along the river is expected to continue withsubsequent grazing continuing to slow recovery of wildlife habitat (BLM 2012a);
- Continuing impacts to soils and vegetation from historic uses such as wood harvesting, agriculture, groundwater pumping, diversion of water flow patterns, fire suppression, dredging and straightening of the river, beaver extirpation, mining, construction of railroad grades and townsites, construction of diversion structures in the river, and tributary washes, etc;
- Impacts to migratory bird habitat and food sources from invasive species such as Johnson grass, Bermuda grass, and Lehmann lovegrass;
- Impacts from introduced aquatic species (e.g., bullfrog and crayfish) to native amphibians and reptiles as food sources for some raptors; and

Forecast

Management of a quantity of water sufficient to fulfill the purposes of the SPRNCA, cooperation with outside entities, successful livestock management, and invasive species control or eradicationare all necessary to ensure that the above trends in impacts to migratory bird habitat do not continue. Drought may be managed for with healthy, resilient populations and management towards exceptional habitat and adequate surface water. However, trends and modeling in groundwater and effects to baseflow in the San Pedro River indicate impacts that are outside of BLM purview. Even so, baseflow in the San Pedro River may continue to decline after groundwater withdrawals are modified (USGS 2013).

2.3.10 Special Status Species

The BLM is mandated by the ESA and BLM policy (BLM Manual 6840) to ensure that special status species are protected. Section 7(a)(1) of the ESA "directs Federal agencies…to further the purposes of the Act by carrying out conservation programs for listed species." Under the ESA, conservation is defined as "...to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures of pursuant to this Act are no longer necessary." This mandate also dovetails with the enabling legislation for the SPRNCA, which directs the BLM to "conserve, protect and enhance" resources including aquatic habitat, fish and wildlife. Public lands in the area are also subject to the Section 7(a)(2) and 7(a)(4) of the ESA because management alternatives may have effects to proposed and designated critical habitat.

Special status species are defined as "(1) species listed or proposed for listing under the ESA, and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as Bureau sensitive by the State Director(s). All federal candidate species, proposed species, and delisted species in the five years following delisting will be conserved as Bureau sensitive species." The following sections will discuss federally listed and proposed species, and BLM sensitive species.

Indicators

Primary indicators for special status wildlife species may include their overall population numbers, number and extent of metapopulations, status within recovery units if federally listed with a recovery plan, population viability such as demographic factors, habitat availability and quality, disease, and threats to habitat. Habitat loss and fragmentation have been and continue to be the primary cause of their special status for most of these species. All of the federally listed species in the SPRNCA depend on perennial, good quality free water sources and/or the riparian habitat created by perennial water. Some of the predatory species, such as jaguar and Mexican wolf, have suffered from historic efforts to extirpate them. Other species, such as Chiricahua leopard frog and Mexican gartersnake, suffer competition or predation from species that have expanded their range or that have been introduced (e.g., bullfrog and crayfish). Therefore, invasive species' location and abundance may be an indicator for some special status species. Although monitoring has been done in the past for Huachuca water umbel, southwestern willow flycatcher, and yellow-billed cuckoo, basic inventory and monitoring data is lacking for most of the special status species in the SPRNCA, and future studies will be needed to determine population numbers and trends.

Current Conditions

Federally Listed Threatened and Endangered Species and Critical Habitat

Federally listed or proposed species were obtained from the USFWS (Federal Register Notice 2015b). Nineteen federally listed (or proposed for listing) threatened or endangered species occur or have potential habitat in the SPRNCA (Table 2.3-27). In addition, designated critical habitat for Huachuca water umbel and proposed critical habitat for yellow billed cuckoo and northern Mexican gartersnake occurs in the SPRNCA. Designated critical habitat for southwestern willow flycatcher occurs on the San Pedro River downstream of the SPRNCA, and designated critical habitat for the jaguar occurs approximately three miles west of the SPRNCA (Figures 2.3-31 to

35). Young, dispersing wolves in North America typically range from 40-96 miles (78 FR 35669), therefore, the possibility exists that wolves from Mexico could travel into the SPRNCA along the San Pedro River where pedestrian fencing is absent, and barbed wire or Normandy-style fencing exists. Thirty-five BLM sensitive species have bee documented in the SPRNCA, and are listed in the BLM Sensitive Species Section (Table 2.3-28).

In addition to those species that have been documented in the SPRNCA, there is another group of biologically imperiled species that have been extirpated. These species are included as species that may be re-established within the SPRNCA or may come in from adjacent areas through natural migration.

Table 2.3-27. Federally Listed Threatened, Endangered, and Proposed Species and Designated and Proposed Critical Habitat

Common Name	Scientific Name	Status	Occurrence and Designated Critical Habitat in SPRNCA
PLANTS			
Huachuca water umbel	*Lilaeopsis schaffneriana ssp. recurva*	Endangered	This species occurs in perennial portions of the San Pedro River along the toe of river banks where it can remain in wet soil throughout the year. In the Babocomari River, the species is present between two sections of the SPRNCA, but has not been observed on BLM lands. It has been transplanted to Murray Spring, Horse Thief Draw, and Frog Spring where establishment of self sustaining populations may occur.
Huachuca water umbel	*Lilaeopsis schaffneriana ssp. recurva*	Critical Habitat	Designated critical habitat for Huachuca water umbel exists in the SPRNCA from approximately 200 meters south of the Hereford Road Bridge, continuing north (downstream) for about 33.7 miles to about one mile north of Summers Well (64 FR 37453; Figure 2.3-31).
Canelo Hills ladies' tresses	*Spiranthes delitescens*	Endangered	This species does not occur in the SPRNCA, but habitat has the potential for species recovery in wetlands and does occur within the SPRNCA watershed.
AMPHIBIANS			
Chiricahua leopard frog	*Lithobates chiricahuensis*	Threatened	This species has been extirpated from the SPRNCA, but habitat has the potential for species recovery in protected open water habitats when excluded from bullfrogs.
FISH			
Desert pupfish	*Cyprinodon macularius*	Endangered	This species has been extirpated from the SPRNCA, but habitat has the potential for species recovery in aquatic habitats protected from invasive, predatory fish. Reintroduced into Murray Spring (Curry Draw), Horse Thief Draw and Little Joe Wetland.
Gila topminnow	*Poeciliopsis occidentalis*	Endangered	This species has been extirpated from the SPRNCA, but habitat has the potential for species recovery in habitats protected from invasive, predatory species. Reintroduced into Murray Spring (Curry Draw), Ben Spring and Horse Thief Draw.
Gila chub	*Gila intermedia*	Endangered	This species has been extirpated from SPRNCA, but habitat has the potential for species recovery in habitats protected from invasive, predatory species.
Colorado pike minnow	*Ptychocheilus lucius*	Endangered	This species has been extirpated from the SPRNCA, but habitat has limited potential for species re-establisment
Razorback sucker	*Xyrauchen texanus*	Endangered	This species has been extirpated from the SPRNCA, but habitat has limited potential for species re-establishment
loach minnow	*Tiaroga cobitis*	Endangered	This species has been extirpated from the SPRNCA. Habitat has potential for species re-establishment.

Common Name	Scientific Name	Status	Occurrence and Designated Critical Habitat in SPRNCA
spikedace	*Meda fulgida*	Endangered	This species has been extirpated from the SPRNCA. Habitat has potential for species re-establishment.
Roundtail chub	*Gila robusta*	Proposed Threatened	This species has been extirpated from the SPRNCA, but habitat may have potential for species re-establishment.
REPTILES			
Northern Mexican gartersnake	*Thamnophis eques megalops*	Threatened	This species has likely been extirpated from the SPRNCA, but habitat has the potential for species re-establishment in protected open water habitats when excluded from bullfrogs. The last known observation in the SPRNCA was in 2007 (T. Miscione pers. comm.). Voucher specimens exist for the Upper San Pedro River (Rosen 2005), but this species may be extirpated due to the presence of the exotic bullfrog.
Northern Mexican gartersnake	*Thamnophis eques megalops*	Proposed Critical Habitat	Critical habitat is proposed for this species on the Babocomari River from the headwaters to the San Pedro River (78 FR 41599; Figure 2.3-23), and the San Pedro River from the International Boundary to the confluence with the Gila River (78 FR 41598; Figure 2.3-23).
BIRDS			
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	The use of the San Pedro River through the SPRNCA is well documented. Willow flycatchers have been documented as nesting and as migrants in the SPRNCA. A pair nested at Lewis Springs in 1977, a singing male was present in 1989 and 1994, and a pair was unsuccessful at nesting in 1997 (Krueper 1999). A nesting pair was unsuccessful near Hereford in 2005 after a storm knocked down trees near the nest (Vernadero 2009). Probable migrants have been observed in 1998, 1999, 2000, 2001, 2002, 2003, and 2004, with 11 southwestern willow flycatchers detected in six of nine survey transects since 2001 (Vernadero 2009). During June 2010, three different birdwatchers documented a southwestern willow flycatchers singing near Kingfisher Pond. During April 2011, a migrant flycatcher was observed near Contention, but a follow-up survey in June did not detect any southwestern willow flycatchers (Radke pers. obs.). AZGDF conducted surveys in 2012, and no southwestern willow flycatchers were detected along the nine survey routes. No southwestern willow flycatchers were detected during surveys in 2012 at the St. David Cienega (Radke pers. obs.).
Southwestern willow flycatcher	*Empidonax traillii extimus*	Critical Habitat	No critical habitat has been designated on the SPRNCA. Critical habitat has been designated for southwestern willow flycatchers (78 FR 343-534), and critical habitat exists downstream of SPRNCA on the San Pedro River from the USGS gauging station north of Benson at The Narrows north to the confluence with the Gila River (78 FR 525; Figure 2.3-33).
Northern aplomado falcon	*Falco femoralis septentrionalis*	Nonessential Experimental Population (AZ)	Aplomado falcons have been observed near or in the SPRNCA; near Fairbank by Willard in 1910, near St. David by Huey in 1939, and the last accepted record for Arizona by Monson at St. David in 1940 (Krueper 1999). Other undocumented reports are from near Hereford by Peabody in 1975, at Greenbrush Draw near Palominas by Balch in 1975, and by Chamberlain near Hereford in 1975 (Krueper 1999). This species has been extirpated from the SPRNCA, but restoration of grassland habitat has the potential for species recovery within the life of this RMP (20-30years).
yellow-billed cuckoo	*Coccyzus americanus*	Threatened	SPRNCA has harbored the largest population in Arizona in the past, and up to five pair could be found per mile of riparian habitat, for an estimated 125 pair utilizing SPRNCA during the nesting season (Krueper 1999). However, survey results show evidence of a long-term downward trend for cuckoos (78 FR 61640). Increasing demands for water use within the basin

Common Name	Scientific Name	Status	Occurrence and Designated Critical Habitat in SPRNCA
			threatens future flow in the upper San Pedro River (FR 78 61654), and subsequently may affect cuckoo nesting habitat.
yellow-billed cuckoo	*Coccyzus americanus*	Proposed Critical Habitat	Critical habitat has been proposed for the yellow-billed cuckoo. The proposed critical habitat within the SPRNCA runs the full length of the NCA and up the Babocomari River to the NCA boundary (Figure 2.3-35). The proposed critical habitat includes not only the stands of the riparian gallery forest along the river, but also the mesquite bosques on the bajadas and flood plains along the San Pedro river. In the SPRNCA, yellow-billed cuckoo occupy large tracts of willow-cottonwood with associated mesquite bosque for their nesting season habitat. Tamarisk may be a component of the habitat, but as the proportion of tamarisk increases, the suitability of the habitat for cuckoo decreases (79 FR 48551). Habitat modeling indicates a 99.3% decrease in cuckoo presence with every 10% increase in tamarisk cover (Johnson et al. 2012).
MAMMALS			
lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	Endangered	This species has been documented in the SPRNCA (Duncan 1989). Habitat is mainly desert scrub in the US portion of this species' range; the species may occur from 1,600-11,500 ft. (USFWS 2007). Roosting occurs in caves, abandoned mines, and unoccupied buildings where the nectar, pollen, and fruit of paniculate agaves and columnar cacti are present within foraging distances as a food source. Roosts are known in the nearby Huachuca Mts., and there has been a steady increase in the numbers of this bat at some of these roosts (USFWS 2007).
jaguar	*Panthera onca*	Endangered	Jaguars have not been documented within SPRNCA, although a jaguar was confirmed in the nearby Whetstone Mountains in 2011 (77 FR 50226), and the same jaguar was photographed in 2012 in the Santa Rita Mts. (USFWS 2012b). Jaguars have been documented since 1980 in Sky Island Mountain ranges from the San Luis Mts. of New Mexico west of the Baboquivari Mts., and from the International Boundary north to approximately Interstate 10. In the southwestern US, jaguar habitat includes thorn scrub, desert scrub, lowland desert, mesquite grassland, oak woodland, and pine-oak woodland (77 FR 50218). BLM land in the planning area may provide habitat for the jaguar, especially for travel between mountain ranges and habitat for prey species.
jaguar	*Panthera onca*	Critical Habitat	Critical habitat for the jaguar was officially designated March 4 2014 (79 FR 12572-12654), and includes the eastern slopes of the Huachuca and Whetstone Mountains within the San Pedro River watershed (Figure 2.3-34). The primary constituent elements essential to the conservation of jaguar consist of expansive open spaces in the southwestern US of at least 38.6 square miles which (1) provide connectivity to Mexico, (2) contain adequate levels of native prey species, (3) include surface water sources available within 12.4 miles of each other, (4) contain from greater than 1-50% canopy cover within Madrean evergreen woodland or semidesert grassland, 5) are characterized by rugged terrain, 6) have minimal to no human population density, no major roads, or no stable nighttime lighting over any 0.4 square mile area, and 7) are below 6,562 ft. in elevation (78 FR 39246).
ocelot	*Leopardus pardalis*	Endangered	Ocelots have not been documented within SPRNCA, although in 2009, an ocelot was documented in Cochise County, Arizona with the use of camera traps. Additionally, in 2010, an ocelot was found dead on a road near Globe, Arizona. In 2011 and 2012, an ocelot was again documented in Cochise County. Another male Ocelot has been documented in the Santa Rita Mountains in April 2014. In addition to the recent Arizona

Common Name	Scientific Name	Status	Occurrence and Designated Critical Habitat in SPRNCA
			sightings, a number of ocelots have been documented just south of the US border in Sonora, Mexico. At least four ocelots have been documented since February 2007 in the Sierra Azul, 30-35 miles southeast of Nogales, and one ocelot was documented in 2009 in the Sierra de Los Ajos, about 30 miles south of the US border near Naco, Mexico. Recent US ocelot locations are near the planning area, especially since one ocelot was known to travel a significant distance (Globe, Arizona). Scattered BLM land in southeastern Arizona may provide dense vegetation for the ocelot, especially for travel between mountain ranges, and may also provide habitat for hunting and concealment.
Mexican wolf	*Canis lupus baileyi*	Endangered Nonessential Experimental Population	Historically, the Mexican wolf was associated with montane woodlands characterized by sparsely to densely forested mountainous terrain consisting of evergreen oaks or pinyon and juniper, to higher elevation pine, mixed-conifer forests, and adjacent grasslands at elevations of 4,000 -5,000 ft. Factors making these vegetation communities attractive to Mexican wolf likely included the abundance of ungulate prey, availability of water, and the presence of hiding cover and suitable den sites. Early investigators reported that Mexican wolf probably avoided desert scrub and semidesert grasslands that provided little cover, food, or water (78 FR 35695). In southern Arizona, this species inhabited the Santa Rita, Tumacacori, Atascosa-Pajarito, Patagonia, Chiricahua, Huachuca, Pinaleno, and Catalina Mountains, west to the Baboquivari Mts. and east into New Mexico (FR 78 35694). After reintroduction efforts, a single wild population of a minimum of 83 Mexican wolves (December 31, 2013 population count) inhabits the United States in central Arizona and New Mexico (80 FR 2491). In Mexico, release of five captive-bred wolves into the San Luis Mountains, approximately six miles southeast of the San Pedro River at the US–Mexico border, occurred in October 2011. As of February 2012, four of the five released animals were confirmed dead due to ingestion of illegal poison. The status of the fifth wolf is unknown. A sixth wolf was released in March 2012; its fate is unknown as only its collar was found in April 2012. In October 2012, a pair of wolves was released and both were alive as of March 3, 2013. Through August 2014, Mexico released a total of 14 adult Mexican wolves, of which 11 died or are believed dead, and one was removed for veterinary care. The remaining two adult Mexican wolves were documented with five pups in 2014, marking the first successful reproductive event in Mexico (80 FR 2491). Young dispersing wolves in North America typically range from 40-96 miles (78 FR 35669), therefore, the possibility exists that wolves from Mexico could travel into the SPRNCA along the San Pedro River where pedestrian fencing is absent, and barbed wire or Normandy-style fencing exists. The Mexican wolf was federally listed as an endangered subspecies on January 16, 2015 (80 FR 2488-2512). Revision to the regulations for the Nonessential Experimental Population of the Mexican wolf was concurrently issued (80 FR 2512-2567). Cochise County is within the Zone 2 Management area, and naturally dispersing wolves will be allowed in this area.

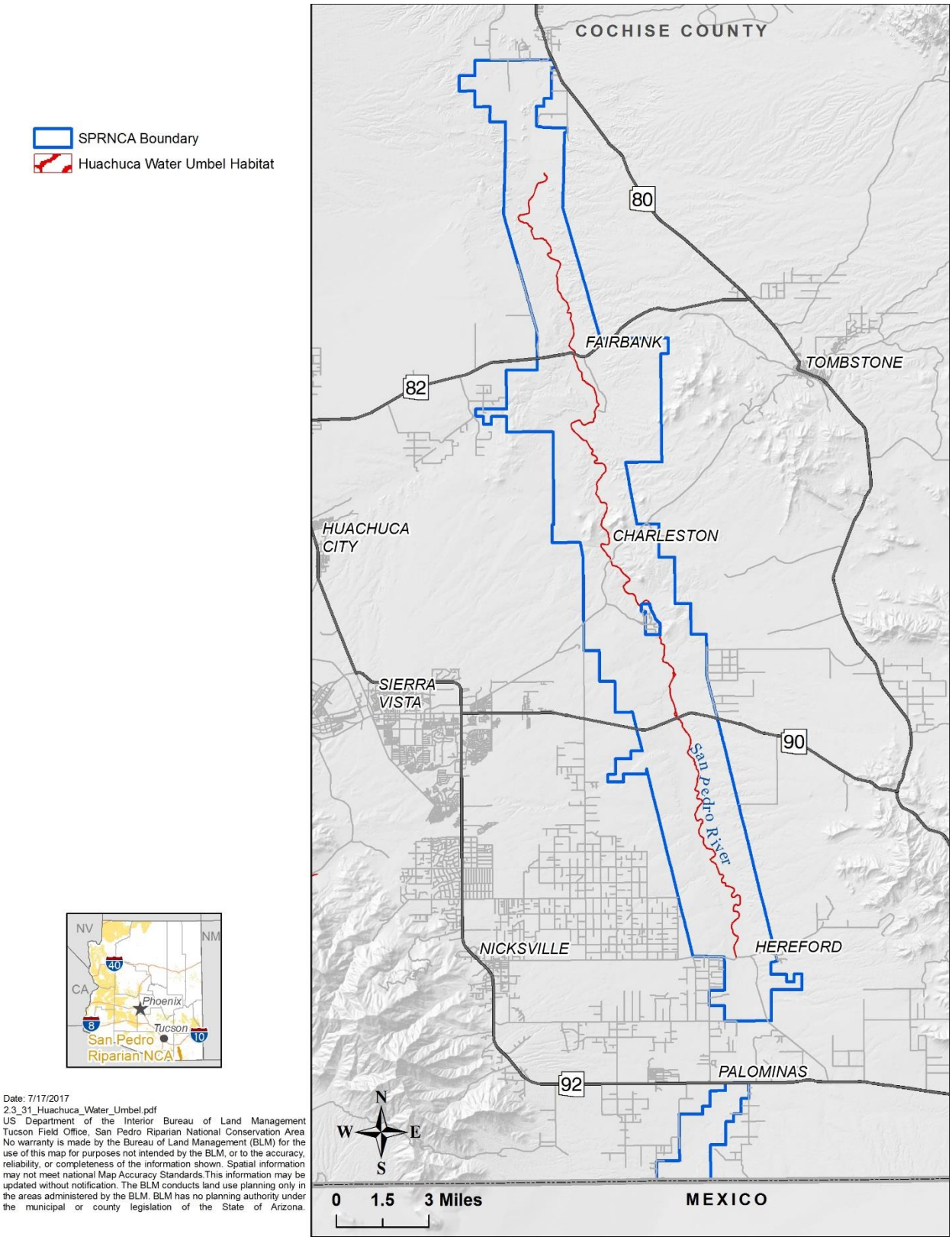


Figure 2.3-6. Designated Critical Habitat Huachuca Water Umbel

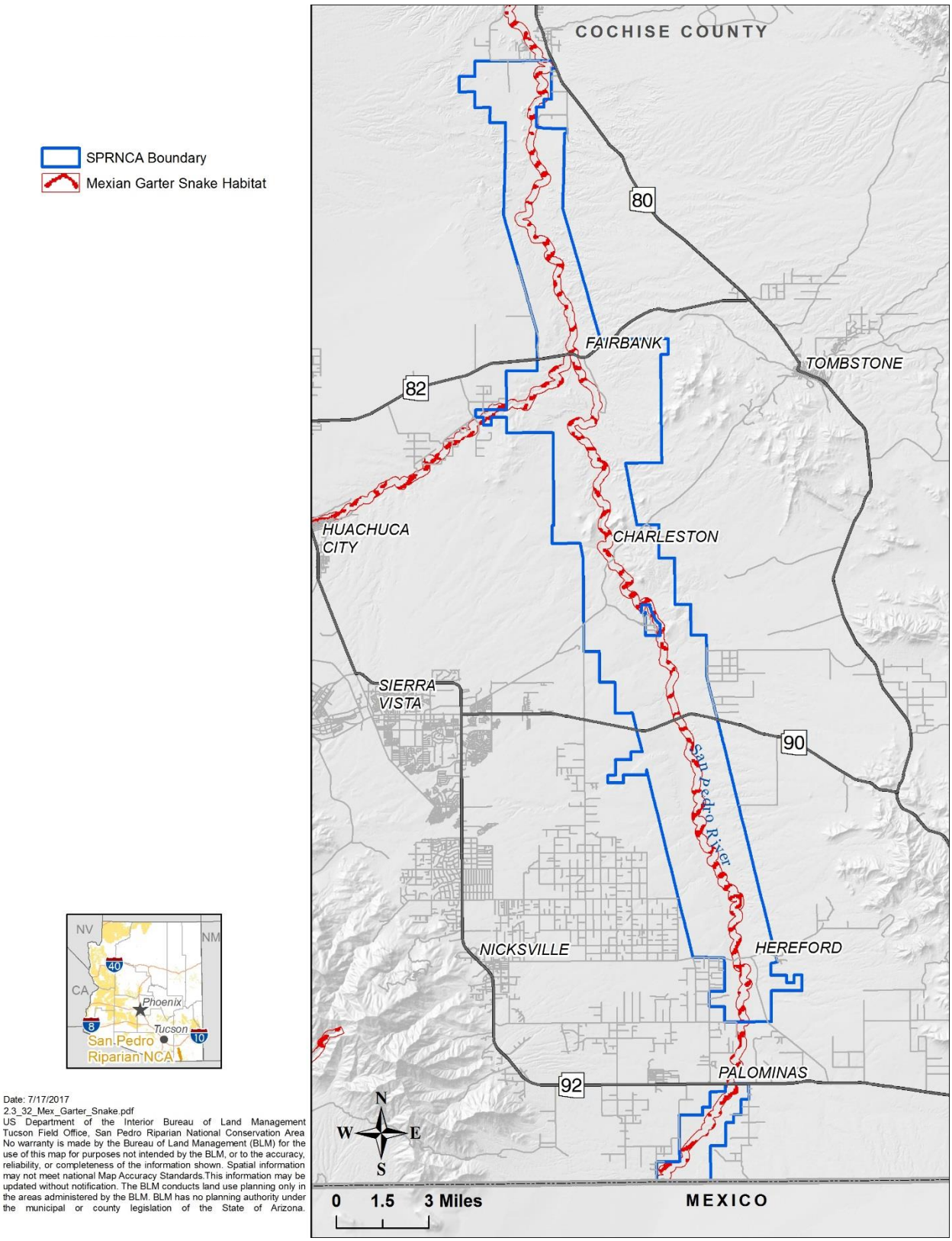


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Figure 2.3-32. Proposed Designated Critical Habitat Northern Mexico Garter Snake

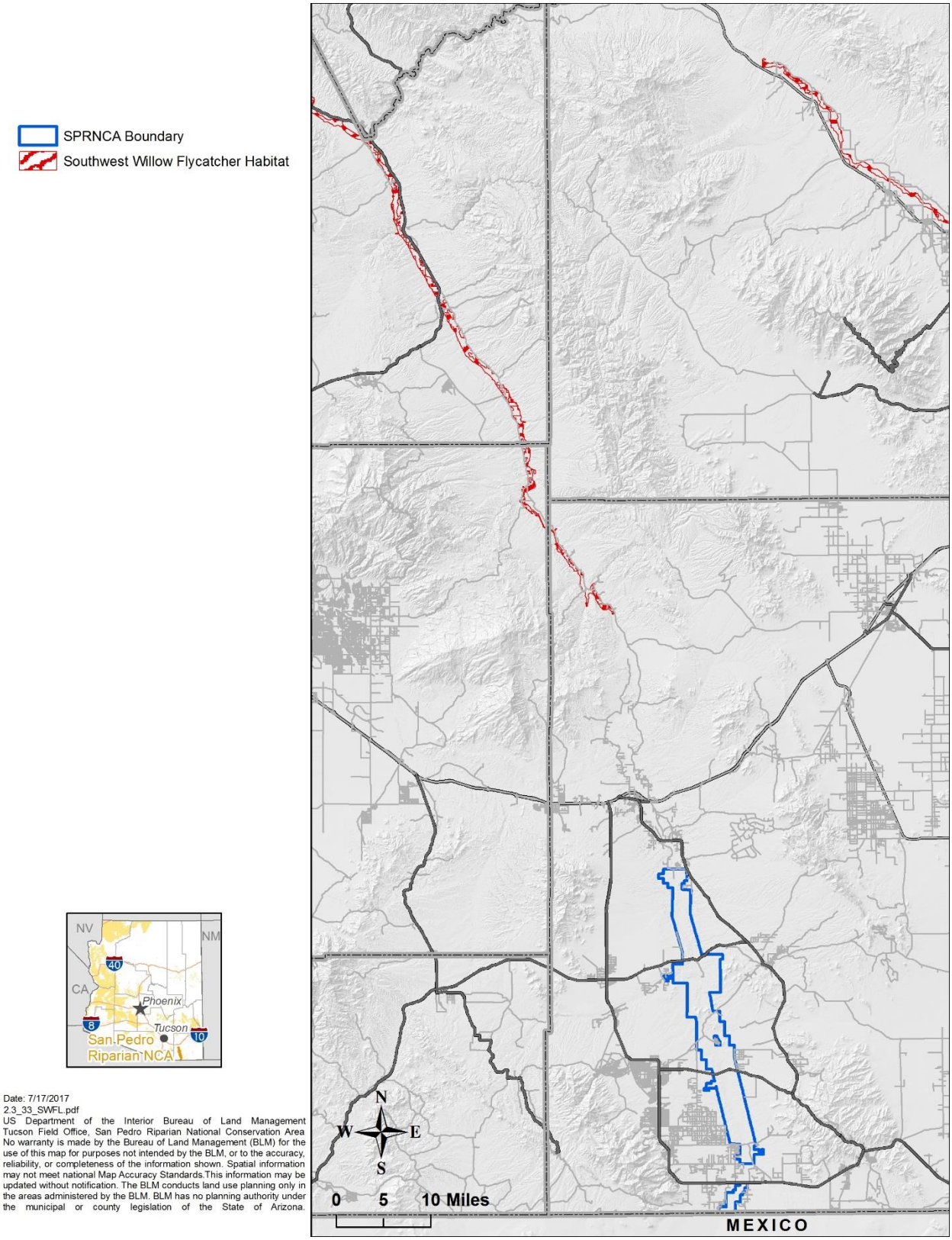

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Figure 2.3-33. Designated Critical Habitat Southwest Willow Flycatcher

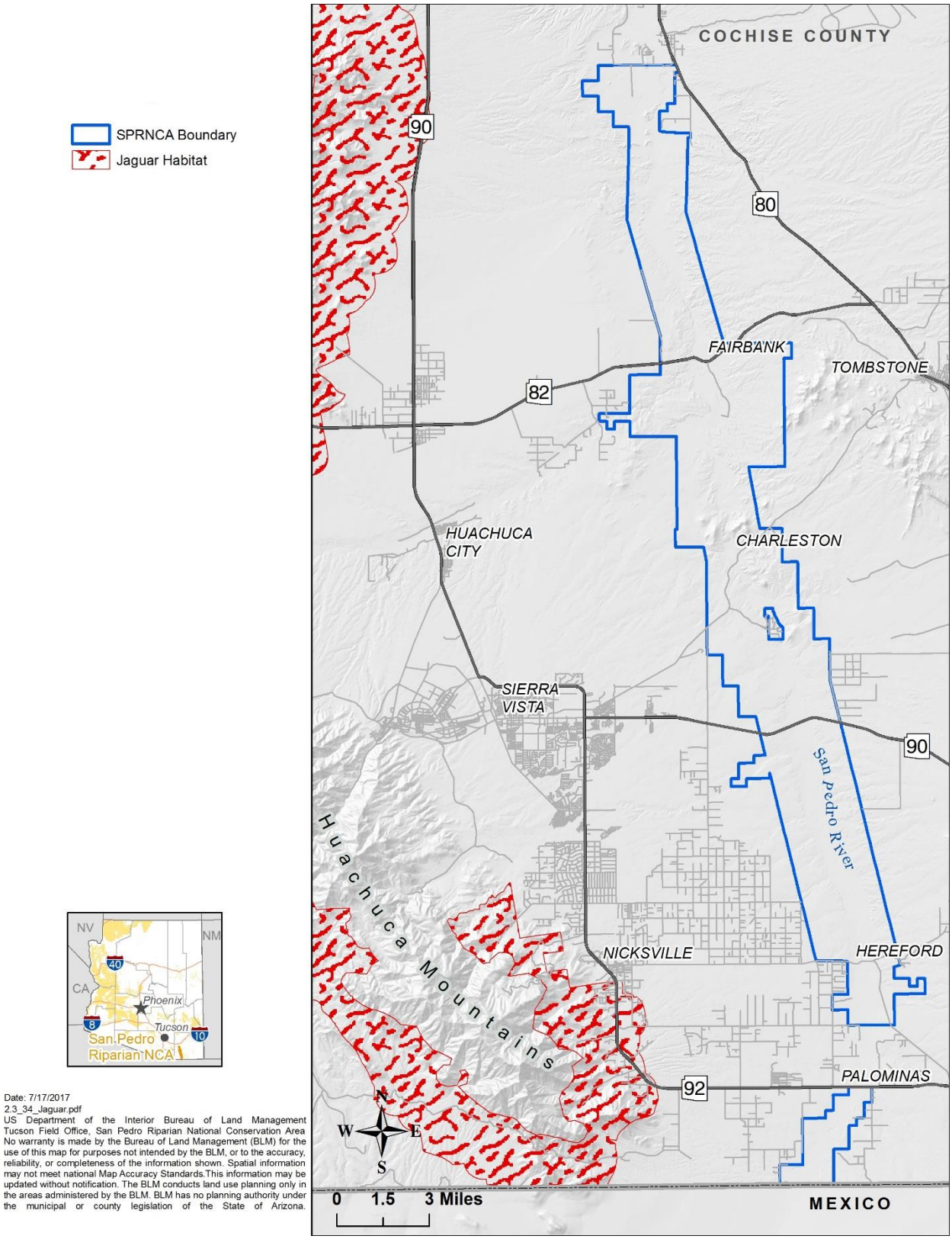

Figure 2.3-34. Designated Critical Habitat Jaguar

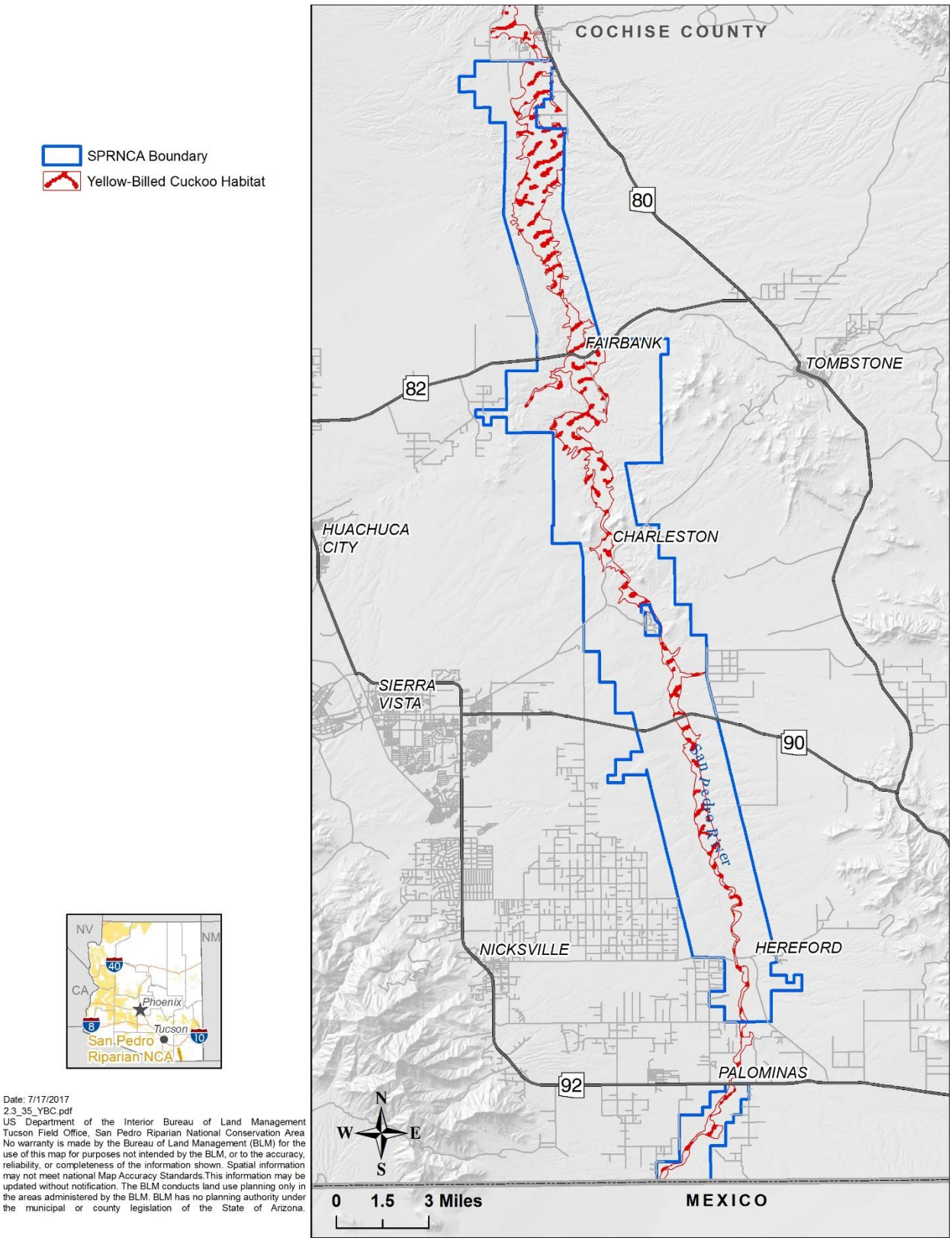

Figure 2.3-35. Proposed Critical Habitat Yellow Billed Cuckoo

BLM Sensitive Species

Implementation-level planning should consider all site-specific methods and procedures needed to bring species and their habitats to the condition under which management under the BLM Sensitive Species policies would no longer be necessary. The AZGFD Online Environmental Review Tool was used to determine the occurrence of any BLM Sensitive Species within the SPRNCA. These BLM Sensitive Species are included in Table 2.3-28, as well as those BLM Sensitive Species that may have potential habitat in the SPRNCA. AZGFD plant and animal abstracts were used for habitat information when available, and are listed under references if the abstract was used for species information.

Table 2.3-28. BLM Sensitive Species that may Occur Within SPRNCA

Common Name	Scientific Name	Occurrence and Habitat Within the Planning Area
		PLANTS
Arizona giant sedge	*Carex ultra*	Documented in the SPRNCA in spring habitat (Radke pers. obs.). The largest sedge of southern Arizona, with populations often small and widely separated. Habitat is aquatic/riparian woodland in moist or wet alluvial soil, sand, and gravel near perennially wet springs and streams, and undulating rocky-gravelly terrain at 2,040-6,000 ft. Exposure is commonly southeast-facing, often shaded.
San Pedro River wild buckwheat	*Eriogonum terrenatum*	Documented in the SPRNCA in the area between Highway 82 and Escalante (Anderson 2004, Radke 2011). Habitat consists of creosote communities and *Acacia constricta* dominated Chihuahuan scrub. Soils are gravelly clayey outcrops, slopes and flats, and also found in calcareous soil. In Cochise County, the plant is confined to the eroded, clay slopes and flats of the Saint David Formation. In the SPRNCA, this species occurs at about 3,850 ft. (Radke 2011). Elevation ranges from 3,520 to 3,914 ft.
Wright's marsh thistle	*Cirsium wrightii*	This federal candidate species has not been documented in the SPRNCA, but was originally collected at San Bernardino Cienega in southeast Cochise County (75 FR 67926). It has not been observed at San Bernardino National Wildlife Refuge since at least 2000 (W. Radke personal communication). This species is likely extirpated from Arizona. Habitat is water-saturated soils in springs, seeps, and marshy edges of streams and ponds in elevation between 3,450 and 7,850 ft. (75 FR 67926).
		FISH
desert sucker	*Catostomus clarki*	The last remaining species of sucker in the SPRNCA. It can still be found in the San Pedro River from Charleston to the Highway 90 Bridge and still persists in small numbers in the Babocomari River, Government Draw, and the lower mile of Curry Draw.
longfin dace	*Agosia chrysogaster*	This is the last native minnow in the SPRNCA. It can still be found throughout the San Pedro River where there is still perennial surface water during dry periods. It is an excellent colonizer of unoccupied habitat and can be found in intermittent reaches, but most individuals perish annually.
Speckled dace	*Rhinichthys osculus*	This species has been extirpated from the SPRNCA, but habitat may have potential for species re-establishment.
Sonora sucker	*Catostomus insignis*	This species has been extirpated from the SPRNCA, but habitat may have potential for species re-establishment.
Flannelmouth sucker	*Catostomus latipinnis*	This species has been extirpated from the SPRNCA, but habitat has limited potential for species re-establisment
Roundtail chub	*Gila robusta*	This species has been extirpated from the SPRNCA, but habitat may have potential for species re-establishment.
		AMPHIBIANS
lowland leopard frog	*Lithobates yavapaiensis*	This species has nearly been extirpated from the SPRNCA, but habitat has the potential for the re-establishment of viable populations in habitats protected from bullfrogs. Voucher specimens exist from the Upper San Pedro River (Rosen 2005). More recently documented in the SPRNCA in shallow wetland areas near St. David Cienega (Radke pers. obs.). Habitat consists of aquatic systems from Sonoran Desert and desert grasslands to oak-pine woodland. Common overstory consists of Fremont cottonwood, willow, seep willow, mesquite, and introduced salt cedar.
Sonoran desert toad	*Bufo alvarius*	This species has been documented in the SPRNCA at Fairbank (BLM 1988b). In the SPRNCA, habitat may include Chihuahuan desertscrub and semidesert grassland. Usually

Common Name	Scientific Name	Occurrence and Habitat Within the Planning Area
		breeds in temporary pools caused by monsoon rains, but adults may be found far from water (Brennan and Holycross 2006).
REPTILES		
ornate box turtle	*Terrapene ornata*	Documented in the SPRNCA in preferred shrub/grass habitat (BLM 1988b), and most commonly observed during monsoon season. Habitat is semidesert grassland and Chihuahuan desert scrub. Found at elevations ranging from 2,000-7,100 ft., although most abundant at elevations from 3,000-6,500 ft.
Sonora mud turtle	*Kinosternon sonoriense sonoriense*	Documented in the SPRNCA in most permanent aquatic habitats especially the San Pedro River, Babocomari River and St. David Cienega, and in some intermittent aquatic habitats (BLM 1988b). Habitat consists of springs, creeks, ponds and waterholes of permanent and intermittent streams. Elevation ranges from sea level to about 6,700 ft.
BIRDS		
Sprague's pipit	*Anthus spragueii*	Federal candidate species. A rare local winter resident in the SPRNCA in grasslands near Palominas and Hereford, with most records between November and February (Krueper 1999). There are no breeding records in Arizona. Populations are typically found in dense herbaceous vegetation in pastures, weedy fields, grasslands, grassy agricultural fields, and alfalfa fields. Low visual obstructions, moderate litter cover, and little to no woody vegetation is preferred. Elevation is usually between 4,285-4,960 ft.
American peregrine falcon	*Falco peregrinus anatum*	Federally delisted. Rare winter visitor to SPRNCA (Krueper 1999), with regular appearances during spring and fall migration (Radke pers. obs.). Sonoran, Mohave, and Great Basin desert scrub up through areas of Rocky Mountain and Madrean Montane Conifer Forest, near cliffs that support sufficient abundance of prey. Optimum peregrine habitat is generally considered to be steep, sheer cliffs overlooking woodlands, riparian areas, or other habitats supporting avian prey species in abundance. Elevation from around 400-9,000 ft.
Arizona Botteri's sparrow	*Peucaea botterii arizonae*	Fairly common to common summer breeding bird in the SPRNCA in savanna-type grassland habitats, primarily between Charleston and Palominas (Krueper 1999). This species also commonly utilizes Lehmann lovegrass-dominated grasslands with scattered mesquite (Radke pers. obs.). Breeding habitat in the SPRNCA is generally a grassland community of giant sacaton or other tall grass, especially with scattered shrubs or trees.
Arizona grasshopper sparrow	*Ammodramus savannarum ammolegus*	This race has an extremely small breeding range in southeastern Arizona and northern Sonora. In the SPRNCA, this species is an uncommon summer breeding bird in semiarid grasslands with a low, woody shrub component such as scattered young mesquite (Radke pers. obs.). The plant community is generally desert grassland and desertscrub with open to dense vegetation of shrubs, low trees, and succulents. In southeastern Arizona, this sparrow is limited to areas with moderate to high coverage of medium height grass with relatively low shrub coverage.
bald eagle	*Haliaeetus leucocephalus*	Rare winter visitor to the Upper San Pedro River Valley including the SPRNCA, which may be individuals dispersing from the Upper Yaqui River in Sonora, where a few breed, or from the central Arizona populations; the San Pedro River may be used as a migratory corridor (Krueper 1999). Areas selected as wintering habitat have an adequate food supply, and open water such as Kingfisher Pond in the SPRNCA where this species has been observed.
cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	A calling individual was reported south of Kingfisher Pond in the SPRNCA in 1997, but was not located the next day. This sighting is considered hypothetical (Krueper 1999). Habitat consists of streamside cottonwoods, and willows and adjacent mesquite bosques, usually with saguaros on nearby slopes. Before the 1950s, Arizona accounts suggested this species occurred along perennial drainages with extensive Freemont cottonwood-Goodding willow woodlands and nearby mesquite bosques. Elevation from 1,300-4,000 ft.
desert purple martin	*Progne subis hesperia*	Casual spring and fall migrant in the Upper San Pedro River Valley, with no documented breeding (Krueper 1999). Breeding habitat includes Upper Sonoran Desert closely associated with saguaro forests. Foraging and roosting may occur in areas adjacent to cactus forests, including open grassy river valleys, pool or marsh edges, towns, parks, lake shores, and ponds.
gilded flicker	*Colaptes chrysoides*	Uncommon permanent resident below 4,000 ft. of the Upper San Pedro River Valley and within the riparian zone of SPRNCA (Krueper 1999). This species is usually associated with Sonoran desert with saguaro, which provides nesting substrate and food, and is associated to a lesser extent with cottonwood at the edges of its range.
golden eagle	*Aquila chrysaetos*	Uncommon permanent resident in the Huachuca and Mule Mts., where adult and juvenile birds have been observed (Radke pers. obs.), with individuals hunting over the Upper San

Common Name	Scientific Name	Occurrence and Habitat Within the Planning Area
		Pedro River Valley including the SPRNCA for most of the year (Krueper 1999). This species is usually found in open wooded country and barren areas, especially in hilly or mountainous regions, nesting on rock ledges, cliffs, or in large trees.
Northern goshawk	*Accipiter gentilis atricapillus*	Accidental winter visitor to the lower elevations of the Upper San Pedro River Valley, with individuals observed near within the SPRNCA (Krueper 1999). Some birds may be altitudinal migrants, moving downslope in the winter. Individuals may be dispersing downslope from the Huachuca Mountains, or from more northerly populations (Krueper 1999).
pinyon jay	*Gymnorhinus cyanocephalus*	Irregular (erratic pattern of occurrence) winter visitor in the SPRNCA. Common permanent resident of pinyon-juniper habitats, but may occur in lower elevations in southern Arizona and the Upper San Pedro River Valley during fall and winter months (Krueper 1999).
Western burrowing owl	*Athene cunicularia hypugaea*	Rare permanent resident of desert and grasslands in the Upper San Pedro River Valley within the SPRNCA. This species occurred in considerable numbers in prairie dog towns between the Huachuca Mountains and the San Pedro River, before prairie dogs were extirpated with poison in the 1930s (Krueper 1999). Habitat is variable in open, well-drained grassland, desert, agricultural lands, and open areas such as vacant lots, golf courses, and airports. This species is often associated with burrowing mammals, but will utilize man-made structures (e.g., lips of pavement, pipe, nesting boxes) for nesting burrows (Radke pers. obs.).
BATS		
Allen's big-eared bat	*Idionycteris phyllotis*	Typically found in mountainous regions at higher elevations, with no known documentation of this species in the SPRNCA (Duncan 1989). However, this species does occur in the San Pedro River Valley on range maps (Reid 2006). In Arizona, this bat may occur in riparian areas with rocky outcrops along streams or over ponds, where they may be seeking water or insects.
California leaf-nosed bat	*Macrotus californicus*	This species has been documented near Tombstone in the Upper San Pedro River Valley (Duncan 1989). Mostly found in Sonoran desert scrub. This species primarily roosts in mines, caves, and rock shelters. This species is not known to hibernate, and although it may not occupy the same roost year-round, it is not known to migrate. The primary summer and winter range is essentially the same.
cave myotis	*Myotis velifer*	Documented in the SPRNCA at Fairbank, Boquillas, Hereford, and Highway 92 (Duncan 1989). Habitat is predominantly desert scrub of creosote. Roost in caves, tunnels, mineshafts, under bridges (with some records of individuals roosting in cliff and barn swallow nests), and sometimes in buildings. Winter roosts in Arizona are wet mine tunnels above 6,000 ft. Elevation is mostly between 300-5,000 ft.
greater western mastiff bat	*Eumops perotis californicus*	Documented in the SPRNCA at Lewis Spring (Duncan 1989). Habitat is lower and upper Sonoran desert scrub near cliffs, preferring rugged rocky canyons with abundant crevices. They prefer crowding into tight crevices at least a foot to ten or more ft deep, and two in or more wide. Considered a year-round resident in Arizona.
Mexican long-tongued bat	*Choeronycteris mexicana*	Generally observed at higher elevations, with no known documentation of this species in the SPRNCA (Duncan 1989), although range maps indicate this species may occur in the Upper San Pedro River Valley (Reid 2006). Habitat includes semidesert grasslands. Roosts are caves and abandoned mines, and may also be found in shallow caves or rock shelters. At Cienega Creek Natural Preserve, roost sites consisted of clay soil holes or piping caves. These bats feed predominantly on cactus and agave nectar. Elevation usually ranges from 4,000-6,000 ft.
spotted bat	*Euderma maculatum*	Range maps (Reid 2006) depict the occurrence of spotted bat in southeastern Arizona, and this species has been documented in the SPRNCA (Duncan 1989). Habitat is varied, with specimens known from desert scrub through riparian to montane coniferous forests, and scattered ranges in between.
Townsend's big-eared bat	*Corynorhinus townsendii*	Documented in the SPRNCA at Hereford (Duncan 1989). Habitat may be desert scrub up to coniferous forests. In Arizona, summer day roosts are found in caves and mines, with night roosts often in abandoned buildings. In winter, they hibernate in cold caves and mines from northern to southeastern Arizona. Elevation ranges between 550-8,437 ft., with most records above 3,000 ft.
MAMMALS		
banner-tailed kangaroo rat	*Dipodomys spectabilis*	This species has not been documented within SPRNCA. Range maps indicate this species may occur in the planning area (Reid 2006), and records do exist for the Upper San Pedro River Valley.

Common Name	Scientific Name	Occurrence and Habitat Within the Planning Area
black-tailed prairie dog	*Cynomys ludovicianus*	Prairie dogs did exist on the San Pedro River near the International Boundary (Cockrum 1960), but were exterminated (Hoffmeister 1986). Habitat is dry, flat, open plains and desert grasslands, where this species excavates burrows.

Source: USFWS 2012a.

Habitat for special status species may be divided into wetlands and uplands. Wetlands include the cottonwood-willow forest, mesquite forest, big sacaton grassland, sandy wash, marsh, and aquatic habitats. Uplands may include Chihuahuan desertscrub, semidesert grassland, cliff/rock areas, and abandoned agricultural fields. Species that have not been documented in the SPRNCA, but are within their range, may benefit from habitat management for documented species in their respective habitat type. As special status species are identified by the AZGFD or FWS, and/or documented in the SPRNCA, they may be added as key species in their habitat type.

Recovery Plans

The USFWS is directed to prepare Recovery Plans for all federally listed Threatened and Endangered Species (Table 2.3-29). BLM policy from 6840.04D5 is "ensuring that when the BLM engages in the planning process, land-use plans, and subsequent implementation-level plans identify appropriate outcomes, strategies, restoration opportunities, use restrictions, and management actions necessary to conserve and/or recover listed species, as well as provisions for the conservation of Bureau-sensitive species. In particular, such plans should address any approved recovery plans and conservation agreements."

Table 2.3-29. USFWS Recovery Plans

Species	Status	Date of Recovery Plan
Jaguar	Recovery Outline	April 20, 2012
Ocelot	Draft First Revision	August 26, 2010
Lesser long-nosed bat (*Leptonycteris yerbabuenae*)	Final Plan	March 4, 1997
Southwestern willow flycatcher	Final Plan	August 30, 2002
Chiricahua leopard frog	Final Plan	June 4, 2007
Gila topminnow	Draft Revised	March 5, 1999
Loach minnow	Final Plan	September 30, 1991
Colorado pikeminnow (*Ptychocheilus lucius*)	Final Plan	August 28, 2002
Desert pupfish	Final Plan	December 8, 1993
Razorback sucker	Final Plan	August 28, 2002
Spikedace	Final Plan	September 30, 1991
Aplomado Falcon	Final Plan	June 8, 1990
Mexican Wolf	Final Plan	September 15, 1982

Trends

The impacts of groundwater pumping, flow diversion, urbanization, mining, recreation, grazing, and other land uses in the SPRNCA have applied pressure to many special status species, their populations, and their habitat over many decades. None of the current special status species populations in the SPRNCA are near their historic levels, and most species remain imperiled because of habitat loss, fragmentation, invasive species, and/or disease. In addition to threats from ongoing habitat loss and fragmentation, habitat quality is an ongoing factor in the distribution and density of these special status species. Additional species have been proposed

for listing, or have become candidate species and BLM sensitive species, which are indicators of continuing habitat loss or degradation. For some species, active management efforts by the BLM, USFWS, AZGFD, and other organizations have reversed the downward trend for some of these populations at local levels, and even resulted in a few delisted species at the population level. Recovery plans will help to slow declines if administered properly, but without massive conservation efforts, most special status species will continue to decline or become locally extinct.

For aquatic species in the San Pedro River and the rest of the Gila River basin, the information indicates the fish fauna is experiencing a basin-wide collapse from a myriad of human impacts (Minckley and Deacon 1991). This is true for other aquatic animals as well. The entire fish fauna is either federally listed or listed by other government entities such as the states of Arizona and New Mexico, USFS, or the BLM.

Maintaining flowing surface water in the San Pedro River, Babocomari River, tributaries, and wetlands was recognized as the BLM's greatest challenge (BLM 1987). During the driest and hottest months, the "flowing" surface water in the San Pedro River has discontinued over most of its 50 miles across the SPRNCA. Annual measurements in late June from 2007 to 2015 show that it still has surface water (flowing or isolated pools) covering 46 to 75 percent of the SPRNCA segment (Nature Conservancy 2015). Much of this surface water occurs in stagnant isolated pools without flow between them, creating conditions poorly suited for most fish species. In years when the monsoon rains do not occur until mid-July, the amount of surface water is much less than that recorded. Approximately 17 miles of river have flowing water that provide adequate habitat for fish (10 miles from Cottonwood to Grave Yard Gulch and seven miles from Waters Road to Hunter Wash). These amounts of habitat fluctuate based on annual hydrologic conditions (Nature Conservancy 2015).

Surface water is largely a product of deep (often stagnant pools) with little flowing water over run and riffle habitat in between. Fish kills have been reported on the San Pedro River near Hereford and on the Babocomari River upstream of the SPRNCA boundary. The kill on the San Pedro River was investigated and was likely the result of low oxygen levels as a result of high oxygen demand from animals and plants at night, with little flow to mix water and air to replace the oxygen deficit created at night. The water in San Pedro River at the Charleston Bridge quit flowing for seven consecutive days in June 2005. This was the first time the river did not have flow since records began in 1905. The Babocomari River no longer flows to its confluence with the San Pedro River and does not have measurable flow at the stream gage located two miles above the confluence for two or more months at a time. Like the San Pedro River, the Babocomari River's surface water is largely a product of deep (often stagnant pools), with little flowing water over run and riffle habitat that lies in between pools.

The wetland/cienega creation process no longer functions along the San Pedro or Babocomari rivers. However, one recently formed cienega still persists above Hunter Wash, a remnant of the meander pattern that is still present in that reach. See Section 2.3.6, Riparian and Wetland Vegetation for more information. Many of the river channel processes that support aquatic habitat are impaired as well. Aquatic habitat at St. David Cienega is at risk of becoming dry from headcut erosion on the southern end, which increases soil surfaces to drying, and an apparent decrease in discharge from the artesian source spring.

Ground water discharge from the city of Sierra Vista waste water treatment plant recharge project is augmenting flows in Horse Thief Draw and Murray Spring which is causing an expansion of aquatic, riparian and wetland habitat. This water has contaminants of environmental concern, many of which may affect the physiology of fish and frogs. See Section 2.3.5, Water Resources and Section 2.3.6, Riparian and Wetland Vegetation for more information.

Another positive trend is the building of bank extensions (muddy shelves on lower banks) along perennial segments of the San Pedro River that support Huachuca water umbel, which is spreading in perennial reaches. While the number of metapopulations of Huachuca water umbel have stayed about the same during systematic monitoring completed from 2001 to 2010 by Fort Huachuca, data may indicate that the length of metapopulations has increased. This is likely the case in reaches of the river that have remained perennial, while some metapopulations may be lost in reaches that are becoming intermittent.

One wetland fed by Little Joe Spring was nearly dry and filled with detritus and sediment. A recent restoration (2011) of this site created 2,400 sq. ft. of open water and reset wetland filling process through excavation of decades of fill. This type of activity may be required to prevent the gradual senescing and transformation of wetland to dry bottomland. Another similar restoration has been approved for the artificial wetland at White House Well. This will provide a quarter of an acre of habitat for special status wetland plants and animals.

Forecast

The future of special status species within the SPRNCA is largely dependent on watershed or regional recovery and restoration efforts due to the small size of the SPRNCA. The ability to obtain resources for restoration activities on the SPRNCA by BLM and partner agencies coupled with policy, in particular water policy, will dictate the future status of these species in the SPRNCA. Recovery to historical status is unlikely because fragmentation of habitat with multiple use interests make comprehensive ecosystem restoration improbable. Population viability for all of the special status plant, fish, amphibian, reptile, bird, and mammal species in the SPRNCA depends upon good quality, permanent water sources. Yet, hydrologic conditions in the SPRNCA continue a downward trend, and the recent drought has reduced the amount or quality of habitat in some areas, further stressing populations of these species.

Some special status species populations must be protected from other land uses, such as recreation and grazing, for habitat quality to be adequate for maintenance or recovery of the species. Some populations need protection from competition and predation from invasive species that exceed the levels at which the special status species evolved. More complete inventory and monitoring of special status species within the SPRNCA are needed. Monitoring of special status species populations and habitat may facilitate timely management responses to factors that affect them.

The San Pedro and Babocomari rivers are slowly going from perennial to intermittent, and intermittent reaches are becoming more ephemeral. See Section 2.3.5, Water Resources and Section 2.3.6, Riparian and Aquatic Vegetation for more information. This trend is reducing habitat suitability for aquatic special status species. Ground water levels are projected to decline in the basin over time due to increased demand and longterm drought; global changes to climate trends anticipated to result in dryer conditions in the region; and long-term drought. As stated in

Section 2.3.6, Riparian and Aquatic Vegetation, resiliency to dryer conditions can be attained through the restoration of the grassland and montane habitats in the watershed.

Murray Spring and Horse Thief Draw are currently supported artificially by groundwater recharge from treated effluent. This water may be reallocated to other uses. One proposal is to move the recharge by pipeline to an area near Hereford to the south. This would likely reduce or eliminate habitat for aquatic and riparian special status species (Huachuca water umbel, yellow-billed cuckoo, Gila topminnow, and desert pupfish) at both sites and lessen surface water discharge in the San Pedro River above the Charleston Bridge that supports habitat for these imperiled species. It is unknown what the habitat benefits would be at the new location of discharge.

New wetland formation through natural processes is virtually at a standstill until the dynamics of erosion and deposition that creates menders is re-established. Until the foundational process of the aquatic ecosystem are fully or partially restored, special status species that rely on aquatic, riparian, and wetland habitat will likely languish as wetland conditions deteriorate. See Section 2.3.6, Riparian and Aquatic Vegetation for more information. However, this is being offset through wetland creation and restoration efforts.

Aquatic, wetland, and riparian habitats that have invasive, nonnative competitors and predators will continue to have limited value to special status species. Currently, there is no method or treatment that can remove these species from such a large and complex system. The mixed ownership along the SPRNCA and the origin of the San Pedro River in Mexico would make removal of these species problematic at best. Many private land owners have source populations of invasive, nonnative species that would eventually recolonize the river. In addition, the river segment and tributaries in Mexico harbor many of the species targeted for removal. It is hard to anticipate how much cooperation would be forthcoming for such an endeavor with Mexico. Sport fishing is a popular recreation activity along the San Pedro River. The conversion of the fishery from sport fish to special status species is likely to meet stiff resistance.

The risks of major, high-intensity wildfires in riparian areas is high due to the presence of sacaton and Johnson grass stands that produce large volumes of dead and dry material. Riparian areas in the region are burning more severely and more frequently than in the past. This may radically alter the acreage of mature cottonwood and willow stands along the river that support species like the yellow-billed cuckoo. However, the reduction of tree thickets that inhibit channel adjustments (meandering) may increase pointbar development that give rise to new stands of cottonwood and willow. These patches of young trees may give rise to areas that support willow flycatcher breeding territories as is the case in the lower San Pedro River. They will also mature into stands that support breeding yellow-billed cuckoo. This is currently being accomplished through beaver activity. Invasive species with deep, rhizomatous root systems, such as Bermuda grass and Johnson grass, quickly come back after fire and may prevent germination of cottonwood and willows.

Overall, beaver are seen as a positive contributor to river health. This species is likely to aid in riparian wetland persistence through time (resiliency to drought), especially if watershed restoration efforts reduce flood peaks that destroy the dams seasonally. See Section 2.3.6, Riparian and Aquatic Vegetation for more information.

PFC assessment findings indicate that unauthorized OHV traffic and unregulated foot traffic has compacted soil, trampled and destroyed riparian vegetation, altered streambanks and increased channel erosion. Left unmanaged, accelerated bank and floodplain erosion (channeling) are likely to cause detrimental effects to special status species habitat. The abandoned railroad bed that runs along much of the San Pedro River continues to alter channel function and riparian vegetation development through confinement and contribution of unstabilized material directly to the river. Because the railroad is privately owned, it may be very difficult to remedy the effects to special status species.

In sections of the San Pedro River, dikes were constructed to divert surface drainage around abandoned agricultural fields. These dikes alter natural hydrologic patterns and channel processes, possibly causing some reaches of the San Pedro River to have less available floodplain acreage, recharge, and flood energy dissipation. Assessment of the effects of the dikes on recharge should be completed and impacts to vegetation and aquatic habitat that support special status species should be remediated as necessary.

Political environment, basin wide cooperation, and sustained available funding will dictate the future of wetland and riparian areas in the conservation area. Recovery to historical status during the life of the plan is unlikely because of the timeframes involved for watershed restoration, recovery of channel processes, and ownership fragmentation. This is compounded by multiple societal interests that make system-wide restoration very unlikely.

2.3.11 Invasive Species

Invasive species aggressively out-compete native species within a community and often alter the physical and biotic components enough to affect the entire ecological community. Therefore, there has been an active invasive species control or eradication program in the SPRNCA in the past.

The noxious weed control program has focused on early detection and control of new invasive plants, and control or eradication of existing infestations depending upon species and extent of infestation. Noxious weed management is a high priority for the SPRNCA. Under a BLM contract, the Sonoran Institute conducted a field mapping of weeds including associated shapefiles in the SPRNCA during 2009, and also used GIS-based models of suitable habitat for target species (Fitzgerald-DeHoog and McIntyre 2011). Target species included tamarisk, Russian knapweed (*Acroptilon*), and giant reed on about 1,023 acres, including 13.9 river miles for tamarisk and 8.5 river miles for giant reed (*Arundo donax*).

The BLM defines a noxious weed as “a plant that interferes with management objectives for a given area of land at a given point in time.” Noxious weeds are defined in the *BLM Arizona Standards and Guidelines* (BLM 1997) as nonnative plants that are especially undesirable because they have no forage value, and are sometimes toxic or capable of invading plant communities and displacing native species. The BLM recognizes noxious weed invasions as one of the greatest threats to the health of public land nationwide.

Most invasive and noxious weeds known to occur in Arizona were originally introduced to North America from Europe and Asia, and many invasive plant introductions were unintentional. However, some plants were purposely introduced for soil stabilization, windbreaks, or as

ornamentals (e.g., Lehmann lovegrass, tamarisk). Invasive plants typically invade disturbed soils and stressed plant communities. For example, tamarisk may become established in riparian areas where hydrologic conditions have been altered. Once established, weeds may spread rapidly by wind, water, wildlife, roads, equipment, and the movement of contaminated feed and seed. Certain characteristics of noxious weeds, such as rhizomes or other morphological features (ability to adapt with many soil and climate conditions, copious seed production, allelopathy, and herbicide resistance, etc.), may make control extremely difficult once plants are established. Noxious and invasive plants mainly occur along trails, roads, parking areas, pipelines, livestock congregation areas, or other areas with soil disturbance or impacts to native plant communities where there is little or no competition from existing native plants.

Indicators

Invasive species include plants and animals that are able to establish on a site where they were not present in the original species assemblage. Invasive plant species are of particular concern following ground disturbances. Therefore, size and location of areas with ground disturbance are excellent indicators on the potential for invasive plants to become established. For example, many invasive plant species expand into new areas following disturbances along road shoulders or into newly disturbed areas, especially when vehicles or people transport noxious weed seeds. Other indicators may include the presence or expansion of invasive species on roads and private or other lands near SPRNCA. Thus, early detection of invasive species is important in control efforts.

Current Condition

Invasive aquatic species (e.g., bullfrog and crayfish) are present in high numbers and occur over most areas of aquatic habitat in the SPRNCA, making eradication or even control very difficult. In the past, coordinated bullfrog events occurred on the San Pedro River to remove bullfrogs in specific areas, but this program ended when it became evident that removal was not likely to stop the spread of bullfrogs. At present, limited bullfrog control occurs through the removal of bullfrogs for sport or food. Exclusion of bullfrogs using fencing at White House Well and Little Joe Spring has occurred in the past in order to provide areas for listed species reintroductions (BLM 2010b).

Other non-native animal species documented in the SPRNCA that have the potential to cause competition, predation, or behavioral disturbances to wildlife include domesticated feral animals such as dogs and cats. Feral cats have occurred in the past at Fairbank, while feral dogs have been observed near Boquillas. Both feral cats and dogs have been documented to predate birds and other small mammals. . A systematic review and quantitative estimate of mortality caused by free-ranging domestic cats in the United States estimated that cats kill 1.3–4.0 billion birds and 6.3–22.3 billion mammals annually (Loss et al. 2013). Findings suggest that free-ranging cats cause substantially greater wildlife mortality than previously thought and are likely the single greatest source of anthropogenic mortality for US birds and mammals (Loss et al. 2013). House mice (*Mus musculus*) have been documented in the SPRNCA.

Noxious weeds that are listed under the Arizona Department of Agriculture (ADA) are listed at http://plants.usda.gov/java/noxious?rptType=State&statefips=04.Federally listed noxious weeds are at http://plants.usda.gov/java/noxious?rptType=Federal. A list and regulations for ADA

regulated and restricted weeds may be found at https://agriculture.az.gov/r3-4-244-regulated-and-restricted-noxious-weeds. ADA regulated weeds may be controlled to prevent further infestation or contamination, while restricted weeds shall be quarantined to prevent further infestation or contamination. Lists of current noxious weeds are included in Appendix D.

Tamarisk (*Tamarix spp*.) occurred throughout the SPRNCA, with the most severe infestations situated adjacent to the San Pedro River north of Fairbank. The relative abundance of tamarisk has varied through time in response to flood and drought cycles and changing land use (Stromberg and Tellman 2009). Tamarisk has increased in abundance in the upper San Pedro basin, perhaps relating to changing streamflow conditions (Leenhouts et al. 2006).

Tamarisk is more common in the northern area of SPRNCA, and tends to form thickets of individuals with multiple stems (Makings 2006). Sonoran Institute field crews surveyed portions of the SPRNCA for tamarisk infestation during May 2009, and field crews surveyed the entire riparian corridor, a total of 12.6 miles, from Highway 82 to the north end of the SPRNCA boundary. The entire survey area consisted of approximately 725 acres, of which 332 acres were found to be affected by tamarisk. Sonoran Institute noted that "the tamarisk infestations in this section of SPRNCA were frequently observed to be occurring on the inside of river bends. Here, the tamarisk tended to be dense at the bank edge (>50 percent area infested) and extending 10-20 meters back. Further away from the river, the tamarisk would thin out in the middle of the terrace, sometimes quite significantly. Dense stands would then again form at the edge of the riparian zone as the riparian zone met mesquite bosque or grassland" (Fitzgerald-DeHoog and McIntyre 2011). Another pattern observed was that as one moves downstream from Highway 82, the tamarisk infestations occur more frequently and are denser. Along the river near Highway 82, tamarisk trees were spotty and did not form dense monoculture stands. The heaviest infested sites occur along the river near the Garcia Tract and continue north until the SPRNCA boundary.

The SPRNCA Habitat Management Plan (BLM 1993) identified 147 acres of tamarisk downstream of the Charleston area. Sonoran Institute (2011) mapped at least 332 acres of tamarisk in the area downstream of Highway 82 (leaving out a portion between Charleston and Fairbank). Thus, tamarisk has more than doubled in this area in 18 years.

Mature tamarisk trees can produce millions of pollen-size seeds dispersed through wind and water. Seeds can germinate while floating and establish themselves on wet banks within two weeks. Newly formed sand banks (common along the San Pedro River following monsoon season) are particularly susceptible. Trees may reproduce in the first year, but typically they reproduce during the second year. Adventitious roots can also produce new trees when buried (Taylor and McDaniel 1998). It has been documented that alterations in the prominence of perennial surface water flow in response to recent drought conditions, alteration to upland/riparian vegetative communities, changes in land use (urbanization), and groundwater pumping may favor the establishment of invasive species such as tamarisk within the riparian corridor (Stromberg and Tellman 2009). Tamarisk is highly adapted to fire, and usually outcompetes native plants after fires in the riparian area, forcing a shift in the vegetation community to a pure stand of tamarisk (i.e., monoculture).

The "Salt Cedar & Russian Olive Control Act" (House Resolution 2720) was signed into law in 2006. House Resolution 2720 directs the USDI to carry out an assessment and demonstration

program to control the spread of salt cedar and Russian olive (*Elaeagnus angustifolia*) in the western US. The SPRNCA tamarisk control Environmental Assessment (EA) (EA AZ-420-2008-011) was completed in 2009. The tamarisk control program in the SPRNCA has removed tamarisk along the San Pedro River River, tributaries, and springs during 2009 to 2015 from the International Boundary to north of Fairbank near Willow Wash. Approximately 25 acres of tamarisk has been removed with 2,800 acres surveyed. Isolated populations of tamarisk to the south of Fairbank functioned to serve as extended seed sources, increasing potential for further spread along the San Pedro River River. Thus, tamarisk eradication has occurred from furthermost upstream at the International Boundary to just north of the Fairbank railroad trestle using the cut-stump method with follow-up foliar application to resprouts. The tamarisk eradication program has been extremely successful, and the area from the boundary to almost Willow Wash is currently essentially free of tamarisk. Large monocultures still exist from approximately Willow Wash to the north SPRNCA boundary, although some control has occurred in isolated springs and wetlands in this area. Maps of these large tamarisk monocultures north of Fairbank are available in Fitzgerald-DeHoog and McIntyre (2011).

Because the tamarisk control program has been successful, control is planned to continue north from Willow Wash to the northern SPRNCA boundary as funding and staffing allows. The area north of the current control boundary becomes increasingly invaded with denser and larger thickets of tamarisk, making control more expensive and time-consuming (Fitzgerald-DeHoog and McIntyre 2011).

Invasive Russian knapweed (*Acroptilon repens*) occupied less than one acre total in six separate sites in the SPRNCA, however, eradication efforts have occurred since 2008 and eradication is nearly complete. Russian knapweed is a rhizomatous, deep-rooted, long-lived perennial (Parker 1972), native to eastern Europe and Asia (Kearney and Peebles 1960). Features of Russian knapweed make cultural control difficult, and allow knapweed to outcompete native species and form monocultures. For these reasons, Russian knapweed is rated as prohibited and restricted (ADA 2008). Russian knapweed is listed as “prohibited” from entry into the state of Arizona and “restricted” (quarantined if already found to prevent further infestation or contamination) by the ADA. These general locations include the San Pedro House, Boquillas Oxbow, Summer’s Well South (near the San Pedro River), Summer’s Well North (in the mesquite bosque), Palominas, and Garcia Tract. An additional site of knapweed infestation was identified by Elizabeth Makings of Arizona State University on July, 11 2001 near the Echoing Hope Ranch, formerly San Pedro River Inn (i.e., Kolbe’s), but this location has not been found even after searches by BLM staff, Sonoran Institute during 2009, and Elizabeth Makings in 2015. Infestations have decreased with treatment from thousands of plants to just a few plants remaining in 2015, and complete eradication is expected.

Cocklebur (*Xanthium strumarium*) is an introduced annual forb that occurs in the SPRNCA in areas that receive supplemental moisture. This weed is widespread and would be difficult to control.

Giant reed is introduced from the Old World (Kearney and Peebles 1960), and is found occasionally along the San Pedro River in moister soils. Giant reed is a perennial grass, spreading through its rhizomatous roots, which may form impenetrable, rank thickets. Giant reed has been controlled in the SPRNCA since 2009. A total of nine giant reed patches were known

along the San Pedro River within the SPRNCA, and an additional patch is within the Escapule private property inholding. No treatment has been documented on the clump on private property at Escapule. At least one new clump was found near Hereford during the PFC assessments on the SPRNCA during April 2012. Otherwise, all other patches of giant reed in the SPRNCA have been eradicated (except private property).

Malta star thistle (*Centaurea melitensis*) and yellow star thistle (*Centaurea solstitialis L.*) are annual invasive weeds that closely resemble each other. Originally introduced during the 1700s from southern Europe, they are now a pest in most western states. Like so many invasive weed species, star thistle will rapidly displace diverse native vegetation and create a monoculture, or pure stand of the weed. When this occurs, range forage value is lost, as it is low in palatability. Its root structure is ineffective at protecting soil against erosion and the spiny flower head guarantees that recreationists will avoid infested areas. Malta starthistle may be toxic when eaten by horses over a long period, causing a nervous disorder called "chewing disease." A small patch of Malta starthistle was discovered near Charleston Road between Moson Road and the San Pedro River during 2009, and the patch was hand-grubbed. Plants and seedheads were placed in trashbags and removed. The patch has been periodically monitored since then, and no Maltese star-thistle has been observed, demonstrating the importance of early weed detection and control.

Bindweed (*Convolvulus arvensis*) is an introduced, prostrate perennial with a deep taproot, producing by seeds as well as by horizontal rhizomes (Parker 1972). The twining or trailing stems may reach up to three meters in length. Bindweed occurs on dry soil in retired agricultural fields in the SPRNCA. Bindweed is difficult to eradicate because of this drought-tolerant nature and root system, resulting in a prohibited and regulated rating (ADA 2008).

Puncturevine (*Tribulus terrestris*) is an introduced, prostrate annual with a shallow taproot that produces large, spiny seedpods (Parker 1972). The trailing stems may reach two meters in length, forming dense mats. Puncture vine begins its vegetative growth after the beginning of monsoons on barren soil along roads, trails, and retired agricultural fields in the SPRNCA. It has been introduced in areas by foot and vehicle traffic when the burs are attached to shoes and tires; then, they dislodge and germinate in places like Fairbank. Each plant produces many seedpods, seeds may remain viable for many years, and burs are extremely painful to remove from skin. These features of puncturevine result in a regulated rating (ADA 2008).

Johnson grass (*Sorghum halepense*) occurs commonly in moist areas along the San Pedro River, forming monocultures and out-competing many native plant species, including deer grass and giant sacaton. Johnson grass is a tall, leafy, introduced perennial which spreads by seeds and by an extensive system of underground rhizomes (Parker 1972). These underground roots extend up to a meter underground, and seeds may lie dormant for many years, thus making eradication very difficult. Repeat photography of permanent photo points in the SPRNCA has indicated that Johnson grass infestations have become newly established or enlarged since the original photos were taken in 1988. Control or eradication of Johnson grass in the SPRNCA has not been feasible because of its widespread infestation throughout the riparian area and potential impacts on native species. Observations following both wild and prescribed fire in the SPRNCA have shown that Johnson grass responds favorably to fire because of its deep rhizomatous root system, while native grasses are not able to compete (Howard 2004). Without an effective, widespread

control method, uncontrolled infestations would merely reintroduce seeds and roots into areas without Johnson grass.

Bermuda grass (*Cynodon dactylon*) is an introduced perennial which produces by seeds, but mainly spreads by long runners on top of the ground and by rhizomes that may be very deep underground (Parker 1972). Bermuda grass is widespread along the banks of the San Pedro River where additional moisture is present. However, it is also very drought and alkali-resistant once established, and may also be found in sandy washes in the SPRNCA, where only ephemeral moisture is available. Control or eradication of Bermuda grass in the SPRNCA has not been undertaken for the same reasons that Johnson grass control is not feasible at this time.

Russian thistle is an annual reproduced only by seed, but one plant may produce thousands of seeds (Parker 1972). At maturity, the plant commonly breaks at ground level and becomes "tumbleweed." Russian thistle commonly occurs in disturbed areas and retired agricultural fields in the SPRNCA. Russian thistle has undergone mowing in some agricultural fields in the SPRNCA to prevent fire hazard and seed maturation. Mowing has been extremely successful in preventing future Russian thistle infestations and promoting the establishment of native grasses.

Lehmann love grass (*Eragrostis lehmanniana*) was first introduced by the US Soil Conservation Service (now NRCS) in the arid Southwest from South Africa for range restoration purposes (Gould 1951). The aggressive, spreading habit of Lehmann love grass causes the displacement of native grasses and is a concern for maintaining native grasslands. Control or eradication of Lehmann lovegrass in the SPRNCA has not been undertaken due to its widespread infestation throughout upland areas and because current control methods are not effective.

Bur bristle grass (*Setaria adherence*) occurs in retired agriculture fields in the SPRNCA. Although not rated as a noxious weed with ADA, the seed heads are difficult to remove from clothing and fur. Dense stands of bur bristle grass makes movement through some areas difficult, both for humans and probably wildlife.

Coastal sandbur (*Cenchrus spinifex*) occurs mainly in disturbed areas in the SPRNCA. Although not rated as a noxious weed with ADA, the plant is very troublesome once the burs mature.

Russian olive (*Elaeagnus angustifolia*) has been documented once within the SPRNCA boundary near Escapule, was removed by the private land owner and has resprouted. Further spread of this invasive species into riparian habitat may occur in the future without active vigilance and control efforts.

Tree of heaven (*Ailanthus altissima*) has been documented in the SPRNCA at Boquillas and Fairbank, and control is on-going, although few plants remain. This rapidly growing clonal tree (Makings 2006) is listed as a prohibited, invasive, or noxious weed in four states.

In Arizona, sportfish are almost entirely composed of introduced species from other regions of North America and other continents. Sportfish are also categorized as nonnative invasive species that influences the viability of habitat for native fish and other aquatic wildlife species, especially native frogs and reptiles which are susceptible to predation and displacement by more aggressive species. Other nonnative invasive aquatic wildlife that are harvested as part of recreational pursuits include the American bullfrog and northern crayfish. Both of these species impact native

fish, frogs, and aquatic reptiles as well. This creates a management conundrum whereever recreational hunting and fishing, native fish and other aquatic species occur together.

Trends

Noxious weeds have generally decreased in prevalence over many locations across the SPRNCA because of an active control and eradication program. However, tamarisk monocultures still exist from roughly Willow Wash to the north boundary of the SPRNCA. Invasive animals, such as bullfrog and crayfish, have increased in abundance and number of new species (e.g., newly documented virile crayfish). Introductions of new noxious weed species (e.g., Malta starthistle) combined with ground disturbance (e.g., trails, roads, pipeline maintenance, livestock paths, and congregation areas) indicate a need for continuing monitoring vigilance, with prompt treatments and control as needed.

The trend for invasive aquatic and animal species includes a general increase in number of species and abundance. The number of introduced terrestrial invertebrate, amphibian, reptile, fish, bird, and mammal species has shown a steady increase over historical numbers and abundance.

Prior to Anglo settlement in the valley, the San Pedro River had 13 native species of fish. By 1988, the number had dropped to two fish species; longfin dace and desert sucker. Nonnative invasive species have been introduced since the early 20th century, and now amount to seven. Some, like the green sunfish, largemouth bass, and black bullhead, are very predacious and widespread. In addition, the northern crayfish, red swamp crayfish, bullfrog, and western mosquitofish are ubiquitous in the system. These species are extremely detrimental to special status fishes, amphibians, and reptiles. They can individually and in combination eliminate populations that would otherwise be viable or even robust.

Forecast

The number and abundance of invasive aquatic and terrestrial animal species has continued to increase. This trend is expected to continue, especially with continued introduction and spread of invasive plant species with associated loss or degradation of native habitats for which native animal species are adapted.

A recent modeling study suggests that regional changes to climate trends, in tandem with groundwater pumping, will significantly reduce groundwater levels, streamflow, and riparian evapotranspiration in the upper San Pedro by 2100 (Serrat-Capdevila et al. 2007). These declines occur under both drier and modestly wetter climates, because recharge is insufficient to offset groundwater pumping. Declines in groundwater levels, whether due to climate, groundwater pumping, or a combination of factors, appears to increase the abundance of tamarisk relative to cottonwood. Native riparian communities with rich canopy structures and abundant decadent trees that support nest cavities contain greater species diversity and abundance than tamarisk monocultures (Anderson and Ohmart 1978, Busch et al. 1992, Ellis 1995, Ohmart et al. 1988, Sedgwick, and Knopf 1986). Therefore, impacts to the SPRNCA ecosystem are expected through changes in the density of tamarisk.

The subtropical tamarisk beetle (*Diorhabda sublineata*) is modeled to arrive at the lower San Pedro River in spring 2017 (Tracy 2013). Due to the large monocultures of tamarisk on the lower

and middle San Pedro River, the subtropical tamarisk beetle is expected to move up the San Pedro River and eventually reach the SPRNCA at some point in time in the future. It may be necessary to plan for the arrival of the subtropical tamarisk beetle with a restoration plan in order to establish native plants and address erosion once tamarisk is controlled or killed by subtropical tamarisk beetles.

The composition and structure of native plant communities in the SPRNCA continues to be threatened with the introduction of invasive species as a response to long-term drought, anticipated increase in wildland and prescribed fires, proliferation of recreational trails, and unauthorized grazing (BLM 2012a). Management actions are needed to restore riparian areas in advance of the arrival of the tamarisk beetle, and to rehabilitate burned areas or other areas of disturbance in order to ensure that threats to native vegetative communities are minimized.

2.3.12 Fire

Current Condition and Indicators

Fire History

Between 1991 and 2012, the SPRNCA had 114 wildfires that burned 6,820.4 acres (Figure 2.3-36). Approximately 60 percent of these fires were human-caused, and 18 percent were caused by lightning with the remaining 21 percent of unknown cause (Table 2.3-30). The majority of the unknown cause wildfires occured during a time of year that lightening typically does not occur (outside of monsoon season). Although the cause of these wildfires was never determined, the time of year that they started suggests human cause.

Table 2.3-30. Wildfire Acres by Cause 1991 Through 2012

SPRNCA Fire by Cause 1991-2012.		
Fire Cause	**Acres**	**Percent of Total**
Human	4,138.9	60.7
Natural	1,248.2	18.3
Unknown	1,433.3	21
Total	6,820.4	100

The human-caused fires have occurred in every month of the year. The peak month for human caused fires is in April. The naturally started fires occur between the months of March and October, with the peak month occurring in July (Table 2.3-31).

Table 2.3-31. Number of Fires and Associated Acres by Month

Month	Number of Human-caused Fires	Acres	Number of Natural Caused Fires	Acres	Number of Unknown Cause Fire	Acres	Total Number of Fires	Total Acres
Jan	4	.6	0	0	1	.1	5	.7
Feb	6	211.6	0	0	0	0	6	211.6
Mar	7	1,029.5	1	3	7	925.2	15	1,957.7
Apr	13	1,666.6	0	0	5	278.5	18	1,945.1
May	12	1,220.8	3	30.1	2	.4	17	1,251.3
Jun	6	1.7	2	1.1	3	216.7	11	219.5
Jul	1	.1	12	1212.8	1	.1	14	1,213

Month	Number of Human-caused Fires	Acres	Number of Natural Caused Fires	Acres	Number of Unknown Cause Fire	Acres	Total Number of Fires	Total Acres
Aug	2	.2	4	.4	0	0	6	.6
Sep	1	3	3	.3	0	0	4	3.3
Oct	3	2.2	2	.5	0	0	5	2.7
Nov	8	1.6	0	0	0	0	8	1.6
Dec	4	1	0	0	1	12.3	5	13.3
Total	**67**	**4,138.9**	**27**	**1,248.2**	**20**	**1,433.3**	**114**	**6,820.4**

The majority of the fires that occur in the planning area are Class A, B, and C-sized fires (0-100 acres). Occasionally fires occur that reach Class D, E, and F-size (100-5,000 acres). Table 2.3-32 shows the number of fires and associated acres by size class from 1991 through 2012.

Table 2.3-32. Fire History by Size Class 1991 through 2012

SPRNCA Fire History 1991-2012			
Size Class	**Description**	**Number of Fires**	**Total Acres**
A	< 0.25 acres	59	5.9
B	0.25- 10 acres	33	41.8
C	10-100 acres	12	598.7
D	100-300 acres	4	587
E	300-1,000 acres	3	1906
F	1,000-5,000 acres	3	3681
G	>5,000 acres	0	0
Total		114	6,820.4

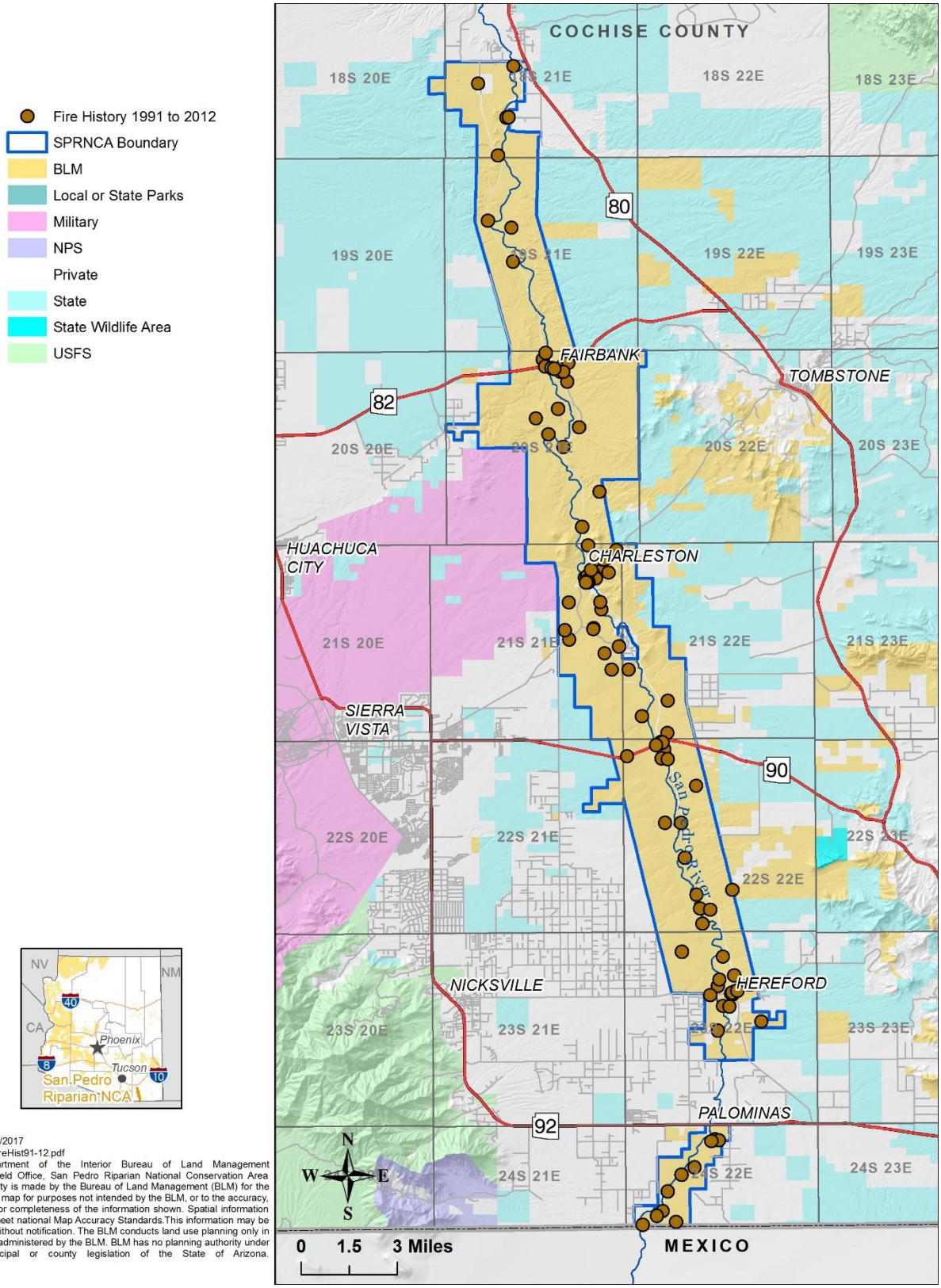

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Figure 2.3-36. Fire History 1991 to 2012

Fire Regime Condition Class

Fire Regime Groups

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning. The five natural (historical) Fire Regime Groups (FRGs) are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant over-story vegetation in Table 2.3-33.

Table 2.3-33. Fire Regime Groups

Group	Frequency	Severity	Severity Description
I	0-35 years	Low/ Mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory.
II	0-35 years	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation.
III	35-200 years	Mixed/Low	Generally mixed-severity; can also include low-severity fires.
IV	35-200 years	Replacement	High-severity fires.
V	200+ years	Replacement/Any Severity	Generally replacement-severity; can include any severity type in this frequency range.

Fire Regime Condition Class

The Fire Regime Condition Classification (FRCC) System measures the extent to which vegetation departs from reference conditions. In other words, how the current vegetation conditions differs from a particular reference condition. Departures from reference condition could be a result of changes to key ecosystem components such as vegetation characteristics, fuel composition, fire frequency, fire severity and pattern, as well as other associated disturbances. Other disturbances include insects and disease mortality, non-native species encroachment, woody species encroachment, fire suppression, or other human activities (e.g., grazing, land use practices, Wildland Urban Interface [WUI]). The classification system is used to categorize existing ecosystem conditions and to determine priority areas for treatment as mandated by national direction. Fire regimes are classified into three condition class categories in Table 2.3-34.

Fire and fuels management related actions may improve sites within the various management areas that may be classified as FRCC II or III and working toward FRCC I. Areas classified as FRCC II and III can be characterized as areas (BLM 2013b):

- Where fire regimes have been moderately or significantly altered from their historical ranges as identified in the *Arizona Statewide Land Use Plan Amendment (LUPA) for Fire, Fuels, and Air Quality Management* (BLM 2004);
- Where there is a moderate to high risk of losing key ecosystem components;
- Where vegetative attributes have been significantly altered from their historical range; and
- Where fire return frequencies have departed from their historical frequencies by more than one return interval.

Table 2.3-34. Fire Regime Condition Classification

Condition Class	Description
Condition Class I	Represents vegetation communities with low departure from reference conditions Represents ecosystems with low degree of departure and that are still within an estimated historical range of variation as determined by modeling for the ecosystems reference conditions. Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range. Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire for resource benefit or prescribed fire.
Condition Class II	Represents ecosystems with moderate degree of departure from reference conditions. Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Where appropriate, these areas may need moderate levels of restoration treatments, such as prescribed fire, mechanical, chemical, or fire for resource benefit treatments.
Condition Class III	Represents ecosystems with high degree of departure from reference conditions. Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Where appropriate, these areas may need high levels of restoration treatments, such as mechanical or chemical treatments, before fire can be used to restore the historical fire regime.

The SPRNCA encompasses 56,431 acres. The vegetation communities are divided into three FRGs—Groups III, IV, and V, and each FRG is classified into one of three FRCCs in Table 2.3-35. The table below shows the acres for each FRCC. Vegetation communities account for 56,281 acres of the SPRNCA, and the remaining 150 acres fall within categories such as urban, agriculture, barren, etc.

The data shows that 99.7 percent (39,166 acres) of the fuels in FRG 3, 99.9 percent (7,481 acres) in FRG 4, and 99.7 percent (9,468 acres) in FRG 5 are classified as Condition Class 2 or 3, moderately or highly departed from historic reference conditions respectively. Overall, 0.7 percent (166 acres) of the vegetation communities are classified as Condition Class 1, or within historical range. This data shows that 99.7 percent or 56,281 acres are moderately to highly departed from the historic reference conditions (Figure 2.3-37).

Table 2.3-35. Fire Regime Groups

Fire Regime Group	Fire Regime Condition Class	Acres	% of total Area
3	1	131	.3
	2	963	2.5
	3	38,203	97.2
4	1	6	.1
	2	120	1.6
	3	7,361	98.3
5	1	29	.3
	2	856	9
	3	8,612	90.7

Fire Management

The *Arizona Statewide LUPA for Fire, Fuels, and Air Quality Management* (BLM 2004) assigns all BLM-administered public lands to one of two land use allocations for fire management (Figure 2.3-38). The allocation of lands is based on the DFCs of vegetation communities, ecological conditions, and ecological risks. The allocation of lands is determined by contrasting current and historical conditions and ecological risks associated with any changes. The FRCC concept helps describe alterations in key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuels loadings. BLM Fire Management Plans (FMPs) include the two allocations and identify areas that may allow wildland fire to be managed to meet multiple resource management objectives as well as, mechanical, biological, or chemical means to maintain nonhazardous levels of fuels and reduce the hazardous effects of unplanned wildland fires. They will also identify areas for exclusion from fire (through fire suppression), chemical, mechanical, and/or biological treatments (BLM 2004).

Wildland fire is a general term describing any nonstructure fire that occurs in the wildland. Wildland fires are categorized into two distinct types:

Wildfires: Unplanned ignitions or prescribed fires that are declared wildfires; and

Prescribed Fires: Planned ignitions.

Federal Wildland Fire Management Policy (USDA 2001) also states:

- "A wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives."
- "Management response to a wildland fire on federal land is based on objectives established in the applicable Land/RMP and/or the FMP."

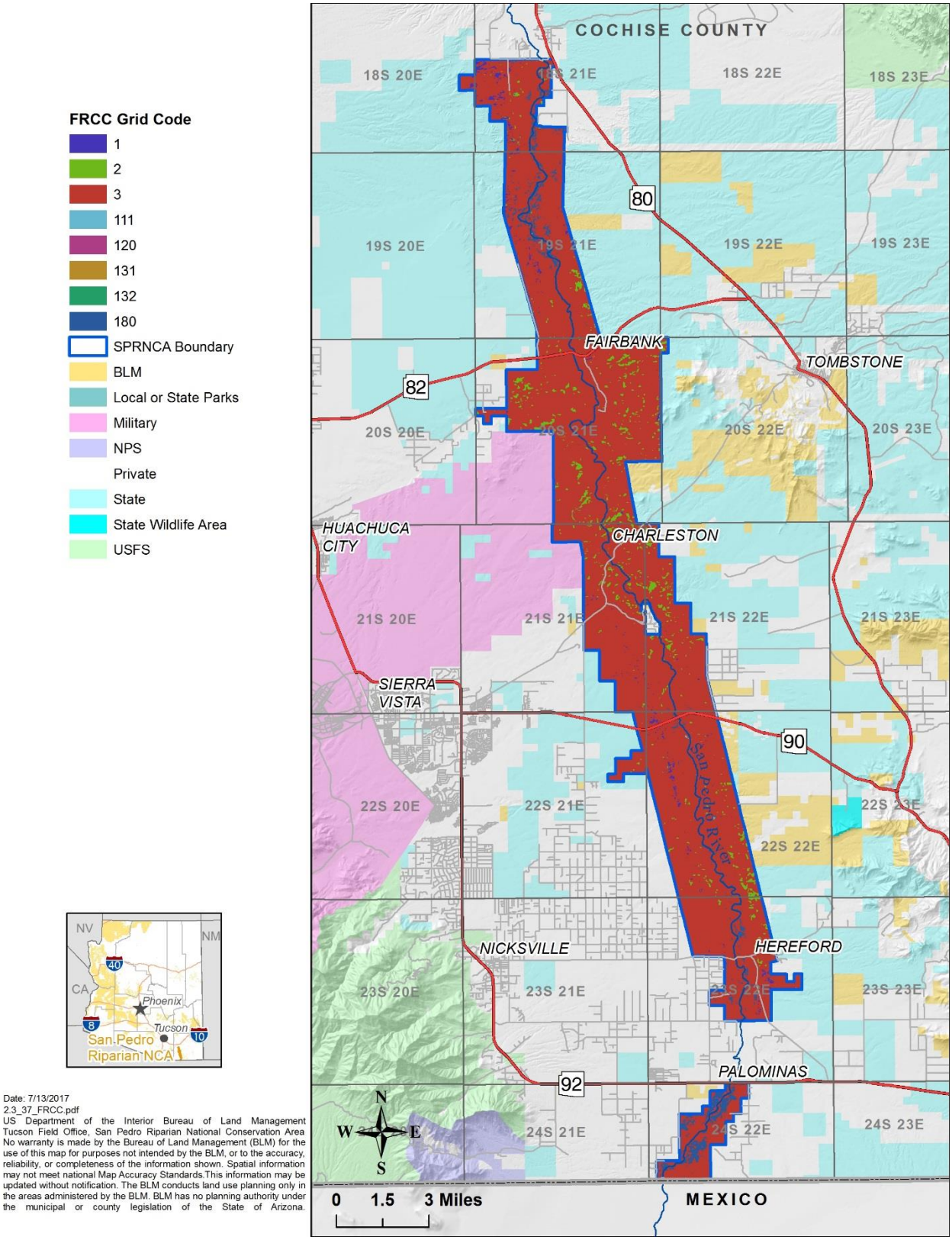

Figure 2.3-37. FRCC for the SPRNCA

The current policy clearly states that wildland fire analysis will carefully consider the long-term benefits in relation to risks both in the short and long term: "Fire, as a critical natural process, will be integrated into land use plans and RMPs and activities on a landscape scale, and across agency boundaries. Response to wildland fire is based on ecological, social, and legal consequences of fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate management response to fire." (USDA 2001).

Land Use Allocation 1-Wildland Fire Use: Areas suitable for wildland fire use for resource management benefit (Table 2.3-36).

> Areas where wildland fire is desired, and there are few or no constraints for its use. Where conditions are suitable, unplanned wildfire may be used to achieve desired objectives, such as to improve vegetation, wildlife habitat or watershed conditions, maintain nonhazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires and meet resource objectives. Where fuel loading is high but conditions are not initially suitable for wildland fire, fuel loads are reduced by mechanical, chemical or biological means to reduce hazardous fuels levels and meet resource objectives (includes WUI areas) (Arizona 2004).

Land Use Allocation 2-Non Wildland Fire Use: Areas not suitable for wildland fire use for resource benefit.

> Areas where mitigation and suppression are required to prevent direct threats to life or property. It includes areas where fire never played a large role, historically, in the development and maintenance of the ecosystem, and some areas where fire return intervals were very long. It also includes areas (including some WUI areas) where an unplanned ignition could have negative effects to the ecosystem unless some form of mitigation takes place. Mitigation may include mechanical, biological, chemical, or prescribed fire means to maintain nonhazardous levels of fuels, reduce the hazardous effects of unplanned wildland fires and meet resource objectives (Arizona 2004).

Table 2.3-36. SPRNCA Land Use Allocation

SPRNCA RMP LUPA Land Use Allocations	
Allocation	Acreage
Fire Use	22,552
Non Fire Use	35,892
Total	58,445

Land Use allocations are based on vegetation communities' interaction with fire (fire-adapted, fire-dependent) Figure 2.3-38 shows the land use allocations outlined in the LUPA and Figure 2.3-39 shows the vegetation communities associated with the land use allocation. Table 2.3-37 shows the vegetation communities and the associated land use allocation. The Chihuahuan mixed scrub and Chihuahuan whitethorn scrub vegetation communities are allocated for nonfire use because they typically have lower perennial and annual grass cover. Fires can carry in these areas with higher wind speeds.

Fire Cause Determination and Trespass Investigation

Agency policy requires determination of cause, origin, and responsibility for all wildfires. Fire trespass refers to the occurrence of unauthorized fire on agency-protected lands where the source of ignition is tied to some type of human activity. The agency must pursue cost recovery, or document why cost recovery is not required, for all human-caused fires on public lands (BLM 2013c).

Border Response Protocol

All wildfire operations that occur at night will have law enforcement onsite for security purposes. All wildfire operations that occur south of Highway 92, during the day and night, will have law enforcement onsite for security purposes.

Fire personnel and equipment cannot cross into Mexico without first contacting the FMO and ensuring that appropriate clearances are obtained.

Unexploded Ordinance

The area near the boundary of BLM land and Fort Huachuca, in particular near the Charleston Hills, had unexploded ordnance (UXO) on the surface (Figure 2.3-40). The UXO is generally limited to the military installation but can be found on BLM lands. Fire management operations in this area should proceed with caution. In the fall of 2013, the UXO area was surveyed and any UXO found was disposed of. Fire operations in this area should continue to proceed with caution.

Table 2.3-37. SPRNCA Land Use Allocation by Vegetation Type

Vegetation Description	Land Use Allocation	Acres
Chihuahuan Mixed Scrub	Non Fire Use	2,403
Chihuahuan Whitethorn Scrub	Non Fire Use	17,655
Interior Riparian/cottonwood-Willow Forest	Non Fire Use	696
Interior Riparian/Mesquite Forest	Non Fire Use	1,575
Interior Riparian/Mixed Broadleaf Scrub	Non Fire Use	2
Interior riparian/Mixed Riparian Scrub	Non Fire Use	6,505
Semidesert Mixed Grass-Mesquite	Fire Use	1,645
Semidesert Mixed Grass-Mixed Scrub	Fire Use	20,121
Semidesert Mixed Grass-Yucca-Agave	Fire Use	787
Sonoran Riparian/Mixed Riparian Scrub	Non Fire Use	2,353
Agriculture	Non Fire Use	4,703
Total		58,445

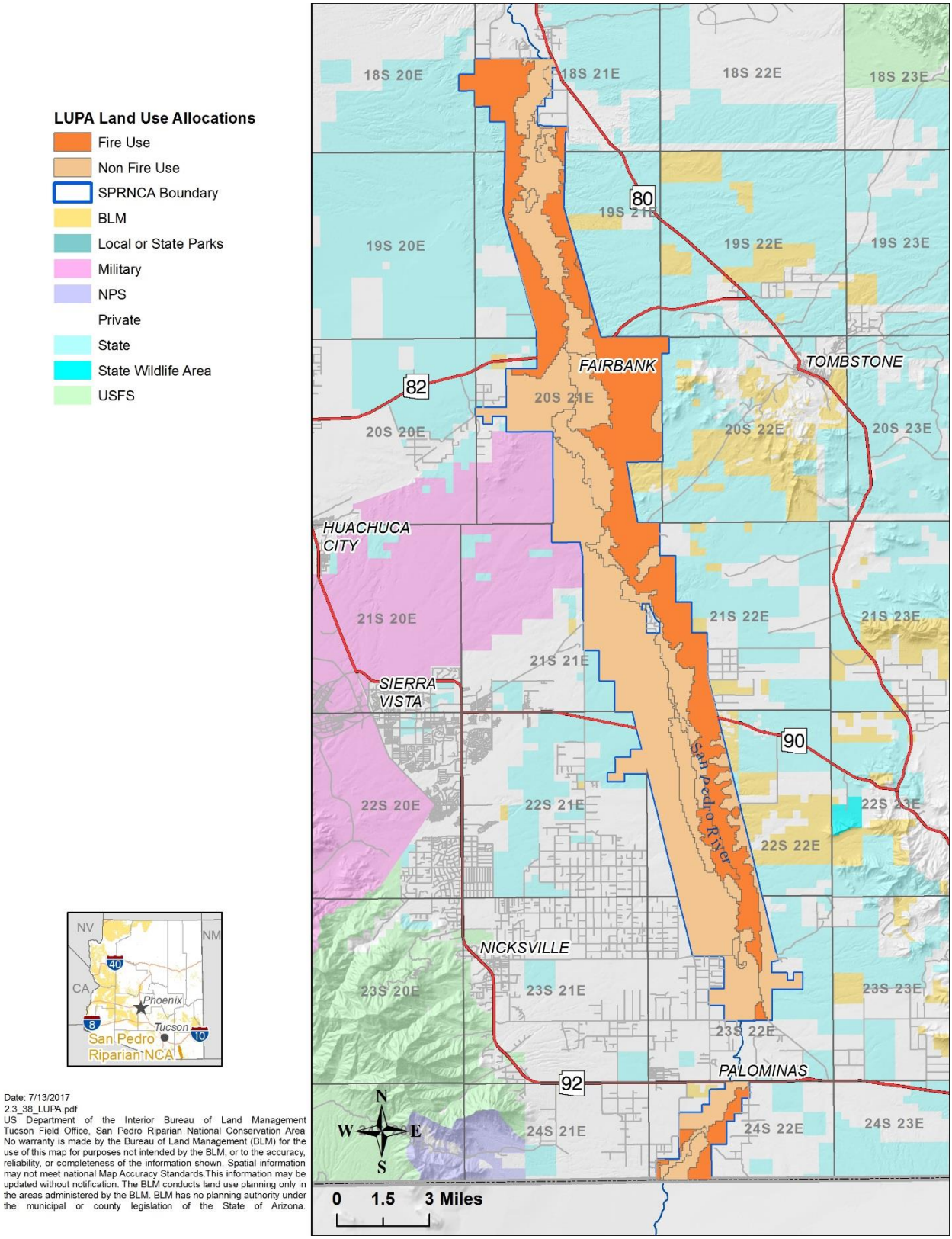

Figure 2.3-38. Land Use Allocation

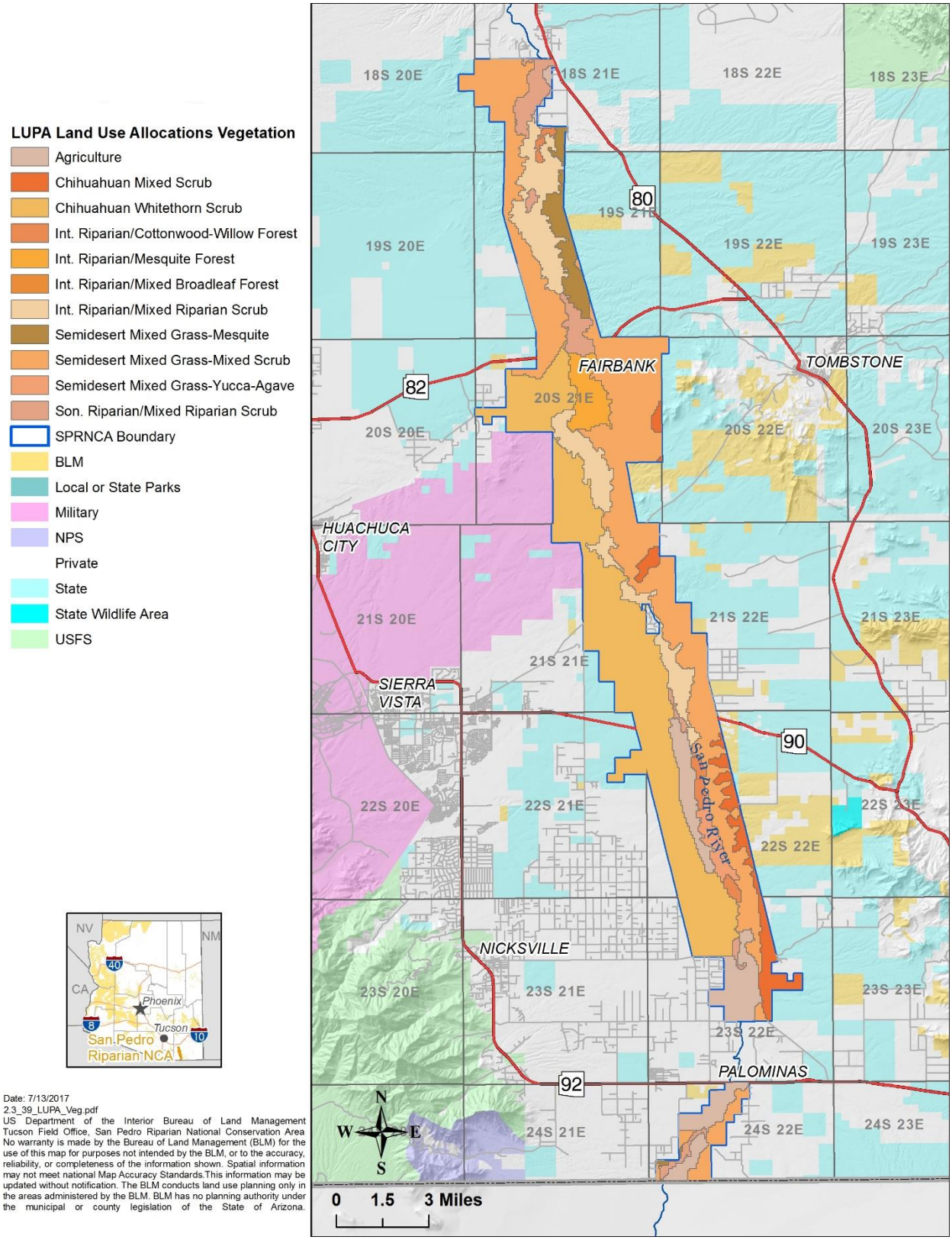

Figure 2.3-39. Land Use Allocation Vegetation Types

Fuels Management

The LUPA establishes DFCs, land use allocations, and management actions, and amends existing land use plan decisions concerning fire, fuels, and air quality management. The LUPA amendment includes use of fire and other vegetative treatments as tools to achieve resource management objectives. Fire management in the amended land use plans also include adaptive management for wildfire; allowance of fire to resume a more natural ecological role within each ecosystem; the use of prescribed fire; and mechanical, chemical, or biological treatments to meet resource objectives and reduce hazardous fuels on public lands inside and outside WUI areas (BLM 2004).

The LUPA ensures that the Gila District Fire Program manages fire and fuels according to the current policies and requirements and to meet the DFCs for those and other resources. Fire management objectives are developed and coordinated from resource management objectives. The utilization of prescribed fire, mechanical, biological, and chemical fuels treatments combined with fire suppression and rehabilitation are the tools fire management will use to achieve the resource objectives (BLM 2004).

The following management actions are established by the LUPA:

- Fire is recognized as a natural process in fire-adapted ecosystems and is used to achieve objectives for other resources;
- Fuels in WUI areas are maintained at nonhazardous levels to provide for public and fire fighter safety;
- Prescribed fire activities comply with federal and state air quality regulations; and
- Each vegetation community is maintained within its natural range of variation in plant composition, structure, and function; and fuels are maintained below levels that are considered to be hazardous.

The *Gila District FMP* (BLM 2013b) outlines the fuels treatment priorities in the SPRNCA for each LUPA vegetation type as the following:

Chihuahuan Desert Scrub: The DFCs are for adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the DFCs are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to nonhazardous levels (BLM 2004).

Semidesert Grassland: The DFC are for perennial grasses to cover its historic range of variability, for annual grass cover to be reduced, and for fire to naturally inhibit the invasion of woody plants such as juniper, tarbush, whitethorn, and creosote bush (BLM 2004).

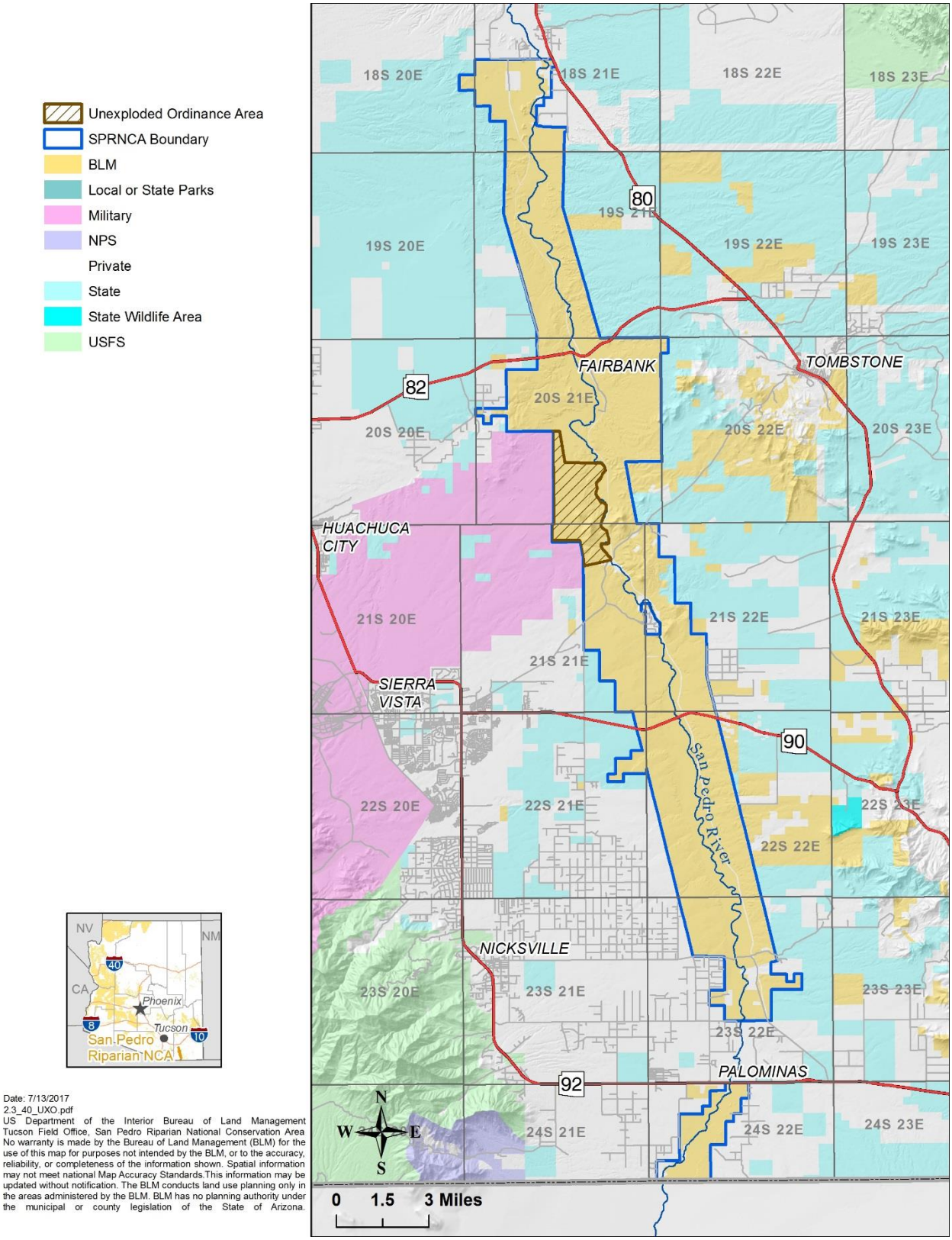

Figure 2.3-40. UXO Area

Riparian: The DFCs are that annual weed cover and density are controlled and ladder fuels and downed woody debris are limited or not present. Disturbances that can potentially reduce natural vegetation cover are managed to maintain adequate cover and mix of natural plant species (BLM 2004).

Upland Sonoran Desert Scrub: The DFCs are for an adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the DFCs are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to nonhazardous levels (BLM 2004).

The *Gila District FMP* (BLM 2013b) outlines the fuels treatment objectives and strategies in the SPRNCA as the following:

- Gila District Fire and Fuels Staff will implement a science-based, integrated vegetation management program that is consistent with USDI and BLM policy and direction, and meets the goals and objectives of the National Fire Plan.
- Prescribed fires on the SPRNCA may be used to achieve resource management objectives as defined in prescribed FMPs (BLM 1989). The development of prescribed FMPs will involve cooperative efforts from the Gila District Fire Management personnel and Resource Management Specialists.
- Within the SPRNCA, BLM will use prescribed fire to maintain wildlife habitat diversity and to reduce hazardous build-up of fuels (BLM 1989).
- Use prescribed fire to improve terrestrial habitat (BLM 1989).
- Within the SPRNCA, BLM will reduce the potential for damage to resources and structures within the SPRNCA and to adjacent land owners' properties. The Tucson Force Account and Gila District Fire Management staff have maintained a firebreak at Boquillas Ranch since 2001, as well as other historic and cultural areas. The BLM will do this by using firebreaks, both natural and constructed, as determined by resource and fire objectives. The following areas will be emphasized: the southwest portion of the SPRNCA, where extensive fuels are within one mile of the El Paso Natural Gas pipeline; and near any structure within the property (BLM 1989).
- Adhere to species-specific Conservation Measures regarding Huachuca water umbel, Pima pineapple cactus (*Coryphantha scheeri var. robustispina*), jaguar, lesser long-nosed bat, Gila chub, Gila topminnow, Longfin dace, Chiricahua leopard frog, southwestern willow flycatcher, and the yellow-billed cuckoo as per the *2004 Biological and Conference Opinion* for the LUPA.

Biomass Utilization

For BLM lands in the SPRNCA, the current SPRNCA *Riparian Management Plan* does not support bio-mass utilization (BLM 1989).

- Prohibit firewood cutting (including the gathering of down and dead wood) within the San Pedro River EIS area.

However, Gila District Fire Management recommends that wood harvesting from vegetation treatments be allowed. This will allow the use of any useable bio-mass (firewood, millwood, etc.) generated during vegetation treatments completed on the SPRNCA.

The Gila District Fire Management Program completed one seeding treatment in 2006 that covered 53.3 acres (Figure 2.3-41).

Mechanical Treatments

The Gila District Fire Management Program completed 4,112.51 acres of mechanical treatments from 2001 through 2012 (Table 2.3-38). Mechanical treatments include mowing, chainsaw thinning, weed whacking, and mastication treatments. These mechanical treatments were implemented as firebreaks. Table 2.3-38 shows the number of acres treated mechanically per year, average 15 to 18 mechanical treatments a year. Figure 2.3-42 shows the location of the most recent mechanical treatments.

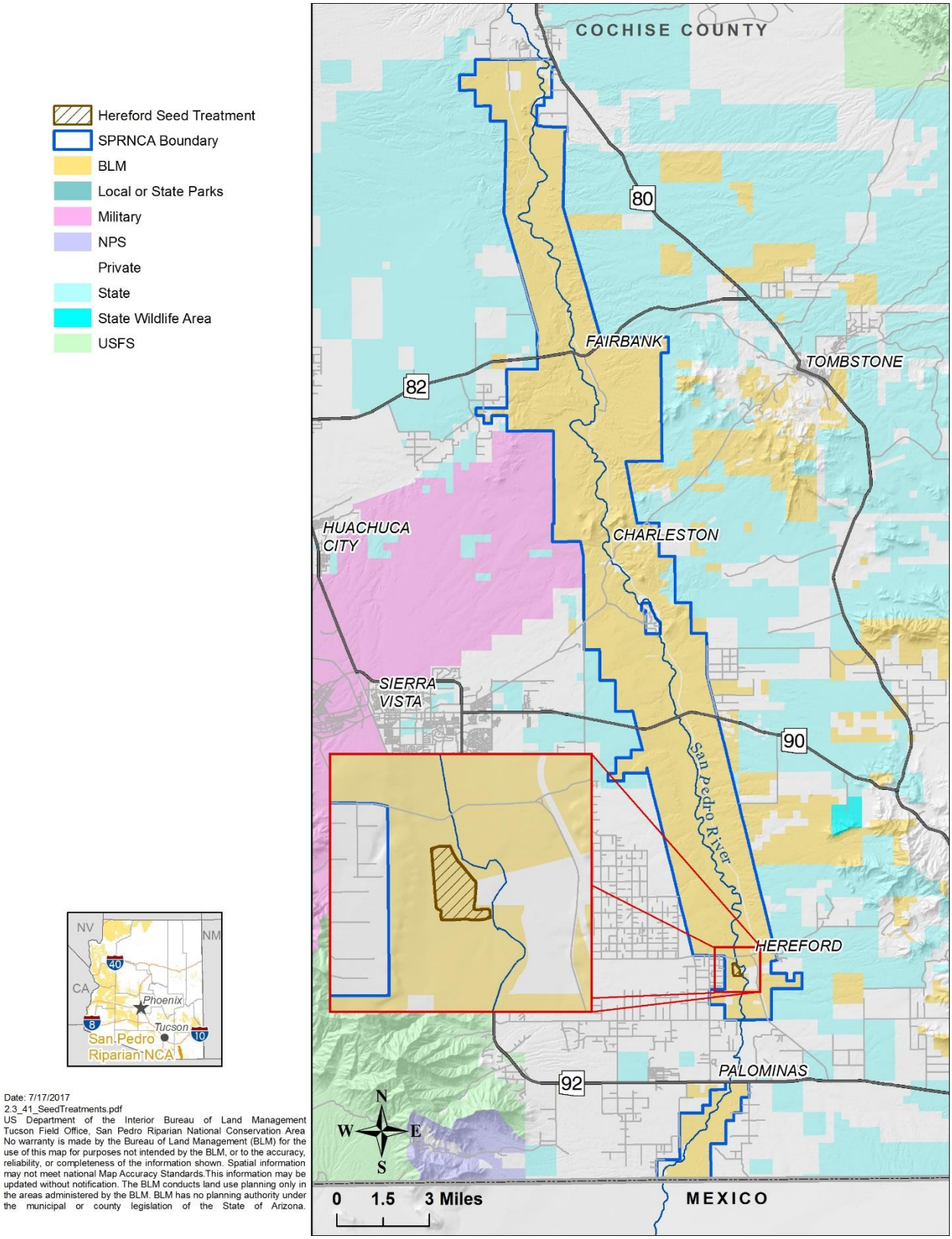

Figure 2.3-41. SPRNCA Seed Treatments

Table 2.3-38. SPRNCA Mechanical Treatment Acres 2001 Thru 2012

SPRNCA Mechanical Treatment Acres 2001-2012	
Year	**Acres**
2001	435.37
2002	435.37
2003	486.15
2004	490.37
2005	505.35
2006	523.60
2007	194.19
2008	204.60
2009	235.00
2010	204.16
2011	194.19
2012	204.16
Total Acres	4,112.51

Prescribed Fire

The Gila District Fire Management Program completed 15 burn plans consisting of 56 treatment units covering 7,754 acres between 1998 and 2007 (Figure 2.3-43). Twenty-nine of those treatment units were treated with prescribed fire (broadcast and pile) for 3,815 acres from 1998 through 2009 (Table 2.3-39).

Table 2.3-39. SPRNCA Prescribed Burn treatments 1998 thru 2009

SPRNCA Prescribed Burn Treatments 1998-2009	
Year	**Treated Acres**
1998	424
1999	438
2000	747
2002	497
2003	540
2004	85
2005	432
2006	10
2007	622
2009	20
Total	3,815

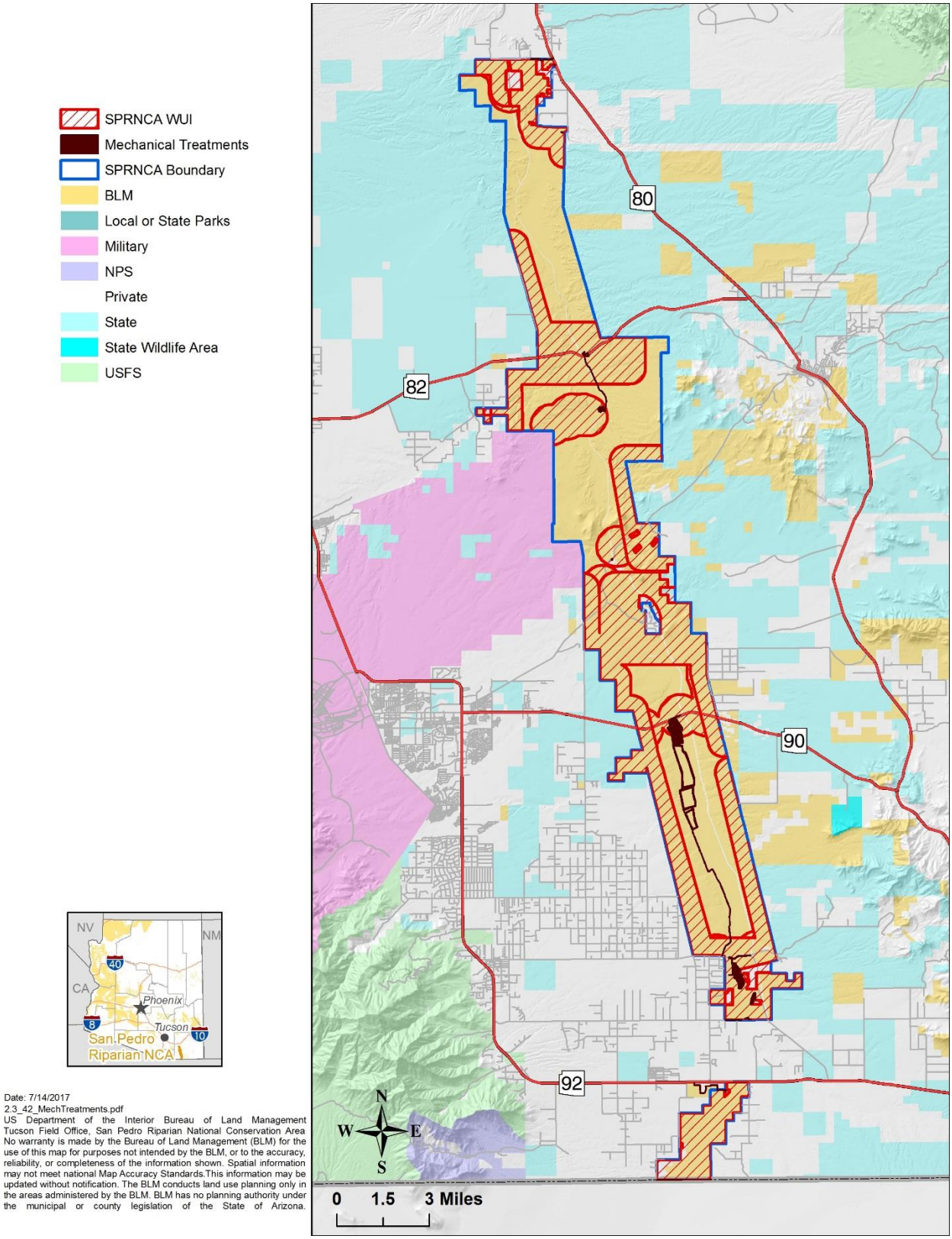

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Figure 2.3-42. Mechanical Treatments

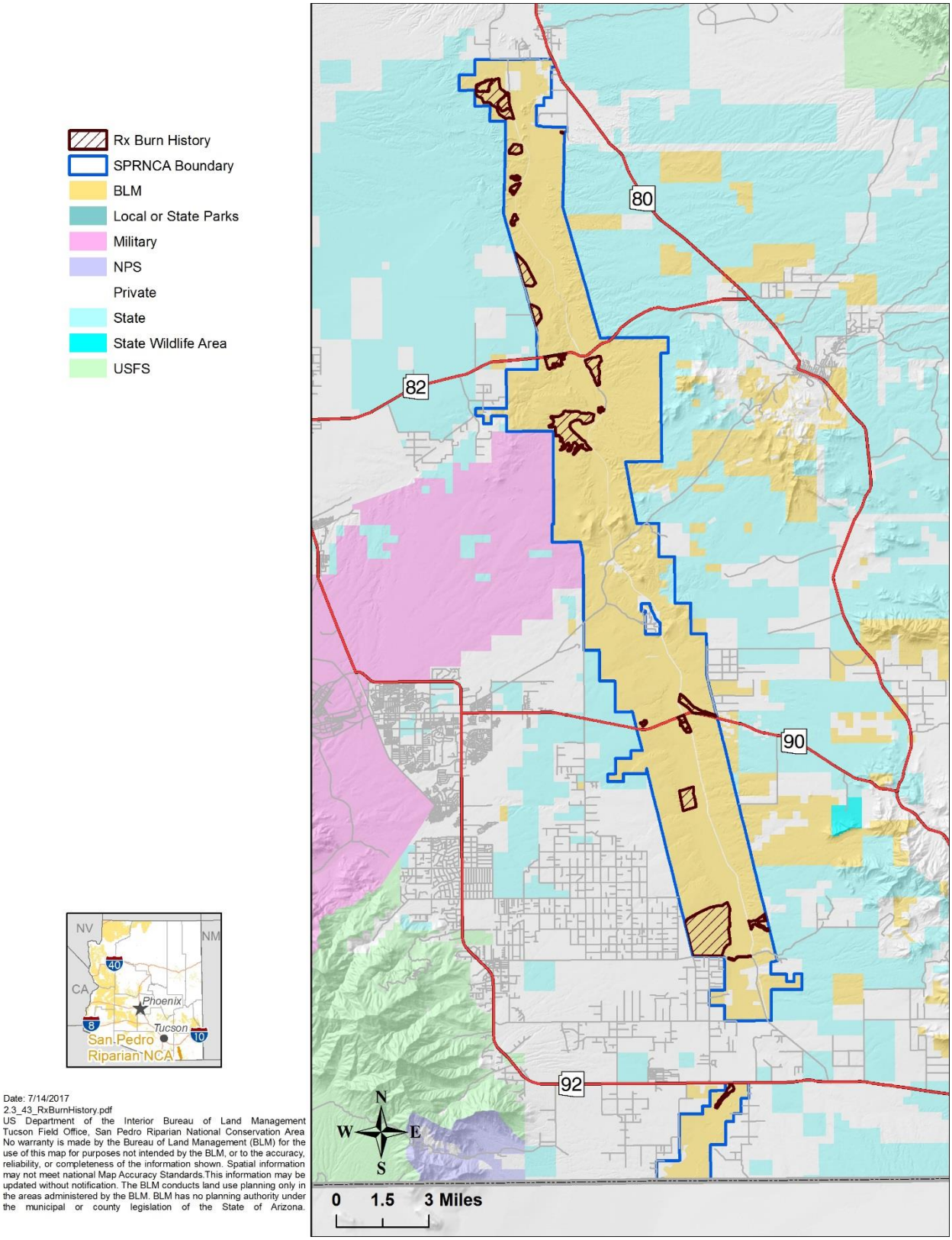


Figure 2.3-43. SPRNCA Prescribed Burn Treatments

Community Assistance

The Gila District FMP 2013 Community Assistance and Protection priorities, as stated in the LUPA include, reducing human-caused wildfires;

- BLM will undertake education, enforcement, and administrative fire prevention mitigation measures;
- Education measures will include various media information, a signing program, information as to the role of fire within local ecosystems, and participation in fairs, in parades, and with the public;
- Enforcement will be accomplished by providing training opportunities for employees interested in fire cause and determination; and
- Administration includes expanded prevention and education programs with other cooperator agencies.

The Gila District Community Assistance and Protection Objectives include:

- Identifying hazardous fuel reduction projects, public and firefighter safety issues, and partnering opportunities with local Firewise groups;
- Completing Community Wildfire Protection Plan (CWPP) with all federal, state, county, city, private, and local partners in compliance with the guidelines such as:
    - Preparing a CWPP-A Handbook for Wildland-Urban Interface Communities, 2004;
    - Best Management Practices for Creating a CWPP, GTR-NRS-89, 2012;
    - Southwest CWPP Guide, Southwest Strategy; and
    - The Federal Land Assistance, Management and Enhancement Act of 2009.
- Implement recommended actions within completed CWPP or agency equivalent prevention and mitigation plans;
- Coordinate and collaborate with CWPP partners during hazardous fuels treatment implementation; and
- Reduce risks to WUI, WUI infrastructure, agency administrative sites, high visitor use areas, and ingress/egress corridors.

The Arizona Firewise Communities program is the primary tool to achieve wildland fire hazards awareness to the public. Technical assistance is being provided by the BLM, allowing Firewise groups to develop local plans that meet mutual goals with the BLM.

There are four CWPPs completed in or adjacent to the SPRNCA; Palominas CWPP, Upper San Pedro CWPP, Bisbee CWPP, and the Cochise County CWPP. These plans identify WUI wildfire risk areas and recommend actions to reduce the risk. Figures 2.3-44 shows WUI areas within the SPRNCA (34,759 acres), and Figure 2.3-45 shows the WUI areas surrounding the SPRNCA (448,450 acres).

The WUI areas in these figures, totaling 483,209 acres, are a compilation of WUI areas identified in the Upper San Pedro CWPP, Palominas CWPP, Bisbee CWPP, and the Cochise County CWPP.

Emergency Stabilization and Rehabilitation

There are no recorded Emergency Stabilization and Rehabilitation (ESR) efforts related to fire suppression activities. Natural recovery appears to be the preferred method of post-fire recovery. For ESR guidance, refer *to DOI-BLM Burned Area Emergency Stabilization and Rehabilitation Handbook*, H-1742-1 and *BLM AZ Programmatic Emergency Stabilization and Rehabilitation Plan*, BLM-AZ-EA-934-2006-0001.

Burned areas will be assessed by the appropriate resource specialists to determine suitable and effective ESR needs to meet current and anticipated environmental conditions. Rehabilitation and restoration activities will be evaluated to assess effectiveness of treatments.

Trends and Forecast

Wildland fires will continue to ignite and burn in and around the SPRNCA, and increased frequency and severity of these fires is forecasted due to a multitude of factors. Fire suppression costs will also increase as fires become larger and more intense due to changes in fuels. As recreation and other human uses increase in the SPRNCA as a result of its designation, so does the potential of human-caused wildfire.

Wildland Urban Interface (WUI)

Within the TFO, the amount of area classified as WUI has increased dramatically over the past two decades. Many large pieces of private land adjacent to BLM lands have been subdivided, while smaller acreages within larger pieces of contiguous BLM land are also being developed. Development has slowed due to the current large-scale economic downturn, but this slowdown is expected to be temporary, and subdividing of large blocks of private land is expected to continue into the near future.

Within the area of the SPRNCA, WUI expansion has occurred around the communities and rural areas surrounding the SPRNCA. With increased WUI in and around the SPRNCA, the need for fuel reduction projects will likely increase. This could have a major impact on the funding requirements for the fire/fuels program in the SPRNCA. The increased WUI, along with other factors such as land ownership (private), riparian resources, ASLD land management polices, and changes to vegetation communities, it is not recommended to utilize natural ignited wildfires to achieve resource management goals and objectives.

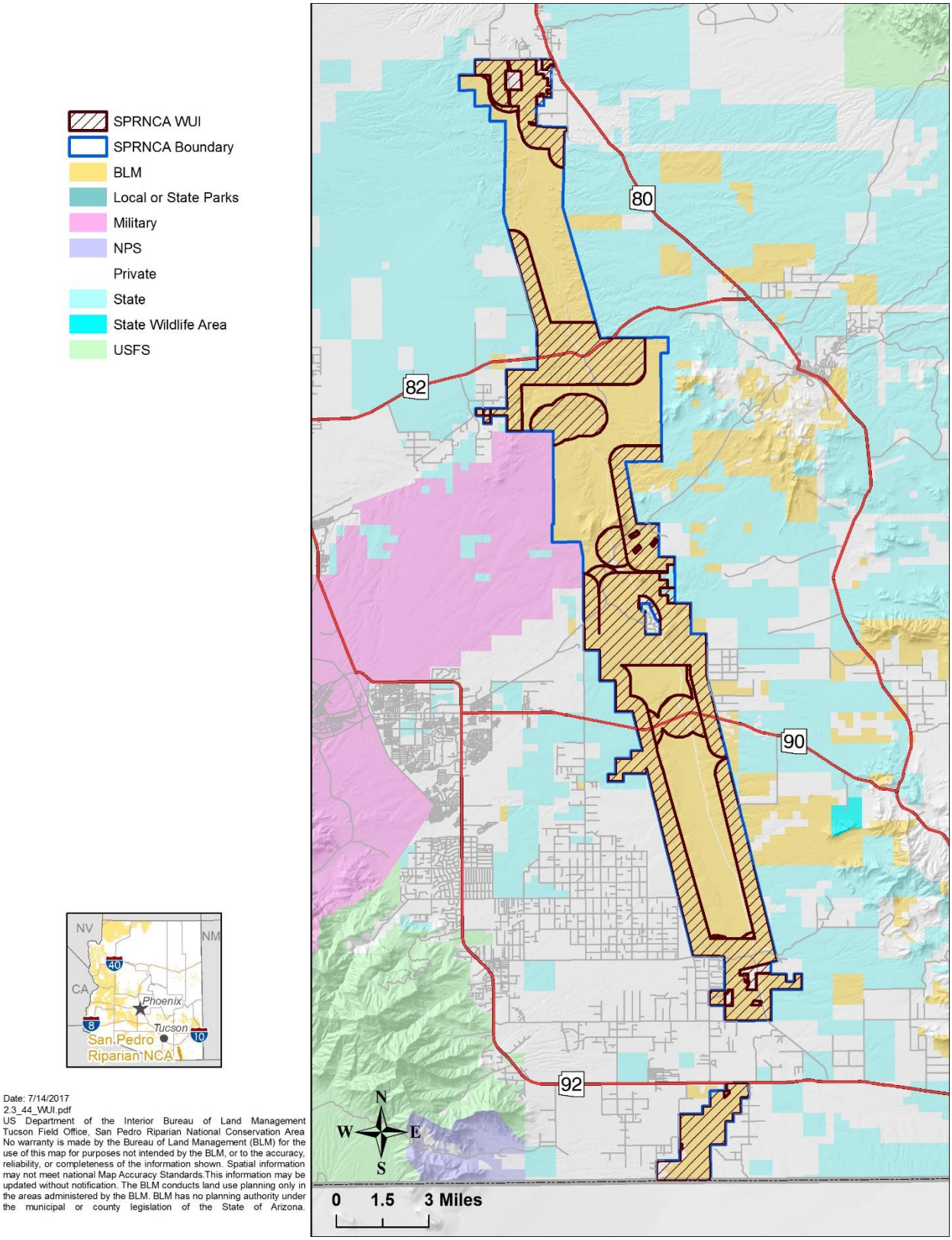


Figure 2.3-44. WUI areas in the SPRNCA

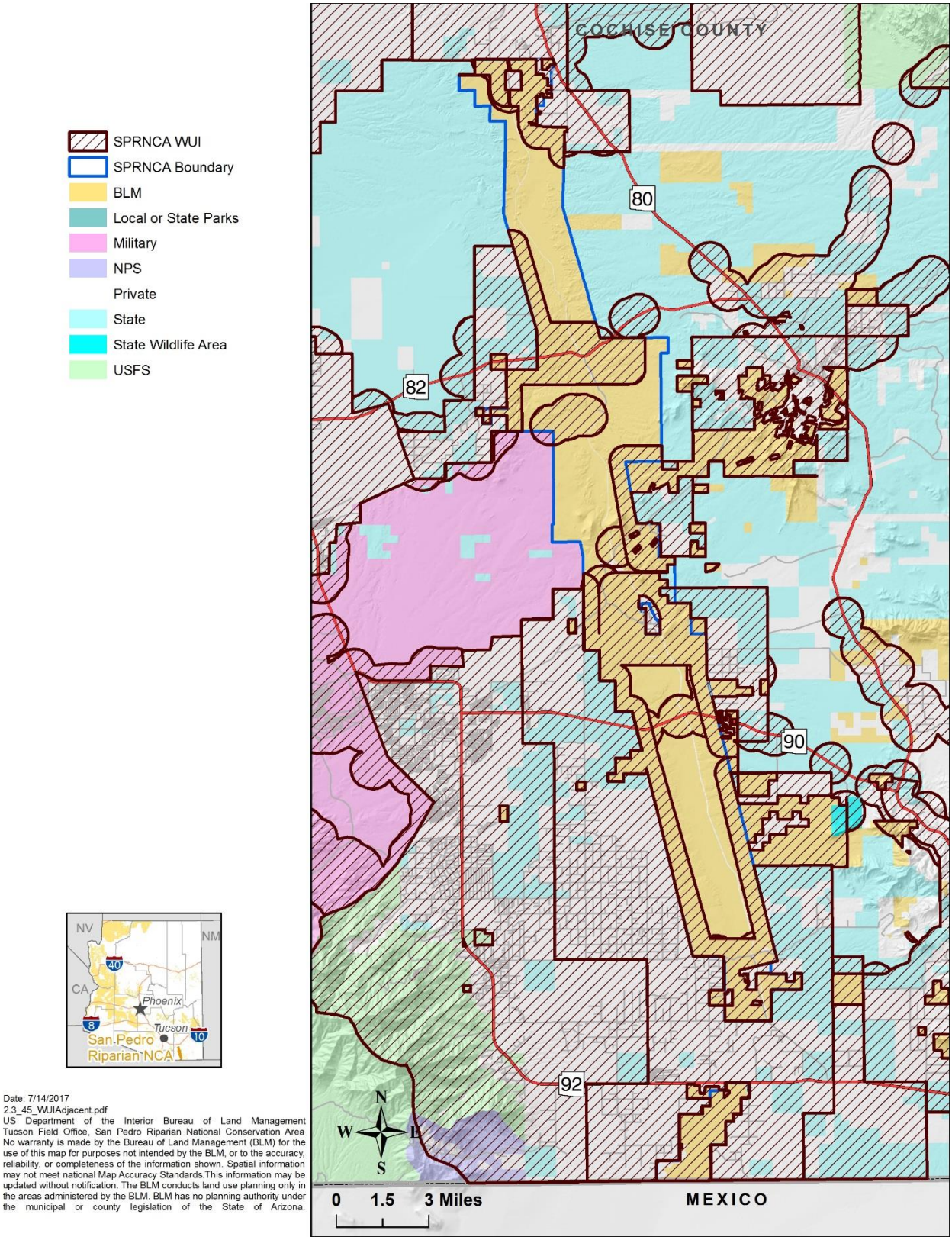


Figure 2.3-45. WUI Areas Adjacent to the SPRNCA

Changes to Plant Communities

Changes in vegetation, especially the woody species encroachment into perennial grasslands, along with fire suppression polices, and land use practices have altered fire regimes in the San Pedro River watershed. Many areas have shifted from grass dominated to shrub and tree dominated ecosystems. In many areas, the reduced herbaceous component has led to erosion concerns. While other areas still contain enough herbaceous cover to carry fire, with the added shrub and tree overstory, fire behavior characteristics have increased (flame lengths, rates of spread, and severity).

Changing Climate Trends

Research indicates that changes are occurring and fire management seems to be readily impacted by minor changes in climate, both in the frequency, intensity, and size of fires but also in the type of vegetative recovery in burned areas. It is important to maintain resilience and diversity across the landscape by utilizing mechanical, chemical, biological, and prescribed fire vegetation management techniques to accomplish resource management objectives. The latest global and local research and recommendations should be read and understood to better understand the management of natural resources in the face of changing climate trends.

Air Quality

Another trend is that smoke from planned and unplanned ignitions is beginning to be more of an issue, as development expands around the SPRNCA. Wildfires and prescribed fire will receive greater public scrutiny due to impacts from smoke. Thus, fewer and smaller controlled burns might be the norm in the future, and/or mechanical vegetation treatments may replace the use of prescribed fire.

2.3.13 Cultural and Heritage Resources

Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing cultural resources for public benefit. Cultural resources are recognized as fragile, irreplaceable resources with potential public and scientific uses, representing an important and integral part of our nation's heritage. Cultural resources are contained within a definite location of human activity, occupation, or use identifiable through field inventories (i.e., surveys) historical documentation, or oral evidence (BLM M-8110). Archaeological resources are material remains of human life or activities that are at least 100 years of age. The term "cultural resource" also includes historic or architectural sites, structures, or places with important public and scientific uses, and may include locations of traditional cultural or religious importance to specified social or cultural groups.

National Historic Landmarks

NHL sites are places where nationally significant historical events occurred, that are associated with prominent Americans, that represent those pivotal ideas that shaped the nation, that teach about the past, or that are premier examples of design or construction. These sites illustrate the complex story of the nation that spans more than 15,000 years, from the earliest native people to the exploration of outer space.

In 1935, the US Congress charged the Department of the Interior with the responsibility for designating nationally significant historic sites, buildings, and objects and promoting their

preservation for the inspiration and benefit of the people of the United States. In 1960, the National Park Service (NPS) took on the administration of the NHL program.

The NHL designation recognizes properties that are nationally significant to the nation as a whole. NHLs are automatically listed in the National Register of Historic Places (NRHP). Within the SPRNCA, there are two NHL properties: the Murray Springs Clovis Site and the Lehner Mammoth-Kill Site.

Indicators

The primary indicator for cultural resources is the integrity of the cultural resource property. Prehistoric or historic cultural resource sites, structures, or objects listed in or eligible for listing in the NRHP are managed as directed by 36 CFR 800, Protection of Historic or Cultural Properties. Additionally, those sites where data is insufficient to make an eligibility determination are treated as though they are eligible until supporting information shows otherwise. Many cultural resource sites located within the SPRNCA have not been formally evaluated for eligibility determination to the NRHP. Currently, inside the SPRNCA planning area, only a handful of cultural resource sites are actually listed on the NRHP. Cultural resource sites with the potential to yield scientific information are typically considered eligible and are avoided during surface disturbing activities. Specific indicators for measuring the current condition of cultural resources are derived through cultural resource site monitoring techniques, which can indicate or show loss of site integrity. Indicators for the loss of site integrity include the extent or intensity of natural wildland fire activity, past (project-related) ground disturbance, past and present grazing activity, recreation use both past and present, past research performed at the site, and unauthorized activity, such as looting and artifact theft.

Current Conditions

According to the AZSITE cultural resource database (Arizona State Museum), there are 216 cultural resource sites recorded within the SPRNCA. Cultural resources range in size from 10 acres to 30 meters. Many additional sites are expected to be present inside the SPRNCA. However, areas would require Class III ground intensive pedestrian surveys to record any additional sites. Currently, active Class III cultural resource surveys are only being performed in conjunction with Section 106 of the National Historic Preservation Act (NHPA) on acres where projects are scheduled to occur. There are approximately 176 prehistoric sites within the SPRNCA. Examples of known site types include: village sites, rock art and petroglyph sites, human habitation areas both permanent and semi-permanent, rock shelters and pottery/lithic scatters. There are approximately 40 historic sites within the SPRNCA planning area including milling towns, railroads, Spanish American presidios, missions, early homesteads, and roads, trails and cemeteries.

Current site condition is assessed by qualitative observation at the site surface level and secondarily through use of site monitoring records. Current site condition is characterized and measured by observation of the site's physical area. Examples of questions to ask when trying to assess a site's condition include:

- How much integrity value does the site contain at the current time?
- Has it been altered by natural or human forces? If so, to what degree?

- How intact is the site?

Terrain, past ground disturbance (projects), geomorphology, access, visibility, and past land use patterns are all factors which influence site condition. For the sites located within the SPRNCA planning area site conditions range from excellent to destroyed. A limited percentage of SPRNCA cultural resource sites are actually in good, fair, or poor condition.

Trends

Cultural resource sites are nonrenewable resources affected constantly by natural factors and human factors. Sites are susceptible to natural processes such as weathering, erosion, animal activity, and many kinds of human activity. Cultural resource sites are also susceptible to human factors. For example, proposed projects being planned and executed in areas where there is a high site density or where cultural resource sites have experienced high thresholds of looting and vandalism activity. Both human factors and natural processes can directly contribute to loss of site integrity and lead to site deterioration.

The degree to which natural processes and human activity affects a site depends on the site type, setting, and the nature of the process and/or activity affecting them. Natural processes are dynamic and have a constant influence on sites. Examples of sources of change to condition include livestock trampling, recreation use, motorized travel OHV use, natural erosion, weathering, and decay.

Most cultural resource sites are identified when Section 106 of the NHPA compliance is required, usually precipitated by a proposed ground disturbing project. An intermediate number of all recorded and monitored cultural resource sites within the SPRNCA are in stable condition. Current management direction and emphasis requires avoidance as the preferred treatment to avoid project impacts to cultural resource sites. In these cases, the trend for cultural resource sites is towards a desired condition of protection and conservation.

Table 2.3-40. Cultural Time Periods Represented in the SPRNCA

Cultural time period	Timeframe	Characteristics
Paleoindian	Clovis culture 9,500-9,000 BC	Clovis artifacts have been found in primary contexts with megafauna located at sites in the San Pedro River Valley. Paleoindian sites are highly significant due to their scarcity.
Archaic	8,500 BC- AD 1	Increased sophistication in hunting/gathering techniques. Settlement systems with increasing dependence on plant resources. Archaic sites are scientifically important for the ability to study culture change and cross cultural interaction

Cultural time period	Timeframe	Characteristics
Early Agriculture Period	1200 BC- AD 1	Maize appears in archaeological record.
Formative	AD 1-1450	Addition of pottery to archaeological record. Groups tend to share similar traits such as subsistence systems, architectural forms, stone tool assemblages, and mortuary customs for the dead. Introduction of ceramic figurines and vessels.
Hohokam Period Sedentary Classic	 1100-1300 AD 1300-1450 AD	 Development of more formalized and substantial architectural features. Elaborate material culture and social organization. Mogollon and Hohokam cultural tradition begins. Development of adobe architecture. Concept of Salado develops.
Protohistoric Period	1450-1691 AD	First formal Spanish exploration-Coronado's expedition. Groups of Athabaskan (Apache) speaking people began to migrate to the area. Hohokam collapse. Protohistoric Mission Indians presence in San Pedro River Valley. Recognition of Apache cultural sites; sites are lacking in archaeological record. Also, importance of Sobaipuri marks the end of prehistoric time period and origin of present day Native Americans.
Historic Period	1691-1950 AD	Colonization begins with the establishment of the mission system. DeNiza and Kino Spanish exploration. Mexican-American War in 1848. In 1780 Presidio Santa Cruz de Terrenate in operation.
Spanish Colonial Period	1692-1821 AD	Kino expeditions to southeastern Arizona; establishment of missions at O'odham settlements.
Mexican Period	1821-1854 AD	Mexico gains independence from Spain. Period of Mexican land grants established on the San Pedro River.
US Period	1854-present	Gadsen Purchase made area in southeastern Arizona to the international border part of the United States. Southern Pacific Railroad built across southern Arizona. Fort Huachuca established. Mining/mill towns spring up adjacent to the San Pedro River. San Pedro River Valley historic towns begin; Charleston, Millville, Contention City and Fairbank.

Forecast

The forecast for cultural resources within the SPRNCA is determined by combining knowledge of current site conditions on the ground coupled with the anticipated effects of what could happen in the future. Two factors that influence site condition include, human elements and natural elements. Human elements that can influence site condition include the following; recreation use, vandalism, and looting of sites as well as planned project activities. Natural elements include erosion, weathering, flooding, and decay. A general qualitative trend for the SPRNCA indicates a downward trend is predicted for cultural resource site condition into the future. This is based on cultural resource site monitoring data acquired over the past eight years. An increase in visitor use especially at high profile public visitation type cultural resource sites is predicted. Increases in outdoor recreation use through OHV and hiking clubs coupled with the public's ever increasing demand for formal cultural resources on-site interpretation (e.g., signage and docent-led tour groups seeking archaeological interpretation) will have a direct effect on the condition of cultural resource sites within the SPRNCA. Looting and vandalism have increased significantly at high profile public sites, corresponding with visitation use trending upward from historic levels. The trend for the future is an overall increase in public visitation to cultural resource sites located in the SPRNCA.

Past cultural resource monitoring records have shown an overall decrease in cultural resource site integrity as a result of high public usage. At most lesser known cultural sites within the SPRNCA, there has been a sharp increase in looting/vandalism leading to site damage. The sharp increase over the years of looted and vandalized cultural sites can be especially visible at historic mine sites, the high profile Protohistoric Spanish mission sites, and rock art sites adjacent to the San Pedro River. Livestock grazing degrades cultural resource sites by trampling the ground where sites reside. If grazing were to increase in the SPRNCA, there could be a downward trend for integrity of cultural resource sites. In the future, federal agency budgets are expected to decline which will result in a downward trend for cultural resource site conditions. There will be less money available for site protection measures such as monitoring, law enforcement, interpretive signage, and general maintenance including site stabilization and rehabilitation. Large scale development projects have been proposed adjacent to or within proximity to the SPRNCA. These large scale projects immediately adjacent to the SPRNCA have the effect of opening up large land areas to development. This effect opens access and directly increases the number of visitors to the SPRNCA. Currently, there are already numerous unmanaged access points to the SPRNCA and increased population would likely result in more. This would have the direct effect of exposing cultural resource sites, located in what were previously obscure closed areas, to access and making the sites more vulnerable to looting, artifact theft, and vandalism.

Natural elements can also influence cultural resource site conditions. This trend is less predictable but can have a significant impact on cultural resource sites. Ongoing weathering for example, flooding in monsoon storms can result in arroyo and bank collapse leaving sites vulnerable to destruction. Ongoing weathering can also result in site areas becoming more visible thus leading to an increased potential for looting and vandalism. Recent qualitative observations at heavily used public cultural resource sites located on the SPRNCA indicate a downward trend as many of the historic and prehistoric remains are subjected to ongoing weathering and decay.

2.3.14 Paleontological Resources

Paleontological resources constitute a fragile nonrenewable record of the history of life on the earth. These resources generally consist of vertebrate, invertebrate, plant, and trace fossils. BLM policy is to manage paleontological resources for scientific, educational, and recreational values and to protect or mitigate these resources from adverse effects..

On BLM administered lands, paleontological resources are managed according to the Paleontological Resources Preservation Act of 2009 and the general guidance of the FLPMA and NEPA. Agency level guidance is provided through the BLM 8270 *Manual Paleontological Resource Management*, the BLM Handbook (H-8270-1) *General Procedural Guidance for Paleontological Resource Management*, as well as, several Informational Memorandums (IMs). As a natural heritage resource, fossil localities must be considered in developing land use management decisions.

The SPRNCA was created in part to "conserve, protect, and enhance the riparian area and the aquatic, wildlife, archaeological, paleontological, scientific, cultural, educational, and recreational resources of the conservation area." The fossiliferous formations in the San Pedro River valley are the Quiburis Formation, which contains a diverse late-Miocene to early-Pliocene fauna and the St. David Formation, which also contains a diverse fauna that spans the Pliocene-Pleistocene boundary. Other late Pleistocene and early Holocene deposits are found scattered throughout the San Pedro Valley, some of which contain evidence of interactions of humans with mammoths.

Indicators

Resource identification and condition are made by field observations (survey or monitoring) and documented through paleontological reports and project reviews. Fossils are often exposed on the surface as a result of natural erosion processes that erode away overlying sediments in which the fossils were originally buried. Human-caused erosion or ground disturbance can have similar effects. The erosive processes that expose fossils will also contribute to its degradation and permanent loss unless the specimens are recovered before they are destroyed. The destruction of fossil resources and their geologic context negatively affect the scientific and educational values the fossils can represent.

The primary resource indicator is whether there is a loss of characteristics that makes a fossil locality or feature significant for further scientific investigation. Natural weathering, erosion, improper collection, and illegal collection can have a permanent adverse effect on the characteristics that are important to the analysis of the paleontological resources and the scientific information they yield. Fossils are generally considered to be scientifically significant if they are unique, unusual, or rare; diagnostically or stratigraphically important; and/or add to the existing body of knowledge for a lineage of an organism, geographic area, or a geologic age. The BLM considers all vertebrate fossils and their traces (foot prints, burrows, body imprints) to be scientifically significant and therefore merit some level of protection. Invertebrate, plant fossils, and petrified wood can be determined to be scientifically significant on a case-by-case basis.

The geologic setting where scientifically significant fossils are known to occur are usually considered to be scientifically important and afforded protection.

Current Conditions

The SPRNCA contains numerous scientifically significant paleontology localities that have been researched for nearly 100 years. Paleontology resources have been collected and studied in this area since the early 1920s. Paleontological research continues today through the University of Oklahoma's Sam Noble Oklahoma Museum of Natural History. Though older marine fossils are present and have been studied in the area, it is the abundant Pliocene and Pleistocene-aged vertebrate faunas that have made the San Pedro River Valley of scientific importance.

In the late 1970s, a paleontology summary and subsequent report for the SPRNCA was produced by the University of Arizona for the BLM (Lindsay 1978). The report outlined geologic formations where fossil resources have been discovered. The report stated that in 1979, 288 paleontology localities had been recorded and were described in scientific literature. Of these, 149 were invertebrate sites and 139 were vertebrate sites. Subsequent research has increased this number. Two of the more scientifically important fossil localities within the SPRNCA are the Dyack site and Wolf Ranch; both are contained within the St. David Formation. Both localities continually produce numerous vertebrate fossils.

Currently, the BLM uses the Potential Fossil Yield Classification (PFYC) system as a management tool to assist the BLM to determine which geologic units potentially contain fossil resources. The PFYC scale consists of assigning a number to a geologic unit from PFYC 1–PFYC 5. A geologic unit assigned as PFYC 1 has a low probability of containing fossil resources; an example of this would be an igneous rock formation such as a granite or basalt. A geologic unit that is assigned as a PFYC 5 is a geologic unit that is known to contain numerous scientifically significant fossil resources. The PFYC map is determined by assigning the numbers to geologic units as they are represented on geologic maps. Ideally, this would be produced to at least the 1:100,000 scale and made into a GIS layer that can be used as part of the decision-making process for any proposed federal undertakings. Some areas may require a more refined scale PFYC map at the 1:24,000 scale. Generally, a paleontology survey is not required in areas assigned as PFYC 1 -2. However, surveys are typically required for PFYC 3 and are required for PFYC 4 -5. Figure 2.3-46 is the PFYC map that has been developed for the SPRNCA.

Mitigation measures for a given project are tailored to the proposed action based on the PFYC and a literature and museum record search for known fossil localities in the proposed area. Additional mitigation may be required based on the results of analyzing the PFYC and a search for fossil localities. The proponent of a given project is responsible for addressing any mitigation and subsequent curatorial requirements associated with their proposed project including inadvertent discoveries.

Murray Springs Clovis Site

The Murray Springs Clovis Site was designated by Secretary of the Interior Ken Salazar as an NHL in 2012. The site is one of only a handful of Clovis-type sites in North America and is viewed as a highly important and unique opportunity to understand the beginning of humans entering North America.

The site was discovered in 1966 by Dr. C. Vance Haynes and Dr. Peter Mehringer of the University of Arizona. The site dates to about 13,000 years BP and is unique among all North American Clovis sites. It is unique, as it contains three distinct areas where paleoindian hunters (Clovis people) killed and butchered Pleistocene-aged megafauna (mammoth and bison) and occupied a campsite that can still be seen today. The site is recognized for its astounding preservation of *in situ* Clovis artifacts and associated faunal remains. It also contains a complete record of sedimentary deposition that preserved the site and records subsequent erosional events controlled by a changing climate.

The many stone artifacts and associated faunal remains dating to the last Ice Age contribute to the knowledge of Pleistocene-aged fauna and flora and early humans in North America. The unique occurrence of an algal black mat buried the Clovis-age surface immediately after abandonment which allowed the integrity of the artifacts and bones to be preserved.

Lehner Mammoth-Kill Site

The Lehner Mammoth Kill Site represents a second site in the SPRNCA where Pleistocene-aged megafauna and Paleoindians (Clovis people) interacted. The locality is nationally significant based on the *in situ* faunal remains and associated human artifacts found at the site. Like Murray Springs Clovis Site, Lehner Ranch is managed by the BLM within the SPRNCA as an NHL. At this site, mammoth bones and human artifacts were discovered in gravel deposits of a former perennial stream that had been exposed through erosion in a modern arroyo bank (Haury et al. 1959). Similar to Murray Springs, the site has been determined to be from the late Pleistocene Epoch, dating to about 13,000 years BP.

Based on the rare presence of Pleistocene mammals and associated Paleoindian artifacts the site was designated an NHL in 1967, and in 1988, was donated by Mr. and Mrs. Lehner to the BLM for public education purposes.

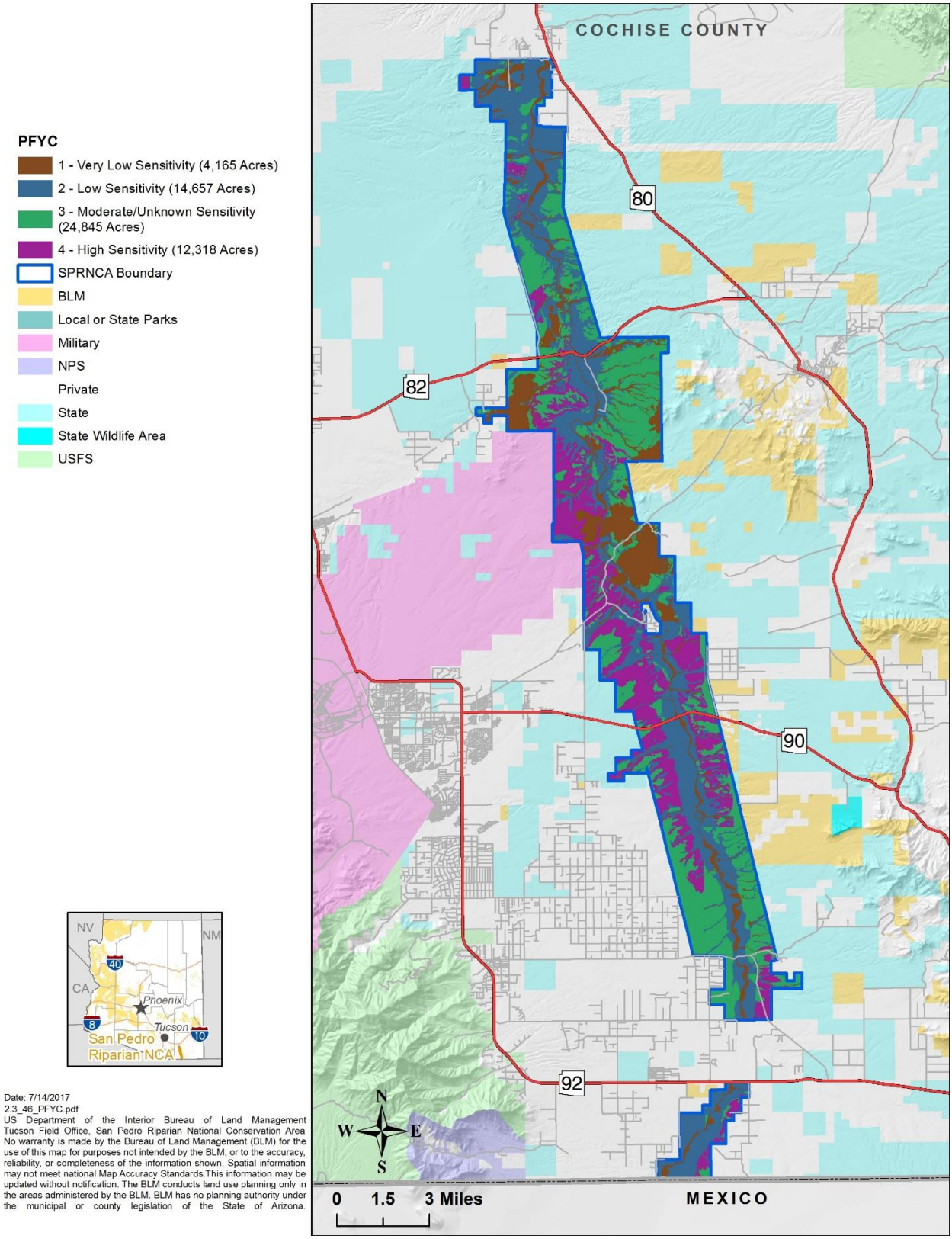


Figure 2.3-46. Potential Fossil Yield Classification (PFYC)

Trends

Paleontological resources will continue to be exposed and affected by ongoing natural erosion processes and erosion resulting from human activities. While erosion exposes fossils for discovery and study, it can also destroy the fossil and the context where the fossil originated, greatly reducing their scientific and educational value. Increased exposure also increases unauthorized collection and vandalism of fossil resources. Increased recreation, particularly OHV use, can result in increased disturbance and erosion in areas where fossil material is present.

Interest in fossils and paleontology has greatly increased in recent years, bringing avocational and professional visitors to areas known to contain fossil resources. This has in turn increased agency concern for potential impacts to the resource from vandalism and theft.

The desired condition of fossil resources on federal lands is that they remain stabilized and protected from adverse effects due to natural and human-caused erosion and processes. The current trend within the SPRNCA is to promote scientific research through the issuance of Paleontological Resource Use Permits as scientific activity is likely to continue or to increase slightly into the future.

Forecast

As access to public lands is improved, there will be a greater potential for paleontological resources to be illegally removed and damaged. Increases in recreational and commercial uses may increase risk to paleontological resources due to the increased human activities which could result in inadvertent damage, increased looting and vandalism. Management actions to identify and protect sensitive fossil areas or to mitigate impacts to fossil resources would reduce impacts to the resources. Implementation of management plans for OHV and other recreational uses would likely reduce the effects of projected increases in recreational use of public lands. Efforts to identify, document, evaluate, and assess sites would ensure that paleontological resources are adequately protected, conserved, or otherwise managed before their values are diminished or lost to deterioration or vandalism. Surveying and monitoring of surface-disturbing activities, land tenure adjustments, and scientific research are anticipated to be the primary means of identifying paleontological localities.

2.3.15 Visual Resources

Management of visual resources on public lands is guided by BLM Manual 8400, which establishes a general objective to manage public lands in a manner which will protect the quality of the scenic (visual) values of those lands. Visual resource inventories are guided by BLM Manual 8410, which identifies procedures for evaluating an area’s scenic quality, sensitivity levels and public concern for scenic quality, and viewing distance of the landscape. These factors are evaluated in combination to identify Visual Resource Inventory (VRI) classes, which portray the relative value of visual resources for consideration in a RMP process to establish land use allocations. The VRI classes do not establish management direction and or constrain land use activities.

VRM classes are established in RMP land use allocation decisions, and must consider the importance of the visual values identified in the VRI, and the impact land use activities may have

on those values. Potential conflicts between different land use allocations for multiple uses are resolved in the analysis of alternatives in the RMP. The VRM classes establish objectives for preserving the character of the landscape and for the level of change allowed to the landscape from management activities.

Guidance for evaluating the level of change in the landscape from visual impacts of management activities is provided by BLM Manual 8431, which establishes procedures for determining and evaluating visual contrast levels of land use activities and conformance with VRM classes, and for identifying project design and construction measures to reduce visual impacts.

Indicators

The key indicator of visual resource values is the VRI class, which is based on a combination of the landscape's scenic quality, visual sensitivity, and viewing distance from viewer positions identified in the VRI.

The VRI is based on three primary components:

- **Scenic Quality Evaluation**: The Scenic Quality Evaluation measures the visual appeal of a landscape. Scenic quality is determined by reviewing landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modifications.
- **Sensitivity Level Determination**: Sensitivity Levels are a measure of public concern for the scenic quality. BLM-administered public lands are assigned high, medium, or low sensitivity levels based on a number of factors including type of users, amount of use, public interest, adjacent land uses, and special areas.
- **Delineation of Distance Zones**: Distance zones are based on the relative visibility from travel routes. Distance zones include the foreground-middle ground (three to five miles from viewing locations), background (five to 15 miles from viewing locations), and seldom seen (areas not seen).

VRI Class I: This class includes all special areas where the current management situation requires maintaining a natural environment essentially unaltered by man, regardless of the scenic quality and other VRI factors. It typically includes existing wilderness areas, and in the San Pedro River NCA, it includes the three existing RNAs.

VRI Class II: This class includes areas with SQ Class A regardless of visual sensitivity, and in any viewing distance zone. It also includes areas with SQ Class B with high visual sensitivity in the foreground-middleground viewing distance.

VRI Class III: This class includes areas with SQ Class B with high visual sensitivity but visible in the backbround or seldom seen, and SQ Class B areas with medium but visible in the foreground-middleground. It also includes areas with SQ Class C, with high sensitivity, and visible in the foreground-middleground.

VRI Class IV: This class may include areas with SQ Class B that have high visual sensitivity, but are seldom seen. It also may also include SQ Class B areas with medium sensitivity but visible in the background or are seldom seen. It may include SQ Class C areas with high

sensitivity but visible in the background, or seldom seen. It includes all SQ Class C areas with low to moderate sensitivity in all viewing distance zones.

VRM classes are based on the combination of VRI elements, and may be adopted as VRM classes, or may be different if adjustments are needed to resolve potential land use allocation conflicts and to accommodate activities that would make achieving VRM objectives impossible. The general VRM Class objectives are defined below:

VRM objectives are indicated by the VRM classes adopted in the *Safford RMP*. The standard definitions for the VRM Classes are:

VRM Class I: The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes with very limited management activity. The level of change by the activity to the characteristic landscape should be very low and must not attract attention.

VRM Class II: The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

VRM Class III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

VRM Class IV: The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Current Condition

Visual resources were considered and analyzed in the *San Pedro Riparian Management Plan* completed in 1989, and the VRM classes identified under the Preferred Alternative were adopted and are currently in effect (Table 2.3-41). VRM classes for public lands adjacent to the SPRNCA were adopted in the *Safford RMP* in 1992. The current VRM classes for the SPRNCA are summarized below. An attempt has been made to best represent what those classes look like (Figure 2.3-47).

Current VRM Objectives/Classes

The objectives established in the SPRNCA RMP are to manage “visual resources to preserve the outstanding scenery and to enhance areas impaired by human disturbance,” and the VRM Classes designated are summarized on Table 2.3-41 below:

Table 2.3.-41. Existing VRM Classes for public lands in the SPRNCA

VRM Class	Acres	Comments
I	2,080	Includes the San Rafael, San Pedro River, and St. David Cienega RNAs.
II	8,311	Includes the San Pedro River riparian corridor.
III	11,926	Includes bajadas and hills near the river.
IV	25,371	Includes mainly the bajada flats away from the river.

A map of the VRM classes was not included in the Riparian Management Plan.

Visual Resource Inventory (VRI)

A VRI was completed in 2012 to evaluate any changes that may have occurred since the existing VRM classes were established. Data from the original VRI was not available for this re-inventory. The 2012 VRI included the SPRNCA and the surrounding landscape in the Upper San Pedro River basin, with the project area bounded by the viewshed created by the surrounding mountain ranges. This inventory provides updated information on visual/scenic values. The process involved delineating scenic quality rating units and rating the scenic quality, outreach interviews for measuring public concern for scenic quality, and identifying the important travel routes for determining viewing distance.

VRI Classes

The combination of factors considered in the re-inventory resulted in the VRI Classes shown on Table 2.3.-42 and Figure 2.3-48.

Current VRM Classes

The Preferred Alternative of the SPRNCA *Riparian Management Plan* designated VRM Classes which were adopted by decisions made in the *Safford RMP*. The current designations are summarized in Table 2.3-41, and shown on the map in Figure 2.3-47**.**

Table 2.3-42. VRI Classes for the public lands in the SPRNCA identified in the 2012 inventory

VRI Class	Acres	Comments
I	0	No VRI Class I areas identified; however, the existing RNAs along the San Pedro River presently under a VRM Class I.
II	17,337	High visual resource value along the San Pedro River riparian corridor and adjacent valley slopes.
III	27,570	Moderate visual resource value on the slopes and lower bajadas adjacent to the river valley, due to relatively low scenic quality, low visual sensitivity or back ground viewing distance.
IV	13,353	Low visual resource value on the bajada slopes away from the river.

Trends

Visual resources on BLM land in the SPRNCA have been preserved by the management allocations identified in the *San Pedro Riparian Management Plan* and *Safford RMP*. No new land use activities have been approved with significant visual impacts since the VRM classes

were established. The visual contrast of landscape disturbances existing at the time of the RMP have been attenuated in places by natural revegetation processes, land use restrictions, and restoration activities. The quality of visual resources in the SPRNCA have improved in condition, and continue to provide a largely natural setting for visitors and residents in the area, and a natural feature in the surrounding landscape.

Visual resources on lands adjacent to the SPRNCA are likely to be impacted in the future by continued residential and commercial development, and may be impacted by renewable energy developments that might occur on private or state lands. The scenic quality in foreground-middleground landscapes adjacent to the SPRNCA may become more influenced by residential, transportation, and utility evelopments.

There has been an increase in public visitation to the SPRNCA, population growth, and rural development in the surrounding area during the 33-year period between the two inventories. However, no dramatic area wide alterations of the landscape have occurred. The Nature Conservancy, concerned with protecting the SPRNCA, has acquired within the past two years three large adjoining tracts (Mansker, 285 acres; Riverstone,1800 acres; and Bella Vista, 2950 acres). These parcels were acquired using funding from Fort Huachuca and the Army Compatible Use Buffer Program. An additional acquistion by Cochise County (Palominas/Three Canyons, 480 acres) was possible with funding from Fort Huachuca and the County. These acquisitions have conservation easements on them and will prevent any significant future development on almost 5,000 acres. Though there has been some growth and development in the upper San Pedro Basin, the character of the SPRNCA and immediate surroundings has continued to have a rural-natural character, with the presence of widely spaced residences, agricultural fields, transportation, and utilities

Forecast

Scenic quality within the SPRNCA will continue to be preserved from visual impacts by land use activities within the SPRNCA by the current protective management allocations. Demand for recreational use that depends on the setting provided by the landscape will continue to increase. The visual contrast of past/existing human-caused landscape alterations will continue to reduce as natural reclamation/revegetetation processes continue, unless maintained for specific purposes. Design measures will continue to be implemented on a case by case basis to manage visual contrasts from new projects and land use activities, and from maintenance activities on existing developments or improvements. Visual impacts related to major utilities and transportation facilities in the SPRNCA (highways, electric transmission lines, natural gas pipeline) will continue in the long term, affecting visual resources in views from local observation points.

The present VRM classification throughout the SPRNCA may not adequately reflect the visual resource values identified in the 2013 VRI, and may need adjustment to preserve visual resources depending on the land use activities anticipated under the revision of the RMP. Cumulative impacts from ineffective implementation of project design measures may lead to project construction or maintenance activities with visual contrasts that reduce the visual quality of the landscape in localized areas. Potential large housing developments on the border of the SPRNCA could also negatively affect visual resources adjacent to the SPRNCA.

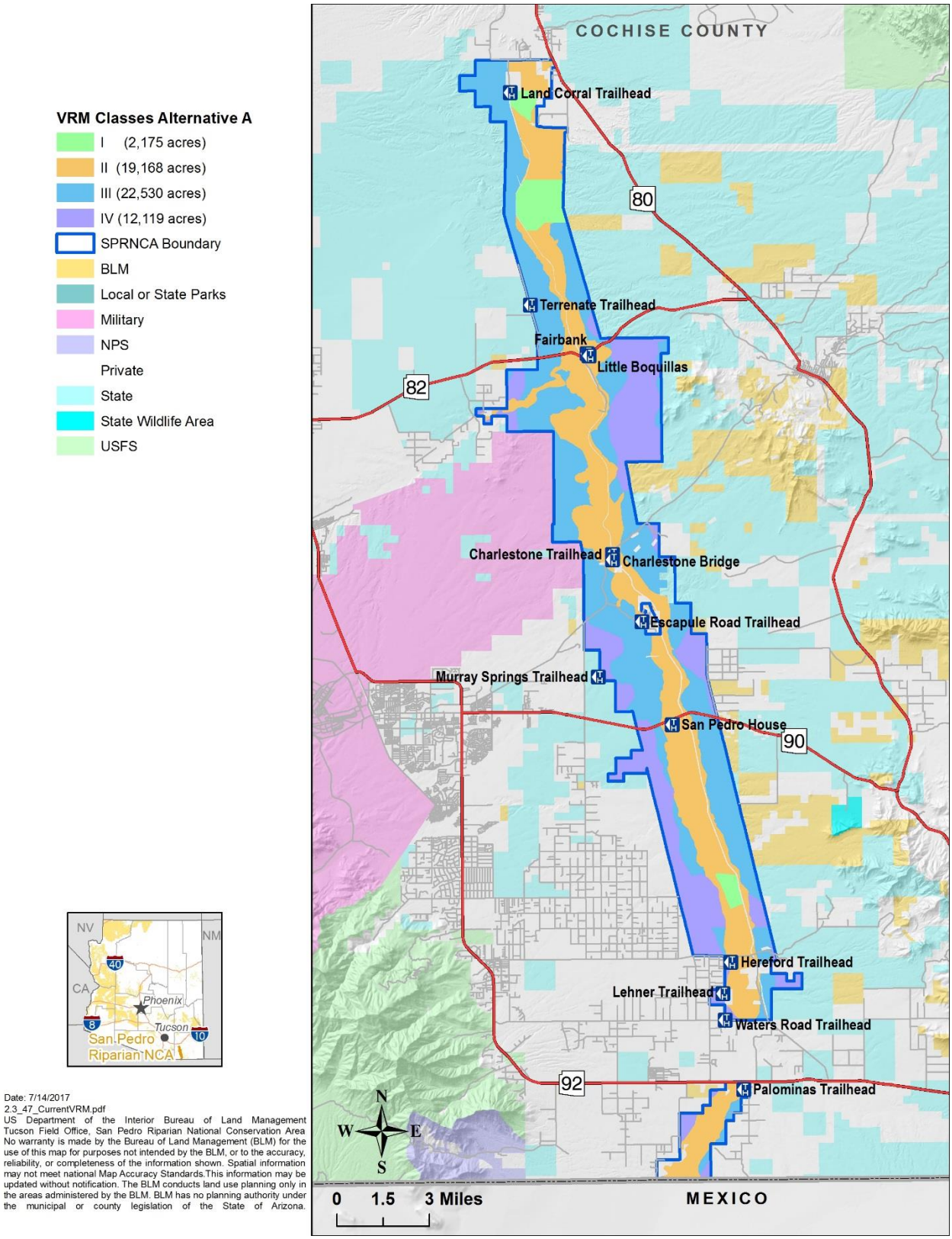


Figure 2.3-47. Current VRM Classes

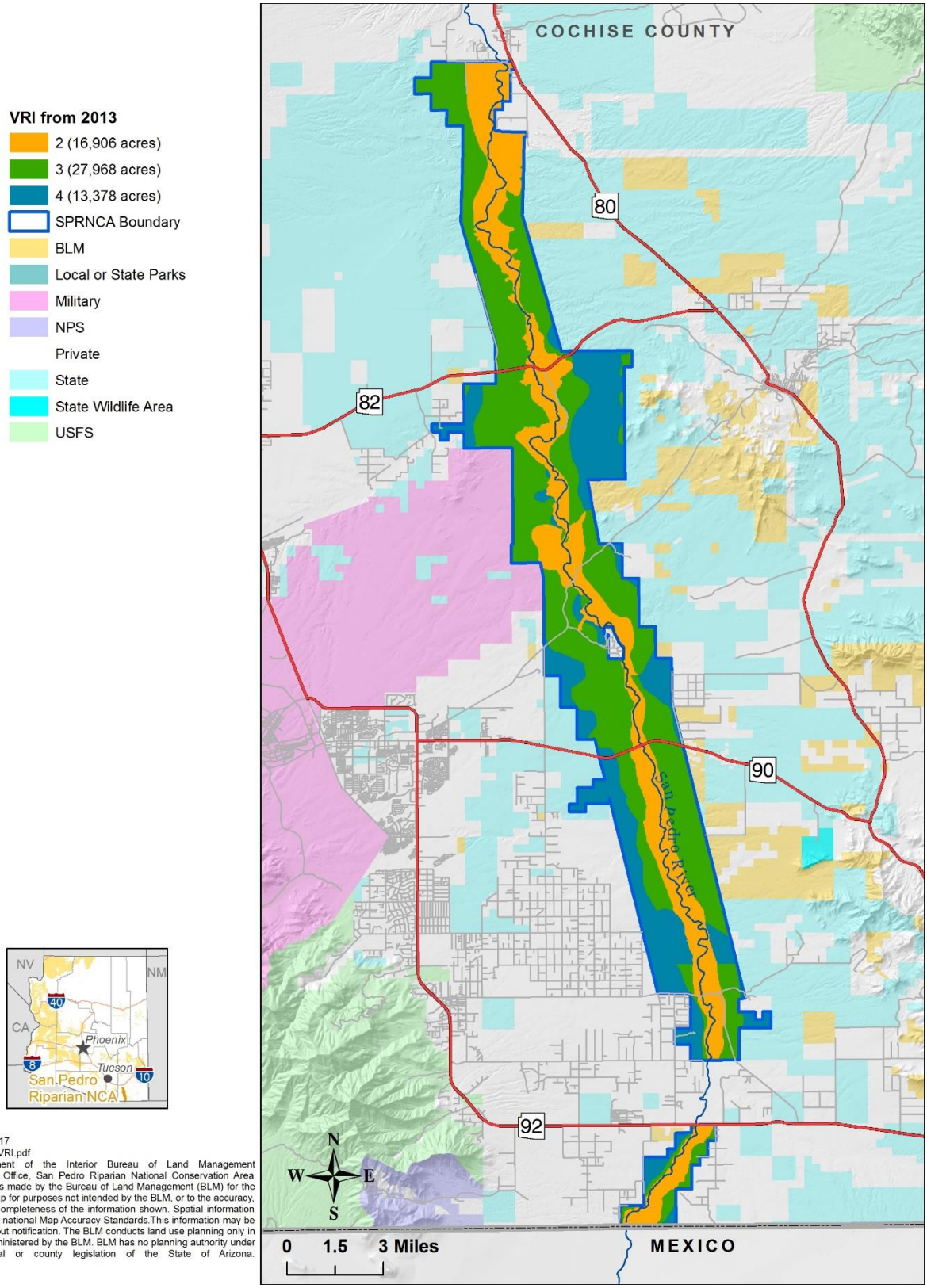


Figure 2.3-48. 2012 VRI

2.3.16 Lands with Wilderness Characteristics

Guidance for considering lands with wilderness characteristics in the RMP process is provided by BLM Manual 6300–Conducting Wilderness Characteristics Inventory on BLM Lands (Rel. 6-129; March 15, 2012). Section 201 of the FLPMA requires the BLM to maintain on a continuing basis an inventory of all public lands and their resources, including wilderness characteristics.

Under current BLM policy, maintenance and updating of the wilderness characteristics inventory may be triggered by undertaking a land use planning process. Therefore, the SPRNCA was reviewed for the presence or absence of wilderness chacateristics in accordance with current procedures.

Indicators

Indicators of wilderness characteristics are defined in the Wilderness Act of 1964, and procedures for identifying and evaluating these characteristics is provided by BLM Manual 6310 The criteria for identifying wilderness characteristics are:

- **Size***:* The area must be roadless and at least 5,000 acres in size.
- **Naturalness**: The area must appear to have been affected primarily by the forces of nature, and any work of human beings must be substantially unnoticeable. Examples of human-made features that may be considered substantially unnoticeable in certain cases are: trails, trail signs, bridges, fire breaks, pit toilets, fisheries enhancement facilities, fire rings, historic properties, archaeological resources, hitching posts, snow gauges, water quantity and quality measuring devices, research monitoring markers and devices, minor radio repeater sites, air quality monitoring devices, fencing, spring developments, barely visible linear disturbances, and stock ponds.
- **Outstanding opportunities for solitude or or a primitive and unconfined type of recreation**: The use of the word "or" means the area does not have to possess outstanding opportunities for both elements, nor does it need to have outstanding opportunities on every acre, even when an area is contiguous to lands with identified wilderness characteristics. In most cases, the two opportunities can be expected to go hand-in-hand. Factors or elements influencing solitude may include size, configuration, topographic and vegetative screening, and ability of the visitor to find seclusion. It is the combination of these and similar elements upon which an overall solitude determination will be made. It may be difficult, for example, to avoid the sights and sounds of people in some areas unless the area is relatively large. Outstanding opportunities for solitude can be found in areas lacking vegetation or topographic screening. A small area could also provide opportunities for solitude if, due to topography or vegetation, visitors can screen themselves from one another. Some examples of primitive and unconfined types of recreation include hiking, backpacking, fishing, hunting, spelunking, horseback riding, climbing, river running, cross-country skiing, snowshoeing, dog sledding, photography, bird watching, canoeing, kayaking, sailing, and sightseeing for botanical, zoological, or geological features.

- **Supplemental Values***:* If size, naturalness, and outstanding opportunities criteria are met, the presence of ecological, geological, or other features of scientific, educational, scenic, or historical value should be documented.

Under current BLM policy, areas found to posess wilderness characteristics are to be considered in the land use planning process and analyzed with all other resource values and uses, and in the management alternatives, to determine appropriate land use allocations to protect those values.

Current Condition

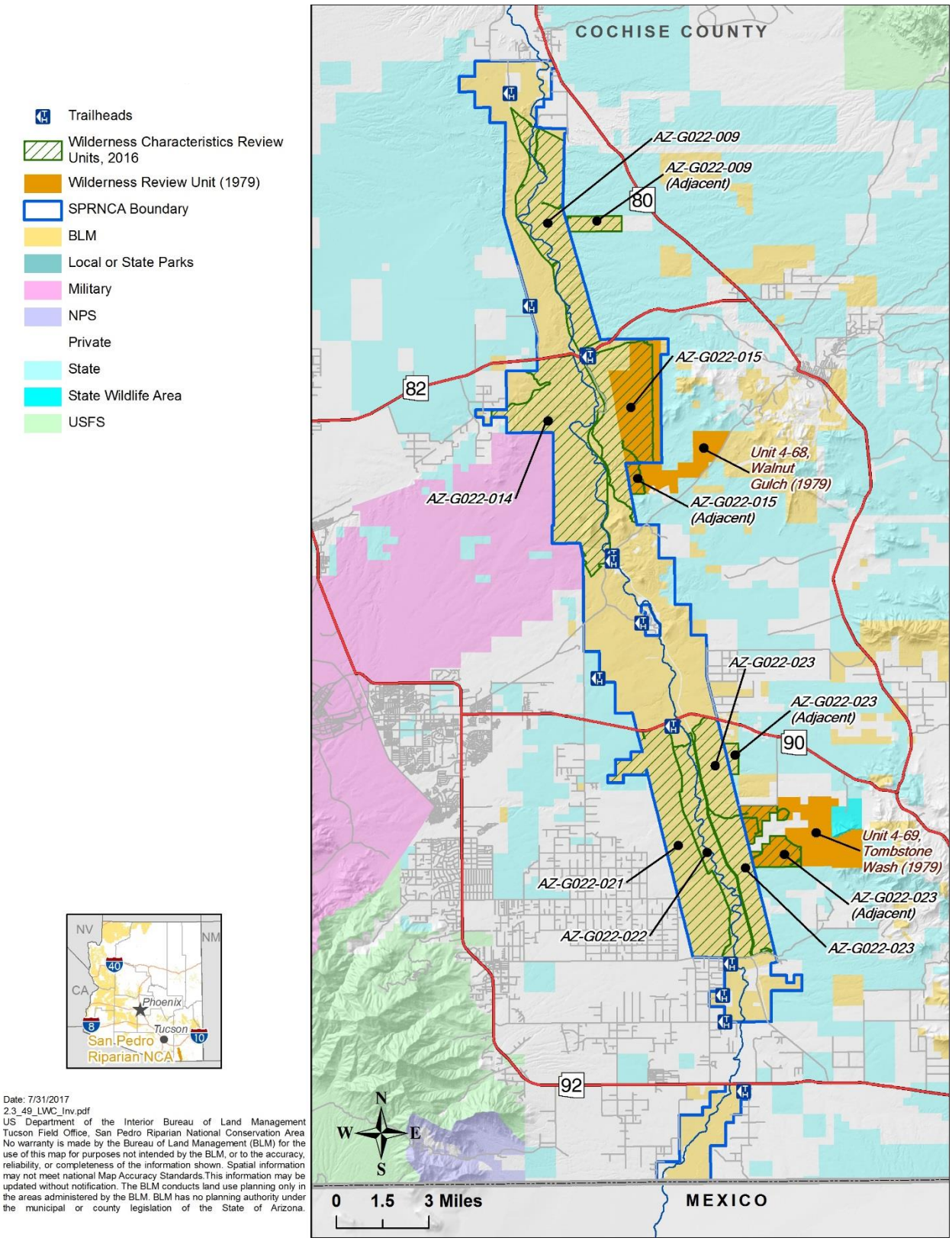
An inventory of wilderness characteristics was completed for the SPRNCA in accordance with current BLM guidance[2] to identify current resource values for consideration in the SPRNCA RMP.

The inventory area includes public lands administered by the BLM within the SPRNCA, totaling approximately 56,000 acres, and adjacent BLM lands outside that form contiguous blocks of federal land. The inventory area is shown on Figure 2.3-49 SPRNCA Wilderness Characteristics Units.

An internal BLM inventory of five areas was prepared for the SPRNCA, which identified the areas evaluated in this report: AZ-G022-009, Cereus; AZ-G022-014, Oxbow; AZ-G022-015, Coati Wash; AZ-G022-021, Kestrel; and AZ-G022-022, Jaguar.

A citizen's inventory of six areas in the SPRNCA was received in February 24, 2016, which identified the same areas in the internal BLM report, and an additional unit called the "Southeast Unit." All six areas are evaluated in this inventory, including the "Southeast Unit," which corresponds with unit AZ-G022-023, Banning Creek in this report.

[2] BLM Manual 6310, Released 6-129 March 15, 2012.



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US Department of the Interior Bureau of Land Management Tucson Field Office, San Pedro Riparian National Conservation Area No warranty is made by the Bureau of Land Management (BLM) for the use of this map for purposes not intended by the BLM, or to the accuracy, reliability, or completeness of the information shown. Spatial information may not meet national Map Accuracy Standards.This information may be updated without notification. The BLM conducts land use planning only in the areas administered by the BLM. BLM has no planning authority under the municipal or county legislation of the State of Arizona.

Figure 2.3-49. LWC Inventory Units

Inventory Area Evaluation

Evaluation of Current Conditions

Existing BLM wilderness inventory records and RMPs were reviewed to identify any findings on file regarding the presence or absence of individual wilderness characteristics, including roadlessness, size, naturalness, and opportunities for solitude, and for primitive and unconfined recreation.

Statewide Arizona 1979 Initial Wilderness Review[3] (Initial Review)

This review identified a roadless area over 5,000 acres on BLM land that is partly within the SPRNCA (Unit 4-68, Walnut Gulch 5,098 acres)[4] and another roadless area over 5,000 acres on lands adjacent to the SPRNCA (Unit 4-69, Tombstone Wash 5,546 acres). The two initial inventory units are also shown on Map 1.

The Walnut Gulch Unit (4-68) is divided by the boundary between BLM and non-BLM land (State Trust and private land), and the San Juan de Las Boquillas y Nogales Grant, which was private property at the time of the 1979 Initial Review. The land grant was later conveyed to the United States under a 1986 land exchange project[5] expanding the land base adjacent to the Walnut Gulch Unit. More accurate area calculations using GIS data to define this Unit's boundary indicates the area includes 5,168 acres of public land administered by the BLM. This unit was found to lack wilderness characteristics due to impacts of human imprints on naturalness, and was dropped from further review in 1979.

The Tombstone Wash Unit (4-69) was dropped from further review due to the presence of a road which reduced the roadless area to less than 5,000 acres. The land area in this Unit was enlarged by the reconveyance of the San Rafael del Valle Land Grant in 1986, now part of the SPRNCA.

San Pedro River Riparian Management Plan

The potential for wilderness was considered but not analyzed during preparation of the *Riparian Management Plan*, completed in 1989. Two roadless areas greater than 5,000 acres were identified in the SPRNCA, the Boquillas Unit, and West del Valle Unit, but they were found to lack some of the wilderness characteristics. No detailed documentation of the inventory for these two Units was found.

The Boquillas Unit, in the west central portion of the SPRNCA (between Charleston Road and State Road [SR] 82 on the west side of the San Pedro River) was found to lack naturalness due to the presence of "boundary and interior roads and ways, railroad tracks, powerlines, old railroad grades and bridge abutments, ruins of a farming settlement and its fields, ruins of the town of

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[3] Wilderness Review, Arizona, Initial Inventory of Public Lands Administered by the Bureau of Land Management, Decision Report, September 1979.

[4] Wilderness Review, Arizona, Initial Inventory of Public Lands Administered by the Bureau of Land Management, Decision Report, September 1979.

[5] BLM Case Number A-21410, March 6, 1986.

Charleston, and livestock facilities." This unit was also found to lack outstanding opportunities for solitude and primitive recreation because of "boundary roads and vehicles on them, an extensive network of interior roads and ways, the railroad line, and other evidence of human activities."

The West del Valle Unit (between SR 90 and Hereford Road on the west side of the river) was found to be "mostly natural in appearance, has few visible human impacts, and meets the criterion for naturalness." However, this Unit was found to lack outstanding opportunities for solitude and primitive recreation due to "boundary roads and vehicles on them, the long and thin alignment of the unit, the lack of topographic relief, and the lack of vegetative screening."

Safford RMP

Wilderness was also not an issue during preparation of the *Safford RMP*, completed in 1992, and therefore wilderness characteristics were not addressed in detail.

Inventory findings are shown in Table 2.3-43 and 2.3-44.

Table 2.3-43. Inventory Source: Wilderness Review, Arizona, Initial Inventory of Public Lands Administered by the BLM, Decision Report, September 1979

Area Unique Identifier	Sufficient Size? Yes/No (Acres)	Naturalness? Yes/No	Outstanding Solitude? Yes/No	Outstanding Primitive & Unconfined Recreation? Yes/No	Supplemental Values? Yes/No
4-68 Walnut Gulch	Yes	No	No	No	NA
4-69 Tombstone Wash	No	No	No	No	NA

Table 2.3-44. Inventory Source: *San Pedro River Riparian Management Plan* and EIS, June 1989, pg. 4

Area Unique Identifier	Sufficient Size? Yes/No (Acres)	Naturalness? Yes/No	Outstanding Solitude? Yes/No	Outstanding Primitive & Unconfined Recreation? Yes/No	Supplemental Values? Yes/No
Boquillas	Yes	No	No	No	NA
West del Valley	Yes	Yes	No	No	NA

Current Inventory Areas

This evaluation describes current conditions in several areas identified in internal staff reports prepared for the SPRNCA RMP, and in the citizen's proposal submitted in February 2016 (Table 2.3-45). The presence or absence of wilderness characteristics is described for the following inventory areas, shown on Figure 2.3-49.

Table 2.3-45. Current Conditions

Unique Identifier	Reference Name	CP Acres[6]	BLM Acres[7]	Previous Inventory Area covering all or part of the current inventory areas
AZ-G022-009	Cereus	5,398	5,842	N/A
AZ-G022-014	Oxbow	8,450	7,769	Boquillas
AZ-G022-015	Coati Wash	5,912	5,140	4-68, Walnut Gulch
AZ-G022-021	Kestrel	5,907	5,904	West del Valle
AZ-G022-022	Jaguar	3,016	2,988	N/A
AZ-G022-023	Banning Creek	3,900	5,013	4-69, Tombstone Wash
	Total		32,656	

Current Conditions: Presence or Absence of Wilderness Characteristics

Summary BLM Current Conditions Inventory Findings

The summary findings for the areas described in this evaluation are shown in Table 2.3-46 below. The acreages are based on the boundaries shown on Figure 2.3-49. The boundary features described in the internal BLM reports and in the citizen's proposal were modified to exclude features found to affect the area's roadlessness and naturalness, and the current land status boundaries from current GIS data.

Table 2.3-46. Inventory Findings.

Unique Identifier	Sufficient Size? Yes/No (Acres)	Naturalness ? Yes/No	Outstanding Solitude? Yes/No	Outstanding Primitive & Unconfined Recreation? Yes/No	Supplemental Values? Yes/No	Identified as an Area with Wilderness Characteristics?
AZ-G022-009, Cereus	Yes, 5,842 acres (5,288 acres in SPRNCA, 554 acres adjacent)	Yes	Yes	Yes	Yes	Yes
AZ-G022-014, Oxbow	Yes, 7,768 acres in SPRNCA	Yes	Yes	Yes	Yes	Yes
AZ-G022-015, Coati Wash	Yes, 5,140 acres; (4,868 acres in SPRNCA, 272 acres adjacent)	Yes	Yes	Yes	Yes	Yes

[6] This is the acreage in the Citizen's proposal received in February 2016.
[7] This is the acreage based on the inventory unit boundaries in this evaluation.

Unique Identifier	Sufficient Size? Yes/No (Acres)	Naturalness ? Yes/No	Outstanding Solitude? Yes/No	Outstanding Primitive & Unconfined Recreation? Yes/No	Supplemental Values? Yes/No	Identified as an Area with Wilderness Characteristics?
AZ-G022-021, Kestrel	Yes, 5,904 acres	Yes	Yes	Yes	Yes	Yes
AZ-G022-022, Jaguar	No, 2,988 acres	N/A	N/A	N/A	N/A	No
AZ-G022-023, Banning Creek	Yes, 5,013 acres; (3,995 acres in SPRNCA, 1,018 acres adjacent)	No	N/A	N/A	N/A	No

Trends and Forecast

Demand for areas that provide opportunities for primitive recreation is expected to grow as demand for public recreational opportunities grow in the project area generally.With increased pressure, wilderness characteristics may become degraded. With changing and growing demand for land use activities that require landscape modification, potential impacts may affect areas that possess wilderness characteristics. The economic importance of recreational use in the SPRNCA, including by visitors seeking primitive types of recreation, will continue to grow in to the local and regional economy. Uses that may degrade wilderness characteristics can be prevented or mitigated through the implementation of land use allocations and management objectives developed in the RMP.

2.4 Resource Uses

The following sections discuss the resource uses in the SPRNCA. The resource uses in the SPRNCA are limited by PL 100-696 which states "The Secretary shall only allow such uses of the conservation area as he finds will further the primary purposes for which the conservation area is established" and "The Secretary shall have the power to implement such reasonable limits to visitation and use of the conservation area as he finds appropriate for the protection of the resources of the conservation area, including requiring permits for public use, or closing portions of the conservation area to public use."

2.4.1 Energy and Minerals

The status of minerals is discussed in Section 2.3.3, Geology. ROWs for energy projects are addressed under Section 2.4.2, Lands and Realty.

2.4.2 Lands and Realty

The goals of the lands and realty program are to manage the public lands in support of goals and objectives of other resource programs; provide for uses of public lands in accordance with the FLPMA, BLM regulations, and PL 100-696 which established the SPRNCA; prevent undue and unnecessary degradation, and improve management of the public lands through land tenure adjustments.

Land Tenure

The planning area contains approximately 56,431 acres of BLM-managed surface and subsurface estate and approximately 1,289 acres of private surface and subsurface estate. PL 100-696 states "Subject to valid existing rights, all Federal lands within the Conservation Area are hereby withdrawn from all forms of entry, appropriation, or disposal under the public land laws." Methods of land tenure adjustments within SPRNCA include:

A. **Acquisition:** Acquisition of lands can be pursued to facilitate various resource management objectives. Acquisitions, including easements, can be completed through exchange or, Land and Water Conservation Fund purchases.
B. **Exchange:** Land exchanges are initiated in direct response to public demand, or by the BLM to improve management of the public lands. Lands need to be formally determined as suitable for exchange. In addition, lands considered for acquisition would be those lands that meet specific land management goals identified in the RMP. Nonfederal lands are considered for acquisition through exchange of suitable public land, on a case-by-case basis, where the exchange is in the public interest, and where acquisition of the nonfederal lands will contain higher resource or public values than the public lands being exchanged. In 2012 the state of Arizona enacted a bill to allow exchanges with federal agencies to consolidate lands. An interagency team will be established to facilitate these actions.

Current Conditions

There are no federal lands within SPRNCA that have been designated for disposal through any means. All federal land within SPRNCA is designated for retention. There are 17 parcels of private lands within SPRNCA consisting of approximately 1,289 acres of private surface and subsurface estate, which could be obtained from willing sellers for protection of riparian values

and the water table and to help provide continued flow in the San Pedro River. The private lands are also valuable for protection of wildlife, cultural, and historic properties. The PL 100-696 section 105 states that the BLM "may acquire lands or interests in lands within the boundaries of the Conservation Area by exchange, purchase, or donation, except that any lands or interests therein owned by the state or local government may be acquired by donation or exchange only. Any purchase or exchange of lands to be added to the Conservation Area shall require the consent of the owner of those lands or rights." PL 100-696 also specifies that any land acquired in the boundaries of the SPRNCA would become part of the NCA.

Forecasts

The BLM will continue to negotiate land exchanges and acquisitions within the SPRNCA on a case-by-case basis as staff and priority workload allow. As opportunities present themselves, each prospect will be reviewed with careful consideration for public benefit.

Land Use Authorizations

Land Use Authorizations under the lands program include:

- ROW grants;
- Permits;
- Leases;
- Easements; and
- Permits.

ROW grants and leases are issued under the authority of Title V of the FLPMA and the Mineral Leasing Act. Other land use authorizations are issued under the authority of the FLPMA (Section 302) and other authorities for surface-disturbing activities on public lands that are not eligible for authorization under other laws and regulations.

Current Conditions

The Escapule subdivision and its residences are part of a private inholding within the SPRNCA. Military operations occur on the adjacent lands of Fort Huachuca to the west. There are 47 land use authorizations within the SPRNCA boundary that include natural gas pipelines, water pipelines, power lines, roads, and telephone lines (Table 2.4-1 and Figure 2.4-1). Most of these authorizations were established when the lands were under private ownership and the BLM obtained fee title to the land subject to valid existing rights. Major transportation facilities that provide access to and within the SPRNCA include two Cochise County roads, Charleston Road, and Hereford Road. The majority of Charleston Road was established by a private deeded fee easement. A small portion of the road at the San Pedro River crossing is a BLM issued ROW. A historic transportation facility crosses the planning area from the north to the south and was constructed by the Union Pacific Railroad for the Benson to Douglas rail line. The rails and ties have been removed as the railroad stopped operating in 2006.

The following ROW actions are in use based on the *Riparian Management Plan* (BLM 1989) and *Safford RMP* (BLM 1992 and 1994):

- Restrict ROWs and other uses to areas where they would not adversely affect resources.

- Allow maintenance on existing ROW, subject to protection of resource values.
- Issue land use authorizations on a case-by-case basis, minimizing disturbances and consistent with the management objectives of the area. The TFO will defer approval of land use authorizations unless the requests demonstrate that the intended uses of those lands will not require groundwater from the Upper San Pedro River Groundwater Basin.

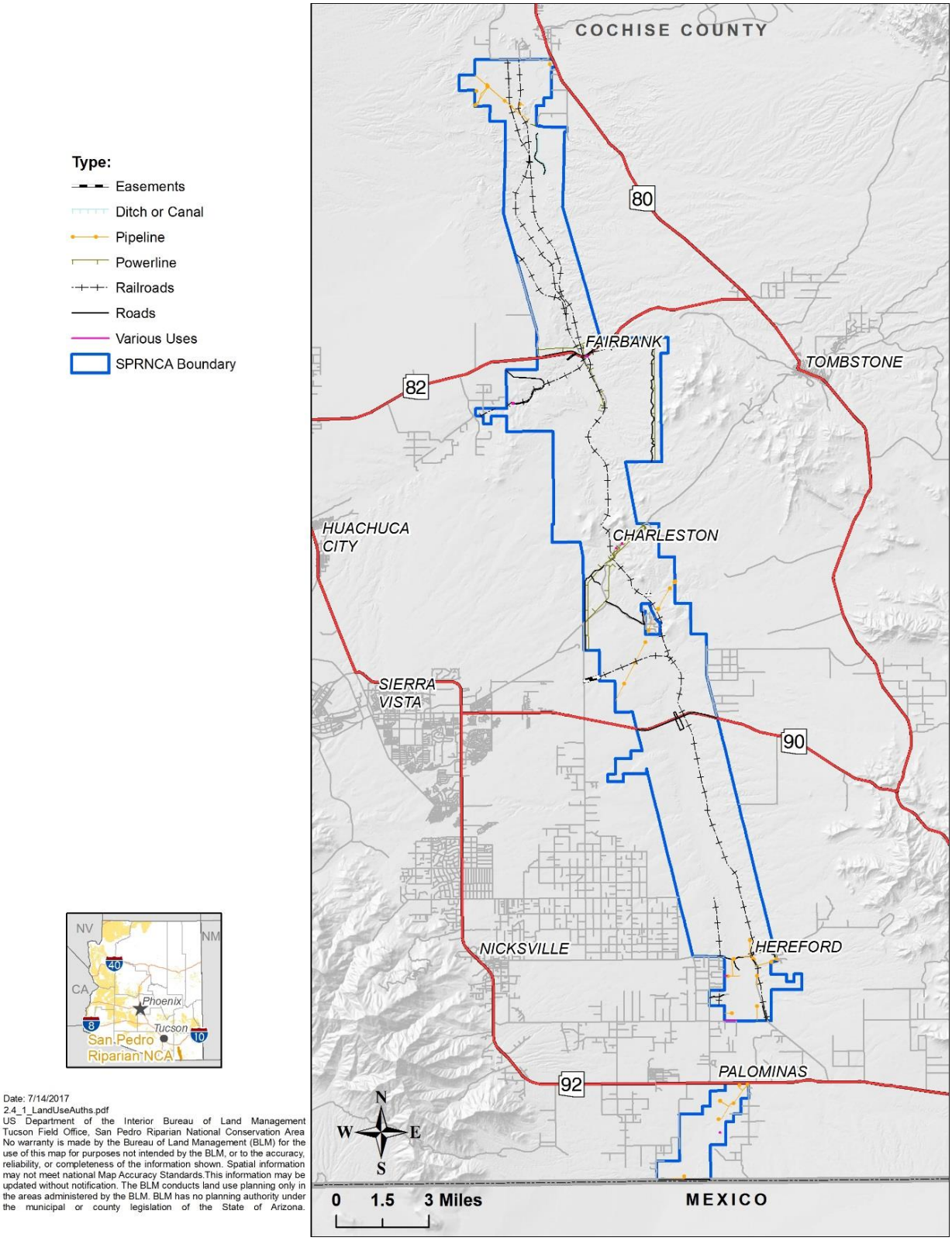

Figure 2.4-1. Existing Land Use Authorizations and Fee Easements

Table 2.4-1. Existing Land Use Authorizations and Fee Easements

Existing Authorization	Number	Acres	Issued By
ROW Roads	5	23.11	Initially issued by the previous land owner but now under a BLM ROW.
ROW Federal Aid Highway	2	155.59	BLM ROW
ROW County Road[2]	4	93.78	Initially issued by the previous land owner but now under a BLM ROW.
ROW Telephone Lines	3	21.271	Initially issued by the previous land owner but now under a BLM ROW.
ROW Railroads[1]	11	1,321.15	Some are BLM ROW, others are fee easements.
ROW Power Lines +1 Fiber Optic	8	162.68	BLM
ROW Gas Pipelines	4	12.68	Initially issued by the previous land owner but now under a BLM ROW.
ROW Border Fence	1	13.69	BLM
ROW Water Facilities (Pipelines)	7	89.232	Initially issued by the previous land owner but now under a BLM ROW.
ROW Miscellaneous (Wells)	2	.25	Initially issued by the previous land owner but now under a BLM ROW.
TOTAL	**47**	**1,893.433**	

1 Not all railroad ROW are BLM, some are fee easements meaning they are owned by the railroad.

2 Portions of Charleston Road is a fee easement meaning its owned by Cochise County. The bridge over the San Pedro River is under a BLM ROW.

Forecasts

Demand for land use authorizations in the planning area is anticipated to increase in correlation with future residential and commercial development and increasing population and energy demand needs.

Renewable Energy

Renewable energy resources include wind, solar, biomass, hydropower, and geothermal. In recent years, the USDI in conjunction with the Departments of Energy, Agriculture, and Defense has developed policy for NEPA compliance for energy projects. This policy development is in response to the nation's increased focus on achieving energy independence from foreign fossil fuel energy supply.

There are no renewable energy projects in the SPRNCA, and the wind and solar Programmatic EIS/Record of Decision (BLM 2005, 2012b) identifies the area as excluded from utility-scale, i.e. 20 MW or greater, wind or solar energy development.

The Restoration Energy Design Project also eliminated all NCAs from consideration, including the SPRNCA from utility scale renewable energy projects. There is potential for land use authorizations for smaller, non utility-scale, renewable energy projects (wind and solar), although the true potential for these resources within the SPRNCA has yet to be determined. Utility scale renewable energy projects are not addressed in the *Riparian Management Plan* or the *Safford RMP*.

There is one designated utility corridor that was established as part of the *Riparian Management Plan* for the SPRNCA (Figure 2.4-2). This corridor is located at Charleston and is consistent with the existing northern ROW boundary and extends south 660 ft. south. There is also a 230-kV transmission line that is not located within an existing utility corridor that runs north to south from Highway 82 to the Charleston Road.

Withdrawals

Withdrawals are used to preserve sensitive environmental values, protect major federal investments in facilities, support national security, and provide for public health and safety. Withdrawal segregates a portion of public lands and suspends certain operations of the public land laws, such as mining claims. There are two withdrawals in the area and a classification (Table 2.4-2).

Table 2.4-2. Existing Withdrawals

Number	Name	Purpose	Acres
AZA-822 (Original) AZA-3753 (Amended)	Bureau of Reclamation	Charleston Dam and Reservoir (2 Withdrawals for same action)	1,988.54
AZAZAA-3545	USGS	Classification of Gila River ([1])	344.97

[1] The classification of the Gila River involves two small parcels within two sections of the SPRNCA which were classified by General Land Office for the USGS in November of 1956. This classification predates the formation of the BLM but it is still in effect.

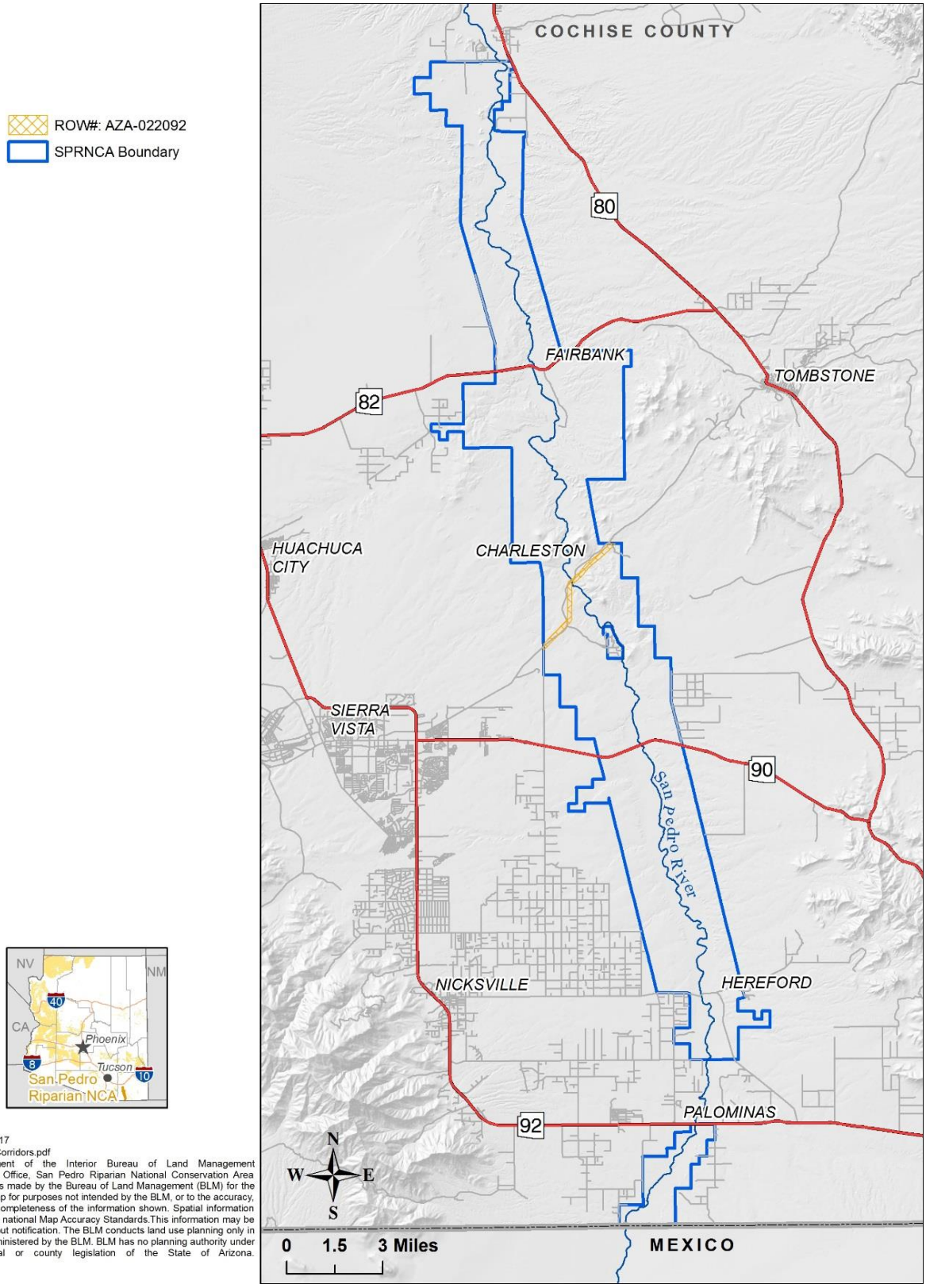

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Figure 2.4-2. Designated Utility Corridors

2.4.3 Livestock Grazing Management

Rangeland Health

The overall objective of the Planning Area's rangeland management program is to manage soil and vegetation communities to meet land health standards and multiple-use objectives. The purpose of the *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration* at 43 CFR 4180 is to provide a measure (i.e., standard) to determine land health and methods (i.e., guidelines) to improve the health of public rangelands. The BLM's job is to maintain the health of the land or make appropriate changes on the ground where land health standards are not being met. The standards help the BLM, public land users, and others to focus on a common understanding of acceptable resource conditions. The standards communicate current and desired resource conditions among the various groups. Guidelines describe or communicate techniques for managing activities to achieve those desired conditions. Guidelines for grazing management emphasize multiple use by incorporating needs for wildlife habitat, soil, watershed, riparian areas, and recreation.

The specific program goals and objectives are accomplished through activity-level planning, with attention given to proper season of use; suitable grazing systems; plant and animal requirements; kind, class, and distribution of livestock; and placement of rangeland improvements. Together, with livestock operators, other affected agencies, and interested publics, the BLM examines the indicators addressed by the standards, and assesses whether or not they are being achieved through the evaluation process. If resource monitoring shows standards are met or progress is being made towards meeting them, existing management can continue. Resource monitoring can include the collection of vegetation and soil attributes (i.e., cover, frequency, and species composition, etc.), utilization levels of key forage plants, actual livestock use, and climate data from permanently established plots within allotments. If progress is not being made towards achieving standards and current livestock grazing is determined to be a significant causal factor, then appropriate actions including changes to permits, grazing systems, and practices can be implemented in order to ensure progress towards achievement of standards.

Appropriate actions can consist of:

- Actions taken pursuant to 43 CFR 4110, 4120, 4130, and 4160 that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with the guidelines (43 CFR 4180.2(c)).
- Implementing and issuing a final decision pursuant to 43 CFR 4110, 4120, 4130, and 4160 upon determining that existing grazing management needs to be modified to ensure that the Fundamentals of Rangeland Health exist (43 CFR 4180.1).

Vegetative Monitoring

Vegetative monitoring data and assessments, utilization (key management area utilization), point cover, line point intercept, PFC, and interpreting indicators of rangeland health have been continuously collected throughout administered grazing allotments. Monitoring data will continue to be collected and utilized to identify areas where it might be necessary to make further modifications to livestock grazing management to ensure the attainment of objectives and the

proper management of public land resources. These modifications could include a change in livestock numbers, livestock kinds, seasons of use, livestock animal-unit months (AUMs), and grazing management systems.

Actual-use reports, which are mandatory reports grazing lessees must submit each year to record the actual livestock numbers and periods of use, are utilized to calculate the AUMs that were used during the grazing year. Lessees have regularly submitted these reports.

Allotment evaluations, which incorporate trend, rangeland health, weather, and other data with utilization and actual-use data are completed as needed to identify and correct resource issues. Evaluations are used to compile and assess rangeland conditions and trends toward management objectives and recommend necessary adjustments in rangeland management for all grazing allotments.

Range Improvement Projects

Range improvement projects, including fences, cattle guards, water pipelines, well development, spring development, stock ponds, and vegetative enhancement projects, are used to assist in livestock and wildlife management. Fire management practices are also used to achieve ecological diversity and/or reduce catastrophic fuel loads. Rangeland manipulation can be used to rehabilitate or restore a particular ecological community related to plant composition and structure and to meet site specific resource objectives.

General impacts associated with vegetative treatments tier to the Vegetation EIS (BLM 1991b), which analyzes and recommends treatment methods to be used on BLM-administered lands. Methods include mechanical and manual treatments, biological treatments, prescribed burning, chemical applications, and use of livestock. In addition, to authorize vegetative treatments and other range improvement projects, site-specific NEPA analysis and decisions are developed and issued in accordance with BLM regulations and policies.

Current Livestock Use

In Arizona, BLM grazing allotments are classified as perennial, ephemeral, or perennial-ephemeral. Perennial means the allotment consistently produces enough forage to support a livestock operation year-round and has an established forage limit, based on the quality and quantity of perennial plants for a defined period, stated in AUMs. An AUM is a measure of forage that will support a cow and its calf, one horse, or five sheep or goats for a month. The amount and length of grazing use, on ephemeral allotments and allotments with ephemeral forage, is based on vegetation production and determined prior to authorizing use. In addition, grazing allotments are assigned in three management categories (improve, maintain, or custodial) based on the present resource condition, management needs, ecological potential, conflicts with other resource values, and economic potential for improvement.

Livestock operations on the allotments in the SPRNCA are classified as perennial and are generally yearlong cow-calf operations and involve raising calves for market from a base cattle herd. These operations usually encompass a mixed ownership of private, Arizona State Trust, and public lands within allotment boundaries. Although the operations are yearlong, they may only use the federal rangelands seasonally. Ephemeral, perennial, and perennial-ephemeral allotments that utilize ephemeral authorizations may turn out large numbers of steers to take

advantage of annual grass and forb species that can produce significant forage amounts for several months during winter and spring. These livestock can have high weight gains, up to several hundred pounds, during particularly wet years before being shipped back to summer ranges in the northern US or to feedlots. Currently, no sheep or goats are authorized on allotments in the SPRNCA.

Three allotment management categories define the management level needed to properly administer grazing lands in accordance with BLM Washington Office IM 2009-018. In November 2010, allotments needed to be reevaluated in relation to WO IM 2009-18 for the entire TFO. These categories may be changed at any time to focus priority on certain allotments (Table 2.4-3). As allotments are evaluated, the categories, in consultation with affected operators, are reviewed and revised when needed to respond to changing resource conditions. All allotments are placed into these categories according to management needs, resource conflicts, potential for improvement, and BLM funding/staffing constraints.

The allotment categories and management are defined as:

- **Category I (Improve)**: Category I allotments are those where the current level of livestock grazing or use on public lands is or is expected to be a significant causal factor in the nonachievement of land health standards, or where a change in mandatory terms and conditions in the grazing authorization is or may be necessary identifying Category I allotments requires a review of critical habitat conditions and whether projects have been proposed specifically for implementing the Healthy Lands Initiative.
- **Category M (Maintain)**: Category M allotments are those where land health standards are met, where livestock grazing on public land is not a significant causal factor for not meeting the standards, and where current livestock management is in conformance with guidelines developed by the state directors in consultation with RACs. It also covers allotments where an evaluation of land-health standards has not been completed, but where existing monitoring data indicates that resource conditions are satisfactory.
- **Category C (Custodial)**: Category C allotments are public lands that produce less than 10 percent of the forage in the allotment or are less than 10 percent of the land area. An allotment should generally not be designated Category C if the public lands in the allotment contain critical habitat for a threatened or endangered species or wetlands negatively affected by livestock grazing.

Livestock Actual Use

A number of variables cause this discrepancy between active preference and licensed AUMs. Seasonal changes in precipitation and temperature result in more or less available forage. Over the past 10 years, the area has experienced periodic drought conditions, requiring a reduction in grazing use to maintain range conditions. In addition, fluctuations in the beef markets can make grazing less profitable. Livestock lessees might also take voluntary nonuse for a variety of reasons, resulting in AUMs that are available, but not licensed for livestock use. These variables can result in the perception that forage is being underutilized, when actually the range is simply being managed for a sustained forage yield. The TFO has worked diligently with grazing lessees

to adjust livestock use based on precipitation and range readiness. Average actual use will always be 100 percent or less of active preference because the BLM cannot normally authorize use above active preference.

Livestock Permits

In 1989, the BLM completed a *Riparian Management Plan* for the 47,668 acres of public land along the upper San Pedro River that make up the SPRNCA. The *Riparian Management Plan* provides direction for management of the natural and cultural resources of the property. An additional 6,521 acres in this area were acquired from the state of Arizona by exchange and were subject to existing livestock grazing leases. Management direction for the adjacent lands was not determined in the *Riparian Management Plan*. The Management decisions and mitigations of the *Riparian Management Plan* are incorporated into the *Safford RMP*.

There are four grazing allotments actively grazed by livestock in the SPRNCA. They are the Babocomari, Brunckow Hill, Lucky Hills, and Three Brothers allotments (Figure 2.4-3 and Table 2.4-3). All four grazing allotments are Section 15 grazing leases, which authorize use of public lands outside an established grazing district. These public lands outside grazing district boundaries are administered in accordance with Section 15 of the Taylor Grazing Act. The four grazing leases within the NCA have been renewed using an Appropriations Act. Through this act it extends current leases for 10 years with no modifications to the existing terms and conditions.

Types of Leases

Section 15 of the Taylor Grazing Act concerns issuing grazing leases on public lands outside the original grazing district boundaries. It states that "The Secretary of the Interior is further authorized, in his discretion, where vacant, unappropriated, and unreserved lands of the public domain are so situated... to lease any such lands for grazing purposes, upon such terms and conditions as the Secretary may prescribe..."

Base Property Requirements: Base property is land, owned or controlled by a BLM permittee or lessee, which may serve as a base for a livestock operation. The land must have the capability to produce crops or forage that can be used to support the livestock authorized for a specified period of time. The base property supporting a Section 15 grazing lease must adjoin the leased public lands unless no applicant owns adjoining lands. In most cases, the base property for a Section 15 lease adjoins, surrounds, or is intermingled with the leased public lands.

Preference Lease Rights of Isolated Tracts: The Taylor Grazing Act and the current regulations provide for giving a preference to applicants having base property which adjoins or corners the public lands they apply to lease. The preference right to lease the whole tract is given where the public lands consist of isolated tracts embracing 760 acres or less. This lease preference is available for a period of 90 days after the tract has been offered for lease.

Domestic Use Grazing Permits: Under Section 15, no provision for free domestic use or subsistence grazing on the section 15 lease lands is made.

Distribution of Grazing Receipts: The receipts from grazing on Section 15 public lands are distributed two ways: 50 percent goes to range betterment projects and 50 percent is returned to the state. From 1934 to 1968, grazing use on the 16 million acres of Section 15 public lands was authorized under 10-year leases. Grazing fees were assessed on an acreage basis. Lessees were required to pay the lease regard-less of whether or not they actually had livestock on the leased lands. No provisions were made for refund or nonpayment due to drought, fire, or other factors.

In August 1968, regulation changes were implemented to place the Section 15 public lands under "multiple use management" (43 CFR 4125.1-1). Key changes made to the regulations are as follows.

1. Joint use of the leased area by two or more lessees was allowed
2. Locked gates or other actions by the lessee to prevent or interfere with lawful public use of the public land were prohibited
3. A framework was established for cooperation between BLM and lessees to develop Allotment Management Plans (AMPs) aimed at improving resource conditions.
4. Construction standards were established for fences and other projects constructed by the lessees to assure multiple use objectives were met.
5. Grazing fee charges were changed from an acreage basis to payment for forage consumed as measured by Animal Unit Months (AUMs).

Management Plans

Coordinated Resource Management Plans (CRMPs) provide a well-developed vision or goal for an allotment that spans more than one management jurisdiction, which can be achieved through implementation of an agreed upon set of conservation practices that provide mutual gain to multiple partners, often including other agencies. Allotment Management Plans (AMPs) provide the same outcome, but are focused only on single agency management.

- The Babocomari Allotment has an active CRMP with all parties' signatures, but improvement projects have only been taking place on state and private lands.
- Brunckow Hill has an AMP signed by the BLM in 1990 and also an active CRMP that the BLM didn't sign. Improvement projects have been taking place on state and private lands.
- Lucky Hills has a CRMP that was signed in 1997.
- Three Brothers also doesn't have a CRMP but the operators have started the process with NRCS to get a plan completed.

Table 2.4-3. SPRNCA Grazing Allotments

Allotment Number	Allotment Name	Total Size of Allotment (acres)	Acreage Breakdown by Ownership	BLM/ Other Acres In SPRNCA	BLM AUMs in SPRNCA	Management Category
52080	Babocomari	11,512	2,025 public 7,892 state lands 1,804 private	1,865	165	Maintain
52510	Brunckow Hill	1,923	1,196 public 171 state land 712 private land	974	68	Maintain

Allotment Number	Allotment Name	Total Size of Allotment (acres)	Acreage Breakdown by Ownership	BLM/ Other Acres In SPRNCA	BLM AUMs in SPRNCA	Management Category
52520	Lucky Hills	20,998	9,448 public 10,749 state 800 private 1,320 patented claims 1,707 uncontrolled state land	1,728	197	Maintain
52320	Three Brothers	9,227	2,691 public 5,403 state land 160 private land	2,280	162	Maintain

Babocomari

The Babocomari allotment is located in Cochise County just west of the San Pedro River, about five miles east of Huachuca City. Highway 82 divides the south pasture from the west and north pastures. The Babocomari River runs through the southern third of the south pasture. The current livestock operation is 15 cattle; yearlong at 100 percent public land use (2,025 acres public land, 7,892 state lands, and 1,804 private lands). The current grazing lease allows for 15 cattle all year long, which equates to 180 AUMs. One hundred sixty-five AUMs are associated within the SPRNCA boundary. All of the ranch's watersheds drain into the Babocomari River before reaching the San Pedro River. The entire ranch is grazed as one unit. There are five pastures that are separated by fences but the pastures themselves are a mix of BLM, state, and private. There is no internal fencing separating BLM from state from private land.

The majority of the lease is relatively flat with the exception of the southeast corner, which is hilly and has well-defined drainages running toward the Babocomari River. Elevation extremes range from a low of 3,900 ft. where the Babocomari River leaves the ranch to a high of 4,200 ft. on the western border. The allotment is cooperatively managed through its CRMP and monitored every other year. A land health assessment for this allotment has never been done. Cooperatively managed means the private land owner, BLM, state lands, NRCS, AZGFD, and any other interested group writes and agrees to management practices on this alottment through the CRMP.

Brunckow Hill

The Brunckow Hill allotment is located in Cochise County, Arizona and is approximately five miles southwest of Tombstone, AZ and approximately six miles northeast of Sierra Vista. The current livestock operation is seven cattle year-long at 100 percent public land use (1,196 acres of public land, 171 acres of state land, and 712 acres of private land). The current grazing lease allows for seven cattle all year long, which equates to 84 AUMs. Sixty-eight AUMs are associated within the SPRNCA boundary. All of the ranch's watersheds drain into the San Pedro River. The San Pedro River is located on the western end of the allotment. Elevation on the Brunckow Hill allotment is approximately 4,541 ft. The Brunckow Hills are located just south of the allotment. The rest of the allotment is made up of mostly limy upland, granitic upland, and sandy wash. Allotment boundaries do actually include a small portion of the San Pedro River due to private land ownership in the river channel itself. Current operations are held and maintained east of the railroad grade and are not within the San Pedro River riparian zone. There are two separate pastures within the SPRNCA. Upland health assessments were completed at one key

area on the Brunckow Hill Allotment on December 2, 2008 and March 7, 2013. A key area was used for the Upland Health Assessment (Standard 1), as it represents ecological sites over the majority of the allotment. This method involves observing a set of physical and biological attributes at a site to determine upland health. These observed attributes are placed in one of five categories depending on their degree of presence or absence on the site (i.e., None to Slight, Slight to Moderate, Moderate, Moderate to Extreme, and Extreme). These attributes include items such as: plant pedestals, flow patterns, soil and litter movement by wind or water, presence of rills, or active gullies. A final upland health determination is made by summing all of the attributes.

Standard 1. Upland Sites: Upland soils exhibit infiltration, permeability, and erosion rates typical for this soil type, climate, and land form. The Upland Health Assessment data shows soil/site stability, and hydrologic functions meet expectations when compared to reference area conditions. The biotic integrity function is slightly impaired due to higher than expected numbers of mesquite, whitethorn, and some invasion of the exotic Lehmann lovegrass. Therefore, Standard 1 is being met for this allotment.

Lucky Hills

The Lucky Hills allotment is located in Cochise County, Arizona. The headquarters are approximately 1.5 miles southeast of Tombstone Arizona and around the town. The current livestock operation is 90 cattle year-long at 100 percent public land use (9,448 acres of public land, 10,749 acres of state land, 800 acres of private land, 1,320 patented claims, and 1,707 uncontrolled state land). The current grazing lease allows for 90 cattle all year long, which equates to 1080 AUMs for the entire allotment. 197 AUMs are associated within the SPRNCA boundary. All of the ranch's watersheds drain into the San Pedro River.

Elevation on the Lucky Hills allotment is approximately 4,000-5,320 ft. The Tombstone Hills are located within the allotment. The rest of the allotment is made up of mostly limy upland, granitic upland, and sandy loam upland. Portions of the allotment within the SPRNCA boundary were never completely fenced out and managed separately from the rest of the allotment. Lucky Hills has a two-mile portion on the eastern boundary that remains unfenced and lessened control of grazing within the SPRNCA. Efforts have been made and discussed with lease holders with plans to complete the fencing and provide water within the NCA boundary.

The Lucky Hills Rangeland Health Allotment Evaluation was completed in 2009. In accordance with BLM policy and regulations, any applicable monitoring data was examined and evaluated to determine progress in meeting Arizona Standards for Rangeland Health and other land use plan objectives. In addition, the Lucky Hills Allotment was reviewed to determine if any new information, issues, or concerns were identified. They were not as the lease was renewed.

Upland health assessments were completed at two key areas on the Lucky Hills Allotment on December 16, 2008 and March 10, 2009. The key areas used for the Upland Health Assessment, represent ecological sites over the majority of the allotment. This method involves observing a set of physical and biological attributes at a site to determine upland health. A final upland health determination is made by summing all of the attributes. Methods for the upland health assessments are described in *Interpreting Indicators of Rangeland Health, Technical Reference 1734-6, 2005*.

Standard 1. Upland Sites: Upland soils exhibit infiltration, permeability, and erosion rates typical for this soil type, climate, and land form. The Upland Health Assessment data shows soil/site stability, and hydrologic functions meet expectations when compared to reference area conditions. The biotic integrity function is slightly impaired due to higher than expected numbers of creosote and some invasion of the exotic Lehmann lovegrass. Therefore, Standard 1 is being met for this allotment.

Three Brothers

The Three Brothers Ranch is located in Cochise County, Arizona and is approximately 4 miles west of Tombstone, Arizona and approximately 20 miles northeast of Sierra Vista. The current livestock operation on controlled lands is 68 cattle year-long at 24 percent public land use (2,691 acres of public land, 5,403 acres of state land, and 160 acres of private land). The current grazing lease allows for 16 cattle all year long which equates to 192 AUMs for the entire allotment. One hundred sixty-two AUMs are associated within the SPRNCA boundary. All of the ranch's watersheds drain into the San Pedro River. There is no free-flowing surface water on the ranch.

Elevation on the Three Brothers Allotment is approximately 4,541 ft. the Three Brothers Hills are located on the southern portion of the allotment. The allotment is made up mostly of limy upland, granitic upland and limestone hills. Portions of the allotment within the SPRNCA boundary were never completely fenced out and managed separately from the rest of the allotment. Three Brothers has a 2.5-mile portion on the eastern boundary the remains unfenced and lessened control of grazing within the SPRNCA. Efforts have been made and discussed with lease holders with plans to complete the fencing and provide water within the NCA boundary.

Upland health assessments were completed at one key area on the Three Brothers Allotment in December 2, 2008. A key area was used for the Upland Health Assessment, as it represents ecological sites over the majority of the allotment. This method involves observing a set of physical and biological attributes at a site to determine upland health.

Standard 1. Upland Sites: Upland soils exhibit infiltration, permeability, and erosion rates typical for this soil type, climate and land form. The Upland Health Assessment data shows soil/site stability, and hydrologic functions meet expectations when compared to reference area conditions. The biotic integrity function is slightly impaired due to higher than expected numbers of creosote and some invasion of the exotic Lehmann lovegrass. Therefore, standard 1 is being met for this allotment.

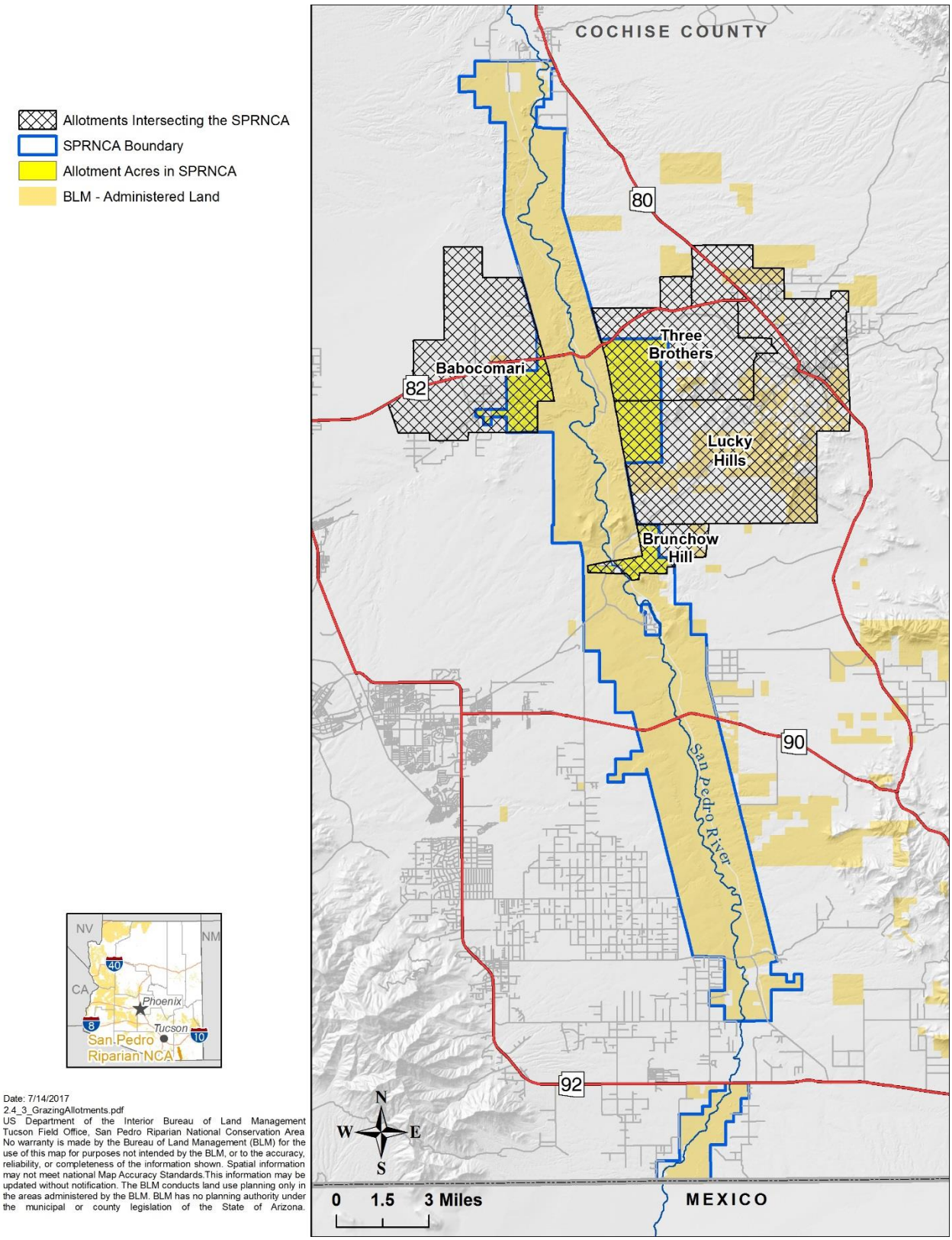


Figure 2.4-3. Grazing Allotments

Forecast

Public land grazing privileges are expected to become more important and more valuable to livestock producers in the SPRNCA. This is in response to trends such as:

- Higher costs of alternative forage, such as hay or private land grazing;
- Higher costs of grain, resulting in long-term trends to minimize time in feedlots and rely more on rangelands;
- Higher costs of fuel, lessening the opportunity to truck cattle away to distant locations for alternative forage; and
- Loss of agricultural land to urban development.

While the demand for grazing on public lands to help make local operations viable will likely increase in the future, demands for other uses of the public lands will also increase.

2.4.4 Recreation

Management of recreation resources on public lands administered by the BLM is guided by BLM Manual H-8320, H-8321, IM2011-004, and other recreation program specific manuals and handbooks for project planning, trails, and recreation permits.

The legislation that created the SPRNCA restricts the "use of motorized vehicles in the conservation area," and only allows motorized vehicles "on roads specifically designated for such use." The legislation also authorizes the Secretary "to implement such reasonable limits to visitation and use of the conservation area as he finds appropriate for the protection of the resources of the conservation area, including requiring permits for public use, or closing portions of the conservation area to public use."

Generally, the BLM manages public lands to provide a broad spectrum of outdoor opportunities that afford visitors the freedom of recreational choice with minimal regulatory constraints. As a national provider of recreational opportunities, the BLM focuses on its primary niche: providing resource-based recreation and tourism opportunities. A visitor's freedom to pursue unstructured recreational opportunities is promoted, as long as they accept the responsibility to use public lands wisely and to respect other public land users. Responsible use is encouraged by the BLM and its partners, especially the FSPR. The SPRNCA provides outstanding opportunities for outdoor recreation and nature-based tourism in a largely natural setting with minimal developments. Recreational activities occurring on public lands are generally considered to be nonconsumptive. The BLM relies heavily on public land users to protect the land, water, and structures so that the next person can also have a quality recreational experience.

Recreation and education, values and resources articulated in PL 100-696, are specifically included with aquatic, wildlife, archeological, paleontological, scientific, and cultural values as paramount for conservation, protection, and enhancement in the SPRNCA.

Since designation in 1988, recreational and educational use in the SPRNCA has become highly valued by visitors from the local area, other states, and international origins. Visitors are attracted by a variety of recreation opportunities, where they can participate in different activities in a variety of outdoor settings, mostly natural in character. Activities include hiking, horseback

riding, mountain biking, camping, hunting, fishing, wildlife watching, viewing historic, prehistoric, and paleontogical sites, heritage tourism, and even canoeing and kayaking.

The SPRNCA is used by commercial recreational service providers and organized group activities under a Special Recreation Permit (SRP). Activities that have been permitted in the past include guided nature tours and horseback trail rides. Individual recreation permits are required for overnight camping.

The *Riparian Management Plan* also implemented restrictions on the use and discharge of firearms on part of the SPRNCA to protect public safety on populated areas adjacent or surrounded by the SPRNCA.

Access for public use is provided at designated access points with minimal improvements and facilities. Access to the interior of the SPRNCA is provided by an existing network of roads that predated the establishment of the area, and managed to accommodate nonmotorized public access, and provide administrative motor vehicle access for resource management, monitoring activities, and emergency purposes.

Recreation Setting Characteristics

The BLM uses the Recreation Setting Characteristics system to identify the character of the setting of an existing area and the recreation opportunities it provides. Factors considered include physical, social, and managerial components. The recreation setting characteristics are considered in land use plans, and analyzed among other resource values to establish land use allocations to manage recreation resources, settings, uses, and activities to provide settings for experiences appropriate for the area.

The Recreation Setting Classes within the SPRNCA include primitive, back country, middle country, front country, and rural. These settings are associated with specific setting qualities, access, types of activities, and other factors, and are normally delineated in a recreation setting inventory. A current recreation setting inventory, including mapping of the classes, has not yet been completed. The inventory provides the basis for analyzing management alternatives, and avoiding conflicts with other land uses.

Limits of Acceptable Change

A widely used management-monitoring technique in recreation is Limits of Acceptable Change. The Limits of Acceptable Change utilize indicators with prescriptive standards based on the recreation objectives to define acceptable limits. If the standards (acceptable limits) are exceeded, the managing partners then make pre-determined management changes that will bring concerns such as: visitor impacts on natural/cultural resources; the physical, social and administrative natural resource recreation setting prescriptions; or the visitor’s attainment of recreation outcomes back within acceptable standards.

Visitor Use/Demographics

Tracking visitor use and regional demographics is necessary for managing recreational use, identifying trends, projecting and prioritizing future recreation management, identifying natural resource recreation settings, carrying capacities, and Limits of Acceptable Change. The BLM has collected recreation information through electronic road and trail counters, recreation patrol

observations, SRP post-use reports, GIS, visitor preference surveys, and planning focus groups. Visitor preference surveys have been collected at the San Pedro House Bookstore and Information Center, Fairbank Historic Townsite, and in the field. Annual Visitor use data on BLM lands is recorded in the BLM's Recreation Management Information System. Estimated visitation in the SPRNCA as documented in Recreation Management Information System from Fiscal Year 2002 through 2015 can be found in Table 2.4-4 below.

Table 2.4-4. Estimated Annual Visitation

Fiscal Year	Yearly Estimated Total Visits
2002	85,847
2003	86,152
2004	116,194
2005	58,813
2006	95,333
2007	113,324
2008	127,848
2009	116,504
2010	107,097
2011	95,450
2012	137,859
2013	140,001
2014	144,741
2015	128,365

Source: RMIS Outputs from 2002 to 2014.

The economic benefits from recreational use in the SPRNCA were identified in a study completed by the Univerity of Arizona in 2002. This study determined that an average of $24.42 is spent by local day use visitors, and $97.18 is spent in the area by overnight visitors. This study also identified demographic information about the visitors, lodging choices, visitation estimates, purpose of trip to the area, reasons for visiting, and sites visited (University of Arizona 2002).

Special Recreation Management Area (SRMA)

The entire SPRNCA was designated as a SRMA in the Record of Decision for the 1989 *Riparian Management Plan*.

SRMAs are land use allocations that recognize unique and distinctive recreation values and are managed to enhance a targeted set of activities, experiences, benefits, and recreation setting characteristics, which becomes the priority management focus. The BLM Manual 8320–Planning for Recreation and Visitor Services, provides the following guidance for this designation:

- **Definition**: The SRMA is an administrative unit, where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation.
- **Management Focus**: The SRMA is managed to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics. The RMP may subdivide the SRMA into Recreation Management Zones (RMZs) to further

delineate specific recreation opportunities. Currently, there are no RMZs in the SPRNCA. Within an SRMA, recreation and visitor services management is recognized as the predominant RMP focus, where specific recreation opportunities and recreation setting characteristics are managed and protected on a long-term basis.

- **Requirements**:
    - The SRMAs/RMZs must have measurable outcome-focused objectives. These objectives must define the specific recreation opportunities (i.e., activities, experiences and benefits derived from those experiences) that will become the focus of recreation and visitor services management.
    - Identify necessary management action and allowable use decisions for recreation and visitor services and other programs to achieve SRMA/RMZ objectives.
    - Within the recreation and visitor services program, identify supporting management actions and allowable use decisions to accomplish the following:
        - Sustain or enhance recreation objectives;
        - Maintain or enhance the desired physical, social, and operational recreation setting characteristics;
        - Constrain uses, including noncompatible recreation activities that are detrimental to meeting recreation objectives;
        - Address visitor health and safety, resource protection, and use and user conflicts (e.g., areas closed to target shooting, camping limitations); and
        - Address the type(s), activities and locations where SRPs would be issued, or not issued.

Within other programs, establish terms, conditions, or special considerations for other resource programs necessary to achieve the SRMA/RMZ objectives (e.g., designations for all types and modes of travel, areas available for livestock grazing, VRM classes, lands with wilderness characteristics, and Wild and Scenic River eligibility). All actions must conform to applicable program policy, regulations, and valid existing rights.

Current Condition

Since the adoption of the preferred alternative in the Riparian Management Plan, recreation and visitor services have been managed to provide for "moderate" use "to the extent possible without impacting other sensitive resources, with both dispersed and developed recreation," and to "intensively interpret all of the resources of the EIS area." Many actions have been implemented towards meeting this objective, including, but not limited to: developing parking areas, a campground, trails, interpretive sites; allowing for commercial uses and equestrian use; prohibiting target shooting; investigating the development of a rail-trail on the north-south railroad grade; and restricting certain uses usually allowed for on other public lands (e.g., firearm hunting south of Charleston Road and north of Highway 92). As the BLM became familiar with managing the environmentally sensitive values of the SPRNCA, certain actions, such as constructing large fully developed campgrounds and providing motorized public access to mid

and back-country areas, as called for implementation in the *Riparian Management Plan*, have been deferred.

Recreation Management Zones (RMZs)

Specific RMZs have not been delineated for the SPRNCA. There are three areas within the SPRNCA that have become associated with specific types of recreation opportunities and activities over time:

- While there are less than two miles of developed trails in the San Pedro River within the Fremont cottonwood and Goodding willow broadleaf riparian gallery forest, this area experiences the greatest visitation of pedestrian bird watchers due to the attractiveness of this habitat, the dramatic contrast of lush forest with the surrounding semi-desert grasslands and uplands, and sheltering an astounding diversity and numbers of resident and migratory avian species present in the gallery forest.
- The riparian grasslands and mesquite bosques adjacent to the gallery forest extending up to the foot of all the upland areas receive a majority of visits from individuals who are bird-watching and wildlife viewing. As a result of the well-developed, nonmotorized, multiple-use trail system in this physiographic area, recreational visitors include, in addition to birding enthusiasts, equestrians, mountain bikers, hunters, hikers, and backpackers not necessarily engaged in bird-watching.
- Although designated trails are few, the SPRNCA uplands, composed of Chihuahuan desert scrub species, with riparian associate species in many of the major side drainages, have the best views of the surrounding mountainous San Pedro River watershed. This area of rugged badlands and sparse grassy terraces also offers the best opportunities for viewing prehistoric and historic sites open to the public, including the Rock Art Discovery Trail, Presidio Santa Cruz de Terrenate, Brunckow Cabin, and Millville Historic Townsite.

There are 10 designated trailheads providing public access across the length of the SPRNCA. There is a backcountry camping area located at the confluence of the San Pedro River and Miller Wash. The facility is the only one of its kind in the SPRNCA, and contains four gravel-hardened circular camping pads, vault toilet, contained iron fire ring, and an animal-proof food storage container. Dispersed backcountry camping is available by noncommercial SRP for $2.00 per person per day throughout the SPRNCA, and is currently limited to seven consecutive days.

Bird-watching and wildlife viewing are by far the preferred recreational activities in the SPRNCA and occurs year-round, with the greatest visitation occurring between November and April. Visitation at the two visitor centers that are manned (San Pedro House, Fairbank) are estimated by the number of participants/visitors (Table 2.4-5). The estimates are based on persons who entered the visitor center and registered, and does not reflect users who accessed the SPRNCA at other access points, or who did not use the visitor center.

Table 2.4-5. 2013 Estimated Visitation

SPRNCA Trailheads and Sites	Estimated Visits (2014)	Estimated Visits (2015)
Fairbank Historic Townsite	5,457	6,024
San Pedro House	12,360	12,735

Source: FSPR 2015.

Special Recreation Permits (SRPs)

Permits for commercial recreational use, competitive use, organized activities, vending, and individual use of special areas, are administered in accordance with public land regulations at 43 CFR 2932. SRPs authorize temporary use of public lands, and are subject to special terms, conditions, and stipulations to protect resources and prevent land use conflicts.

The BLM currently administers several commercial SRPs, noncompetitive organized events, and special social events, e.g., weddings, meetings, or picnics. Permitted activities include guided birding and wildlife tours and photography workshops. In addition, several new applications are received annually for additional commercial, competitive, or organized group events. All permits are processed on a case-by-case basis with preference given to existing permittees.

During the past 10 years, applications for SRPs have not greatly increased. Organized groups, primarily nonprofit educational institutions, frequently request permits to provide interpretive and educational tours of sites with the SPRNCA. These permits are rarely for overnight campouts and for groups of less than 20 people.

Dispersed Recreation

By definition, dispersed recreation is made up of small events distributed over large areas. Impacts, such as minor disturbances to soil and vegetation, are negligible and the environment tends to recovery quickly. It is the general policy of the BLM that undeveloped federal lands under its administration are available to the public for dispersed camping and general recreation, with the following provisions:

- Camping is limited to seven consecutive days within the SPRNCA in a 21-day period;
- Leave No Trace Ethics;
- Avoid camping within 0.25 miles of any water source, including man-made water sources for use by wildlife or domestic stock; and
- Campfires in designated campfire rings only.

Most of the SPRNCA is open for dispersed recreation use, including foot access on and off the trails. While visitors are highly encouraged to remain on designated trails, long-term cumulative impacts could occur in association with dispersed recreational activities and need to be monitored. These activities are normally, but not exclusively, linked to more heavily used popular areas and can increase unacceptable levels of soil compaction and erosion, noxious weed dispersal, the creation of single track and nonmotorized trails, as well as the vandalism of natural and cultural resources.

AZGFD's Rules and Regulations for Hunting Migratory Game Birds

Migratory game birds that may be hunted during the appropriate season within the SPRNCA planning area on Units 34B, 35A, and 30B (Figure 2.4-4) include band-tailed pigeon (*Patagioenas fasciata*), mourning dove, white-winged dove, and Eurasian collared dove (*Streptopelia decaocto*) (see AZGFD dove and band-tailed pigeon regulations). The AZGFD snipe and waterfowl regulations allow hunting in the SPRNCA planning area in Units 34B and 35A on the west side of the San Pedro River, and in unit 30B on the east side of the San Pedro River, during the appropriate season for common snipe, ducks (including mergansers, American coot, and common moorhen), white geese (snow [*Chen caerulescens*], blue, [*Chen caerulescens*] and Ross' [*Chen rossii*]) and dark geese (Canada and white-fronted [*Anser albifrons*]). Sandhill crane (*Grus Canadensis*) hunting is currently allowed under the AZGFD sandhill crane regulations in the SPRNCA in Unit 30B on the east side of the San Pedro River. In the SPRNCA, hunting of dove occurs most commonly, with fewer numbers of waterfowl hunters. However, numbers of band-tailed pigeon, sandhill crane, and geese are not present in the SPRNCA in high enough to attract hunters.

Hunting

In the SPRNCA, firearms discharge is currently permitted in the area north of Charleston Road and south of Highway 92 from September 1 to March 31 for the purpose of regulated hunting as authorized by AZGFD, and bow hunting is allowed anywhere except within 0.25 miles of developed areas (54 FR 36056). In the SPRNCA, Unit 34B is on the northwest side of Highway 82 and the river, Unit 35A is on the southwest side of the river between Highway 82 and the International Boundary, and Unit 30B is on the east side of the river (Figure 2.4-4).

Animals that may be hunted during the appropriate season on these units within the SPRNCA may include Coues white-tailed deer, mule deer, black bear, mountain lion, cottontail rabbit, Gambel's and scaled quail, coyote, skunk, raccoon (*Procyon lotor*), bobcat, foxes, ringtail (*Bassariscus astutus*), and badger (*Taxidea taxus*) (AZGFD 2013a). In the SPRNCA, antlered mule deer currently may be hunted in Units 30B and 34B, and by archery in Unit 35A (Figure 2.4-4). Coues white-tailed deer may be hunted in Units 30B, 34B, and 35A. There are also general population management seasons for designated deer in Units 30B, 34B, and 35A (AZGFD 2013b). Javelina may be hunted during the appropriate season in Units 34B, 35A, and 30B. Black bear may be hunted in Unit 35A. Gambel's and scaled quail, mountain lion, cottontail rabbit, coyote, skunk, raccoon, bobcat, and foxes may be hunted statewide, including all units in the SPRNCA. A small number of permits are issued for Gould's turkey in Unit 35A. There are currently no permits issued for pronghorn in Unit 35A (AZGFD 2013b). Currently, trapping is prohibited in the SPRNCA except for health and safety or administrative purposes (54 FR 36056).

Hunting in the SPRNCA has steadily increased over the last several years with increased development of the surrounding area, increased demand, and increased trailhead access. Game feeders, tree blinds, and wildlife cameras have become a common occurrence, and are usually in place longer than the 10 days allowed under 43 CFR 8365.1-2. However, the use of edible or

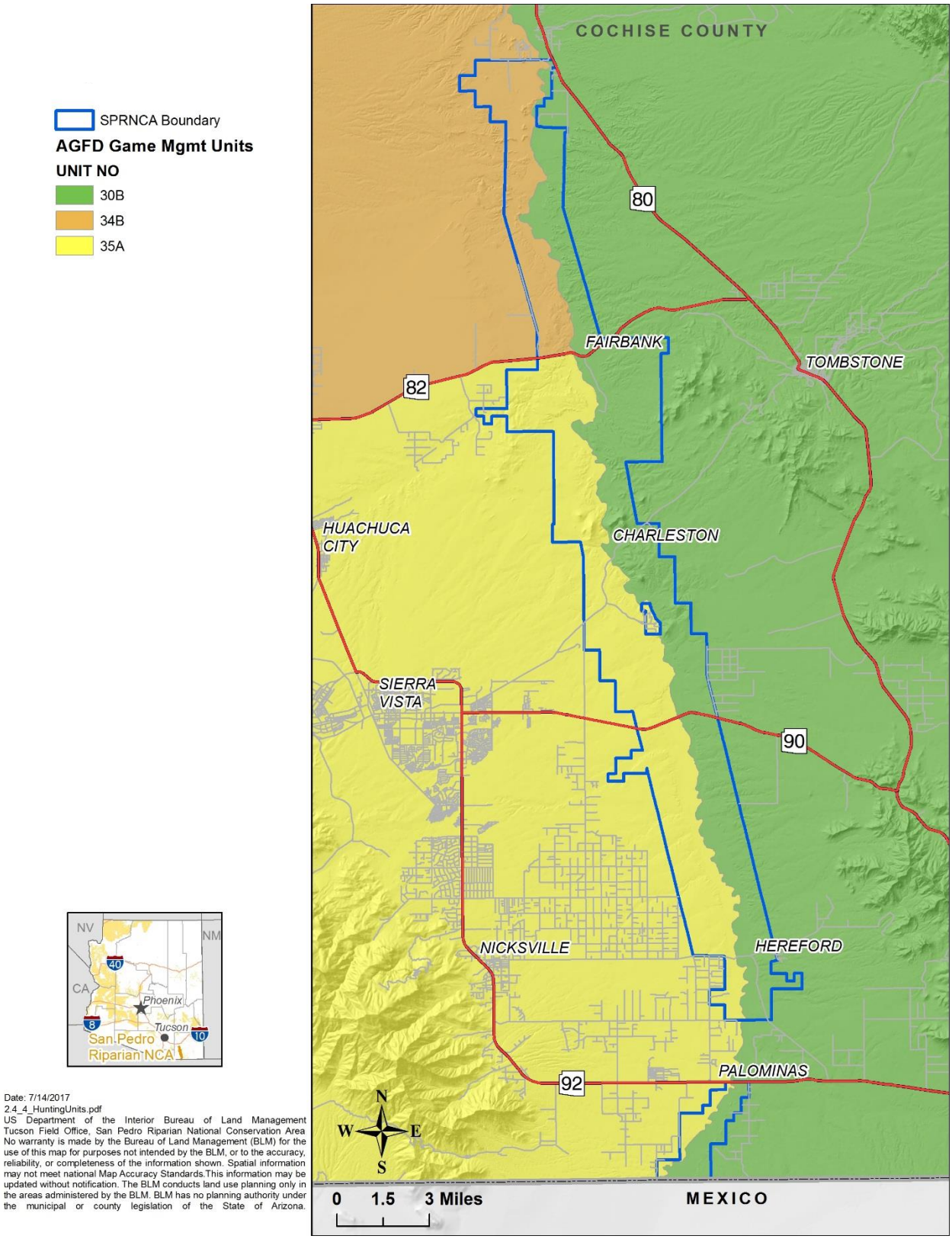


Figure 2.4-4. Hunting Units in the SPRNCA

ingestible substances to aid in taking big game (i.e., baiting) became unlawful in 2013 (AZGFD 2013a), but blinds and cameras are presently common throughout SPRNCA year-round.

Fishing

Currently, fishing in the SPRNCA occurs for American bullfrog, crayfish, black bullhead, bluegill (*Lepomis macrochirus*), common carp, green sunfish, largemouth bass, and channel catfish. The most frequented areas include areas with perennial water in the river from roughly Hereford Road to Charleston Road, and at Phoebe Ponds. Currently, Kingfisher Pond is prone to annual drying and does not support any angling opportunities.

Trends and Forecasts

The demands for both developed and undeveloped recreation on public lands have been increasing slowly since the SPRNCA was established. Visitation at all locations in the SPRNCA appears to mirror national trends. According to studies (University of Arizona 2002), the majority of visitors to the SPRNCA are from out of Cochise County. Visitors are generally satisfied with the existing facilities, including trailhead access to public lands, maintenance, and public information in the SPRNCA.

However, population increases in areas of urban and rural interface could escalate demands for access to public lands near residential developments and the need to provide increased management and protection of resources. Public lands adjacent to interface areas typically experience an increase in user-created social trails or staging areas that account for the proliferation of new user defined recreation opportunities in areas that may have significant resource values. Over time, unmanaged recreational activities can adversely affect sensitive soils, wildlife habitat, riparian areas and important cultural and historical sites. Demand for trail access points directly from private residences and communities into the SPRNCA will also increase.

The BLM continues to view heritage tourism as an aspect of resource protection, education, recreation, and sustainable economic potential for local communities. Cultural resources important to American and international heritage remain a part of the SPRNCA landscapes managed by the TFO. They are often preferred destinations among many visitors. Protecting recreation, scenic, paleontological, archaeological, and historic resources, while providing reasonable access to these locations, will continue to challenge the agency and public alike.

2.4.5 Transportation and Access

Indicators

Guidance for preparing, amending, revising, maintaining, implementing, monitoring and evaluating land use and travel management plans is provided by the legislation that established the SPRNCA (PL 100-696), BLM Manual H-1626 and Handbook H-8342, and public land regulations at 43 CFR 8340. Other handbooks address trail and road maintenance.

Current guidance requires an interdisciplinary approach to travel and transportation planning and management that addresses access needs for administrative purposes related to allowable uses, access needs of land users with specific authorizations, and access for public use to meet recreation and other management objectives. BLM’s travel and transportation management

system identifies area allocations, which designate public lands as open, limited, or closed to motorized vehicles. The system also identifies route designations to achieve specific access purposes or management objectives, which may address motorized, nonmotorized, or mechanized modes of travel.

Objectives

The BLM Travel and Transportation Handbook (H-8342) has identified the following essential planning elements to travel and transportation management planning:

- **Comprehensive**: Managers are to consider access needs and should incorporate management prescriptions for all motorized, mechanized, and nonmotorized travel and access that occurs on public lands. The Travel and Transportation Management (TTM) prescriptions should be implemented in a holistic approach that provides clear direction for access and recreation opportunities while protecting sensitive areas and meeting resource management objectives of all resource programs.
- **Interdisciplinary**: The TTM must be interdisciplinary, requiring all affected BLM resource programs to actively participate throughout the planning process and during the implementation phase.
- **Collaborative**: Collaboration is a process in which interested parties, often with widely varied interests, work together to seek solutions with broad support for managing public lands. Collaboration mandates methods, not outcomes; it does not imply that parties will achieve consensus. Depending on local circumstances and the judgment of the field manager, varying levels of collaboration may be used in specific involvement processes. Travel plans should be accomplished in a collaborative process by incorporating internal and external input from cooperating agencies, communities, and interest groups.
- **Outcome-based**: Travel and transportation systems should be identified, designated, and managed in such a manner that they support the RMP desired outcomes.

Current Conditions

Section 102 (b) of PL 100-696, the legislation which established the SPRNCA states that, "Except where needed for administrative or emergency purposes, the use of motorized vehicles in the conservation area shall only be allowed on roads specifically designated for such use as part of the management plan prepared pursuant to section 103 of this title."

The *Riparian Management Plan* (BLM 1989) and the *Safford RMP* (BLM 1992 and 1994) designated the entire SPRNCA as Limited to designated roads and allowed public vehicle and mountain bike use on designated roads. Public highway access from Interstate 10 to the SPRNCA is provided by SR 80, SR 82, SR 90, and SR 92. Public access is also provided by several Cochise County maintained roads including Apache Powder, Charleston, and Hereford roads and other roads that border the NCA. Access to the 10 existing designated access points and trailheads, and administrative access roads and routes is from these five roads (Figure 2.4-5).

A route inventory in accordance with current BLM procedures was completed in June 2014 to support review of the current management situation and potential revision or amendment of the

current RMP, and transportation management plan. The 2014 route inventory identifies all existing roads and trails that are currently providing access for administrative purposes and public use within the SPRNCA (Figure 2.4-5). Part of the route inventory process included identifying the routes that provide administrative access for the various BLM resource management programs in the SPRNCA, and access for existing authorizations (i.e., ROW, permits).

The *Riparian Management Plan* adopted several practices or actions specific to travel and transportation management, including:

- Prohibited off-road use by any type of vehicle.
- Maintenance and use of existing ROWs, subject to stipulations that protect resource values.
- Equestrian use.
- Designation of the entire EIS area under the Off Highway Vehicle (OHV) management regulations as "Limited to Designated Roads." Allow public vehicle and mountain bike use on roads designated for such use.
- Development of public access points to the SPRNCA, trails and signing at various locations to accommodate public use (San Pedro House, Herefored area, Fairbank townsite area, Presidio of Santa Cruz de Terrenate, Boquillas Ranch, Babocomari River, Lewis Springs, Murray Springs, Lehner Ranch, Charleston area, and Palominas area).
- Rebuilding of the San Rafael del Valle Road (Highway 90 to Hereford) use as a motorized interpretive route with improvements for day use (gravel surfacing, seven to 10 pullouts with interpretive displays, parking areas, picnic sites, overlooks).

The adopted actions above have been largely implemented and are in operation since the plan was approved. The *Riparian Management Plan* and subsequent Federal Register Notice stated that maps would be forthcoming, but maps (other than trail plans) were never formally developed.

The *San Pedro Intermodal Transportation Plan – November 1995*, and the *Recovery – SPRNCA Trail System Maintenance – September 2009*, were prepared for the SPRNCA to provide for the designation, construction, and maintenance of the current nonmotorized trail system, totaling approximately 50 miles, in the SPRNCA to fulfill the requirements of the PL 100-696 in providing access for administrative purposes and public and authorized use.

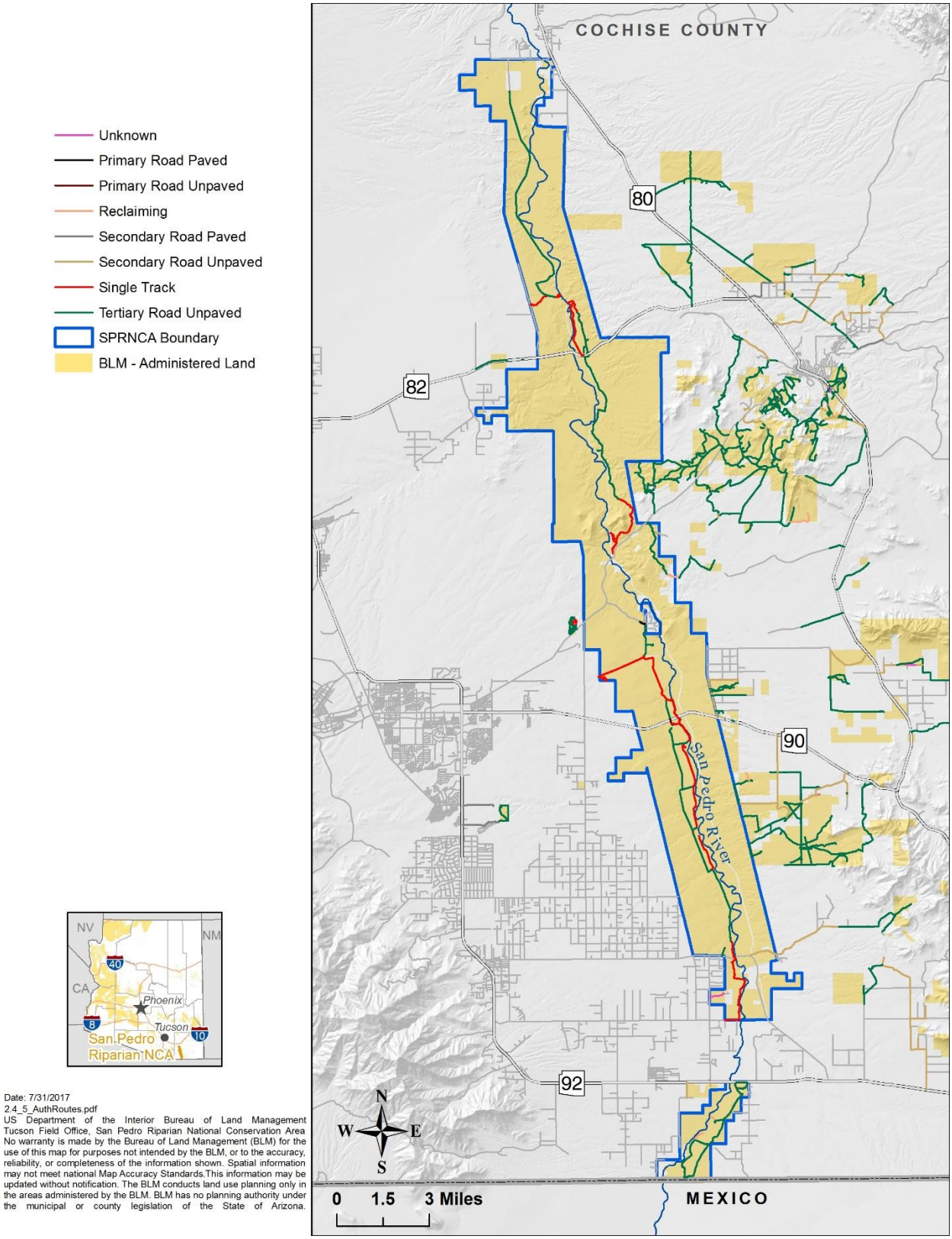


Figure 2.4-5. Authorized Routes Within The SPRNCA (2014)

Even with the implementation of the actions proposed in the above documents, some of the current system of linear transportation features has developed over time as a result of administrative access, resource use needs, and recreation access and use.

Administrative access routes in the SPRNCA, and the public trail system, utilize routes constructed prior to the designation of the SPRNCA, and now provide access for monitoring, ROW, designated public use sites, and access to private lands (see Section 2.4.2, Lands and Realty for more on ROW).

Many existing routes are used for project-specific and general monitoring by BLM staff and authorized users (i.e., ROW holders and those with grazing permits). The routes designated for administrative and resource uses provide primary access within the SPRNCA for administrative, emergency, and resources use, and are open to nonmotorized recreation use. These routes have signs and locked gates to restrict use. Recreation-specific routes were created (authorized and unauthorized) in response to demand for trail-based recreation. Over time, recreation use extended, connected, or pioneered new routes from the administrative and resource use routes. This pattern of route development has resulted in unacceptable densities in some areas.

Trends

Administrative access needs will continue, driven by the allowable uses and management activities needed to implement monitoring, maintenance, or enhancement of resource conditions and uses. Access needs of authorization holders (e.g., ROWs, permits) will continue as needed depending on the purpose and nature of the uses authorized, and the condition of the facilities or improvements authorized. Public access demand will continue, driven by population growth, increases in visitation to the area, and the recreational opportunities and attractions in the SPRNCA. All access needs are influenced by the travel management designations that regulate use of motorized vehicles and designate the allowable uses of particular access routes. Over time, access needs may change, and those changes will be reflected in the access route network. As needs for administrative access changes, the nature of the route system may change (i.e., new routes are created and/or existing routes become unnecessary and decommissioned or re-purposed).

Roads or segments of roads in the SPRNCA which pre-dated the establishment of the NCA have been maintained under current management to accommodate administrative vehicle access needs and public use for largely nonmotorized purposes, with designated access points or trailheads along the existing public highways (maintained by the state and county). Existing access roads, trailhead facilities, and trail networks appear to largely accommodate current public demand for administrative and public recreational use. With the exception of providing motorized public access along the Del Valle Road, and a preliminary proposal for a regional trail crossing the SPRNCA, no significant changes to the existing route network have been suggested in public input so far. Interest in providing public motorized access on the Southwest Transmission Line Service Road has been expressed in the past, but was not a major issue in public comments.

Some residents on private land adjacent to the SPRNCA have expressed interest in having convenient trail access from their property to the SPRNCA, and have over time established user-created equestrian trails that are not on the BLM trail system.

Potential conflicts have been identified by resource specialists with some existing trails and management of sensitive resources which may be impacted by ongoing trail use. Trail users are generally satisfied with the existing designated trails locations and levels of maintenance. Seasonal climatic events, especially flooding and heavy growth of vegetation after the summer monsoons, perpetuate the need for regular and prompt trail inventories, maintenance and sometimes, reconstruction of route segments.

The most significant influence on the trends of the travel and transportation system is likely to be public desire to access the SPRNCA via motor vehicles and to have trail access near residential areas. Studies of the migration patterns of the past two decades suggest people are moving into the local communities partly because of the recreation opportunities on public lands (Rasker et al. 2004)). Population growth in the Upper San Pedro River watershed is frequently associated with the proximity of federal lands for recreation. Lands managed by the BLM in Cochise County have experienced a dramatic increase in recreational OHV use. This has resulted in levels of demand not anticipated by travel management decision makers. However, the SPRNCA has developed and filled a niche for public recreational use based on a nonmotorized access system, which appears to be largely accepted/supported by residents and visitors to the local area.

Forecasts

Land use allocations will need access for administration of the uses and activities needed to implement management practices under various resource management programs (wildlife habitat, water resources, watershed, grazing, recreation, etc.).

The SPRNCA will continue to attract public use from local, national, and international origins for a variety of recreational purposes that have become established under current management. This will result in increased pressure on existing access routes, parking areas, and trails.

Existing land use authorizations and facilities/infrastructure (ROW for access roads, electric powerlines, ditch and water pipeline; grazing permits and range improvements, monitoring sites, etc.) will continue to require access for maintenance or replacement activities. This will result in continued maintenance of existing physical access related to the authorized facilities, and re-clearing or reconstruction of vehicle access in places where revegetation has reclaimed the access along the ROW.

Emergency vehicle access will continue to be needed to respond to public safety and wildfire incidents. Growth in the area will continue to increase demand for recreational use and access to recreation opportunities. This will result in greater use of existing access routes and trails and an increased demand for motorized and nonmotorized recreational access to the SPRNCA. Demand and pressure from local residents to establish trails connecting residential areas or individual properties is likely to continue.

2.5 Special Designations

Special designations are applied to areas to protect or preserve their unique values or uses. These areas therefore require different management than would be applied to the surrounding public lands. This section identifies the various special management areas in the SPRNCA and addresses the qualities or uses that have resulted in their designations.

2.5.1 Areas of Critical Environmental Concern

An ACEC is defined in the FLPMA, Section 103(a), as an area within BLM-administered public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards. BLM regulations for implementing the ACEC provisions of the FLPMA are found in 43 CFR 1610.7-2(b).

Special management attention refers to management prescriptions developed during preparation of an RMP or RMP amendment expressly to protect the important and relevant values of an area from the potential effects of actions permitted by the RMP, including proposed actions deemed to be in conformance with the terms, conditions, and decisions of the RMP (BLM Manual 1613). Such management measures would not be necessary or prescribed if the critical and important features were not present.

To be eligible for designation as an ACEC, an area must meet criteria for both relevance and importance. An ACEC possesses significant historic, cultural, or scenic values, fish or wildlife resources (including habitat, communities, or species), natural processes or systems, or natural hazards. In addition, the significance of these values and resources must be substantial in order to satisfy the importance criteria. Restrictions that arise from an ACEC designation are determined at the time the designation is made, and are designed to protect the values or serve the purposes for which the designation was made. Goals, standards, and objectives for each proposed ACEC will be identified, as well as general management practices and uses, including necessary constraints and mitigation measures. The RMP will identify a reasonable range of alternatives that will include current management for existing ACECs, as well as management for proposed ACECs.

Current ACECs

Three ACECs currently exist in the SPRNCA for a total of 2,060 acres (Figure 2.5-1 and Table 2.5-1). They were established subsequent to the creation of the SPRNCA in the *Riparian Management Plan*. All three have the following management applied to them:

- Development and new ROW prohibited;
- Overnight camping and campfires prohibited;
- Avoidance by recreational users encouraged;
- Preserve and enhance vegetation communities
- Sign the boundary;
- Control exotic vegetation;
- Prohibit the introduction of non-native species; and
- Preclude public vehicular access.

Table 2.5-1. ACECs within the SPRNCA

Name	Size (acres)
St. David Cienega	350
San Pedro River	1,340
San Rafael	370

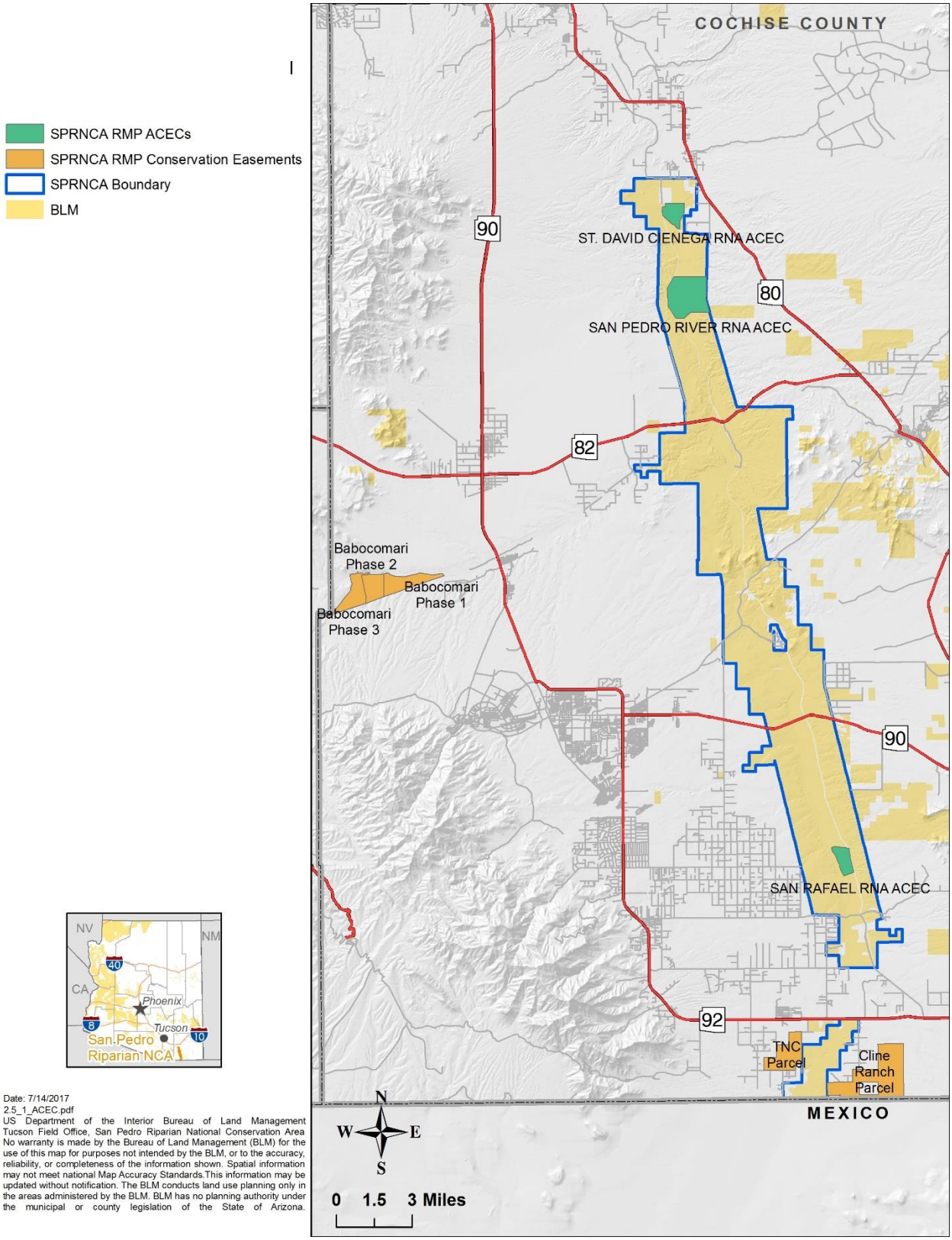


Figure 2.5-1. Areas of Critical Environmental Concern

2.5.2 Wild and Scenic Rivers

Current guidance for the identification, evaluation, planning, and management of eligible and suitable wild and scenic rivers is provided by BLM Manual 6400–Wild and Scenic River- Policy and Program Direction for Identification, Evaluation, Planning, and Management (Public), Release 6-136, July 13, 2912.

An eligibility study for the San Pedro River in the SPRNCA was completed in 1992, and it was determined eligible with a tentative classification as "recreational" due to the character of the study area. The San Pedro River's suitability for addition to the National Rivers system was analyzed in the Final Arizona Statewide Wild and Scenic Rivers EIS completed in 1994, and it was determined suitable with a "recreational" classification in the final Study Report/Record of Decision in 1997. The suitability recommendations have been submitted by the Arizona State Director to the Director of the BLM, who will submit them to the Secretary of Interior. Once a study river is determined suitable for addition to the National River System, it is placed under protective management to protect its free flowing condition and outstandingly remarkable values until it is designated by Congress or it is released.

Under current BLM policy, rivers for which a study has been previously completed, additional assessment, and study through the land use planning process need only be done if the documentation no longer exists or is incomplete or outdated; changed circumstances warrant additional review of eligibility; there is a change in the suitability factors; or the Field or District Manager decides to evaluate suitability in the land use planning process.

Due to possible changes in circumstances affecting the San Pedro River's outstandingly remarkable values, it is suggested that the eligibility and suitability of the river be revisited in the RMP being prepared for the SPRNCA.

Indicators

Indicators of suitability for addition to the National Rivers System are based on the Wild and Scenic Rivers Act of 1968, as amended. Suitable rivers must be in free flowing conditions, and possess outstandingly remarkable values.

The BLM considered eligibility in the *Safford RMP*, and determined two segments 0.25 miles on both sides of the San Pedro River, totaling 44 miles were eligible for inclusion in the National Rivers System with a tentative "recreational" classification (Record of Decision Sept. 1992). The determination on suitability for designation was deferred to a later decision.

The BLM completed an Arizona Statewide Wild and Scenic Rivers Legislative EIS in 1994, and analyzed alternatives for 20 rivers determined eligible in BLM RMPs. The San Pedro River study area included the river from the southern to the northern boundary SPRNCA, totaling 46 miles. The Statewide Rivers Study confirmed the eligibility of the two San Pedro River segments, their "recreational" classification, and determined were suitable for inclusion in the National Rivers System in the final Study Report/Decision Record in 1997.

The San Pedro River segments determined “suitable” for inclusion with a “recreational” classification comprise a total of 44 miles and 12,256 acres of federal land, with 1,840 acres of private land within the study corridor.

The Study Report identified “Scenic,” “Recreational,” “Fish and Wildlife Habitat,” and “Cultural, Historic and Paleontological” as the Outstandingly Remarkable Values possessed by the San Pedro River.

The BLM decision determining the two San Pedro River segments suitable for addition to the National Rivers System placed the study corridor under protective management to protect its outstandingly remarkable values until such a time as Congress acts on the BLM’s suitability recommendation.

Since that time, an additional study has been performed. Resource conditions and circumstances in the San Pedro River Study Area have changed since the 1996 River Study Report was completed. The changes do not affect the river’s free flowing condition, but added one outstandingly remarkable value for botanical resources. Road access which was planned by the BLM along some of the river segments was not implemented to preserve resource values, and public access is limited to nonmotorized travel throughout the river corridor, except at designated highway crossings and trailhead access points. Critical habitat has been designated within the study corridor by the USFWS for threatened and endangered species, adding to the importance of the wildlife ORVs identified in the 1996 River Study Report. Resource inventories have identified botanical resources that include unique and rare plants, including exemplary stands, and specimens of riparian and upland vegetation that are considered an additional outstandingly remarkable value.

The protective management established in the EIS is Study Report Appendix pp 518-520. The BLM issued current guidance for identifying and evaluating rivers under the WSR Act in 2012 (BLM Manual-6400).

Current Conditions

Changes in circumstances that warrant revisiting the 1997 determination of suitability include new critical habitat has been proposed by the USFWS for Yellow Billed Cuckoo and the northern Mexican gartersnake. Both species were recently listed as “threatened” under the ESA. Also, critical habitat has been designated by the USFWS for the Huachuca water umbel, a listed “endangered” plant species, found along the river.

Additionally, the character of the river corridor has been under protective management for nearly thirty years, and some of the characteristics may have changed due to restoration of natural conditions of the developments that previously were considered to influence the “recreational” classification.

Table 2.5-2 below shows the recommended tentative classifications for analysis in the San Pedro RMP.

Table 2.5-2. San Pedro River Study Area Segment Tentative Re-Classifications

ID	River Segment	River Miles	BLM Acres	Private Acres	Proposed Eligibility Re-Classification
1	US - Mexico Border to SR 92	4.8	1,798.63	176.22	Scenic
2	SR 92 to Waters Road SPRNCA Boundary	2.4	0	0	Non eligible
3	Waters Road to Hereford Road	2.6	1,029.36	294.07	Recreational
4	Hereford Road to Garden Wash	9.6	4,378.03	176.59	Wild
5	Garden Wash to SR90	0.9	541.96	22.08	Recreational
6	SR 90 to Charleston Rd.	7.1	1,817.97	293.15	Scenic
7	Charleston Road to SR 82	9.7	3,453.97	114.48	Wild
8	SR 82 to Willow Wash	2.0	639.44	34.56	Recreational
9	Willow Wash to Saint David Diversion Ditch	8.4	1,918.90	41.47	Wild
10	Saint David Diversion Ditch to SPRNCA Boundary	3.3	989.27	126.00	Recreational
	Total	50.8	16,567.53	1,278.62	

In addition, The San Pedro River has many side drainages with watersheds draining Whetstone, Huachuca, Mule, and Dragoon mountains forming the Upper San Pedro Basin. While all the major washes draining into the San Pedro River are important to the river's hydrologic and other resource values, the Babocomari River is the most substantial tributary due to its perennial flow and was identified for study to evaluate its eligibility for addition to the National Wild and Scenic Rivers System. The Babocomari River is not identified in previous inventory or planning efforts, including the *Safford RMP* (1992), the Arizona Wild and Scenic River Legislative EIS (1994), the *San Pedro Riparian Management Plan* (1988), or the NPS's Nationwide River Inventory River Segment Location and General Description.

In addition, the Babocomari River is identified as an area suitable for consideration as an ecological linkage, as this river provides important wildlife genetic connectivity between the Huachuca Mountains (Hass 2000), Whetstone Mountains, and Las Cienegas National Conservation Area to the San Pedro River. The Babocomari River is even more important as a wildlife corridor considering the amount of urban growth in Sierra Vista and the Hereford area between the Huachuca Mountains and the San Pedro River. The 27-mile Babocomari River was divided into two segments, primarily considering changes in land status or ownership. Segment 1 includes approximately four miles of river from its confluence with the San Pedro River to the SPRNCA boundary. Segment 2 includes approximately 23 miles of the river from the SPRNCA boundary to the beginning of the defined channel near Elgin, AZ.

Segment 1, a four-mile portion on BLM land is within the SPRNCA and is in largely natural condition. The area within Segment 1 includes the topography break that defines the canyon rim that is natural to the river corridor. See Figure 2.5-2 for more information. The study area is in a total of 562 acres and contains four miles of the river. There are 26 acres of private land within the study area.

The tentative classification for the Segment 1 is scenic. The study area is entirely within the SPRNCA, which protects it from development and has been managed through natural processes since designation. There is an abandoned railroad grade that follows the river for approximately 1.5 miles and is used solely for administrative vehicular access. The downstream beginning of the study area is located at the river's confluence with the San Pedro River. State Route 82 is within 300 ft. of this terminus. The first 1.5 miles of the river from the upstream terminus is within 1,000 ft. of private land holds with small residential developments. There is a small amount of evidence of human activity in the upstream portion, including an old abandoned bridge abutment. Evidence of grazing also occurs in the upstream portion. Other than the factors listed above, there is little evidence of human activity, especially within the riparian corridor.

Trends

Demand for various allowable land uses in the SPRNCA, including public recreation, will continue. The increased demand may place additional pressure on resources including the outstandingly remarkable values previously identified, and may require additional management to protect identified river values.

Forecasts

Critical habitat for the Yellow billed cuckoo and northern Mexican gartersnake is likely to be designated by the USFWS within the SPRNCA, and the critical habitat designation for the Huachuca water umbel will likely continue. This will likely require new considerations for management or terms and conditions for land use to protect these threatened and endangered species.

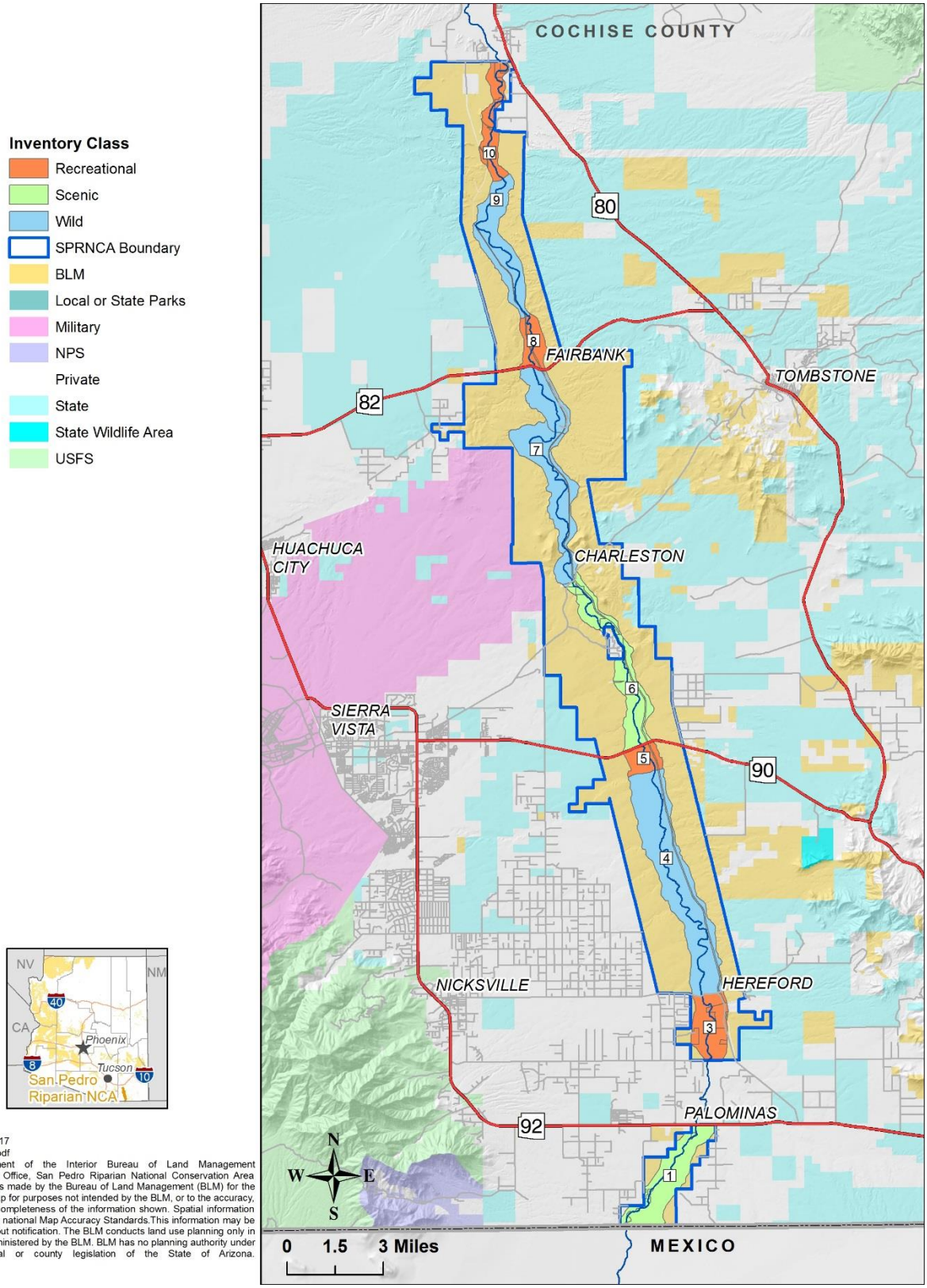


Figure 2.5-2. Wild and Scenic River Inventory

2.6 Support Conditions

2.6.1 Interpretation and Environmental Education

Current Use

The SPRNCA provides a significant resource for learning and education, particularly biological, cultural, and paleontological. The area provides opportunities for wildlife viewing including birdwatching, picnicking, primitive camping, pre-historic and historic site visiting, hunting, hiking, fishing, biking, horseback riding, guided hikes, interpretive site visitation, and weekend children's programs. Parking, interpretive kiosks, and trailheads are located at Fairbank, Murray Springs, the San Pedro House, Land Corral, Terrenate, Millville and Hereford Bridge. Parking and trailheads are also available at Hereford Road, Charleston Road, Palominas, Terrenate, Escapule and Lehner.

The FSPR is a volunteer, nonprofit organization dedicated to the conservation and restoration of the river through advocacy, education, and interpretation. The FSPR operate a gift and bookstore at the San Pedro House and lead guided interpretive walks/hikes along the river and throughout the adjacent area. They also present educational programs to schools and community groups, and assist the BLM in a variety of other programs. FSPR also have trained guides called docents, who present programs in the field, in the classroom, and in other meeting places. Docents receive training in all aspects of the SPRNCA with a primary focus on interpreting the information. Volunteers are needed to lead a host of activities in a variety of settings in support of the following programs:

- **Community Education:** Docents present a slide show program to groups and organizations.
- **Schools Program**: Docents provide school children with information in the classroom followed by hands-on learning experiences.
- **Hikes and Walks**: One or more Docents lead short interpretative walks and longer hikes along the river and throughout the adjacent areas of the NCA.
- **Site Interpretation**: Docents give site-specific information at prehistoric and historic locations.

Current Guidance

Resource Management Plans

Neither the *Riparian Management Plan* or the *Safford RMP* provided general guidance regarding education. Instead, education-related guidance can be found within each resource area. However, the *Riparian Management Plan* did designate specific areas for educational purposes. These generally are referred to as RNAs that are now considered ACECs. The San Rafael, the San Pedro, and the St. David Cienega are all ACECs, however, the guidance provided for the *Riparian Management Plan* has no specific education-related language.

America's Great Outdoors Initiative

The America's Great Outdoors Initiative was launched on April 26, 2010 by Executive Order (EO). The general goal of this initiative is to reconnect Americans with their "natural and cultural heritage." The following is excerpted from a report released in February 2011:

> "The result is a call for a grassroots approach to protecting our lands and waters and connecting all Americans to their natural and cultural heritage. The America's Great Outdoors Initiative seeks to empower all Americans—citizens, young people, and representatives of community groups; the private sector; nonprofit organizations; and local, state, and tribal governments—to share in the responsibility to conserve, restore, and provide better access to our lands and waters in order to leave a healthy, vibrant outdoor legacy for generations yet to come."

This initiative includes a specific objective that the federal government should "engage young people in conservation and the great outdoors."

Youth in the Great Outdoors

In March 2014, Secretary Jewell issued a Secretarial Order to significantly expand recreational, educational, volunteer, and career opportunities for millions of youth and veterans on the nation's public lands, including partnerships with businesses and youth organizations to support the 21st Century Conservation Service Corps.

The Secretarial Order sets forth specific benchmarks for increasing the Interior's engagement with the next generation, empowers bureaus and offices to lead and implement a comprehensive strategy for meeting the goals, and outlines the accountability structure and implementation framework to achieve the goals, which are described as follows:

- **Play:** USDI will develop or enhance outdoor recreation partnerships in a total of 50 cities over the next four years to create new, systemic opportunities for outdoor play for over 10 million young people.
- **Learn:** In four years, USDI will provide educational opportunities to at least 10 million of the nation's K-12 student population annually. In addition to welcoming students into public lands, USDI will leverage technology, including the recently launched NPS teacher portal, to bring our public lands to the classrooms.
- **Serve**: In four years, USDI will attain one million volunteers annually on public lands. Interior will invest in volunteer management and coordination to ensure anyone who has an interest in devoting their time and talents to public lands has an opportunity to serve.
- **Work**: USDI will provide 100,000 work and training opportunities to young people and veterans over four years within our bureaus and through public-private partnerships.

The initiative is intended to create a meaningful connection between young people and the great outdoors.

2.6.2 Scientific Resources

The scientific resources of the SPRNCA were singled out in PL 100-696 as purposes for the area's designation as an NCA. Science can encompass research by academic or professional institutions, and applied research by BLM staff, as well as state and federal agencies.

Science in National Landscape Conservation System (NLCS) units is defined broadly as "including basic and applied research in natural and social science, as well as inventory and monitoring initiatives" (BLM 2007). In addition, within NLCS units there is an expectation for "identifying science needed to address management issues, communicating those needs to science providers, and incorporating the results into the decision making process" (BLM 2007).

Ecosystem management is also a stated goal of NLCS units. Ecosystem management was defined for the BLM as, "The integration of ecological, economic, and social principles to manage biological and physical systems in a manner safeguarding the long-term ecological sustainability, natural diversity, and productivity of the landscape" (Morrissey et al. 1994). Further, the goal of ecosystem management for the BLM is "to develop and implement management that conserves, restores, and maintains the ecological integrity, productivity, and biological diversity of public lands" (Morrissey et al. 1994).

Current Use

Science-related activities within the SPRNCA are currently managed by applicable programs of the BLM . This includes internal monitoring programs being conducted by the BLM, as well as external research being conducted by individuals outside of the BLM. Because these activities are usually managed in a resource-specific manner, much of the information that would be found in this section can instead be found under specific resources.

Internal

Each resource program housed under the BLM monitors the condition of their resource. For example, water quality and water flow are monitored in the SPRNCA by hydrologists and cultural sites are monitored by archeologists. While much of the monitoring done by the BLM is done internally, the BLM partners with other state and federal agencies to monitor many resources. These partners include the University of Arizona, AZGFD, USGS, Fort Huachuca, and the USFWS.

External

Research by external researchers is permitted on a case-by-case basis. There are multiple active paleontology research sites in the SPRNCA. In addition, The San Pedro Avian Resources Center is a BLM-led, volunteer-based, Monitoring Avian Productivity and Survivorship protocol, and bird-banding program. BLM biologists are in the process of banding on the San Pedro River, and cooperate with banders operating at Chiricahua, Coronado National Monuments, and in Sonora. In addition to banding more than 6,000 birds of 100 species, they have trained dozens of biologists and volunteers from Arizona and Sonora. Because a comprehensive science plan does not exist for the SPRNCA, current use of the SPRNCA for science-related purposes is fragmentary and program-specific.

2.7 Current Social and Economic Conditions

2.7.1 Native American Interests

Native American people have occupied the region for more than 10,000 years utilizing lands in the planning area for hunting, fishing, plant gathering, trade and exchange, and other cultural, social and religious activities. Multiple federally recognized tribes in the region continue to recognize and use the public lands and resources of the SPRNCA in their traditional practices and beliefs.

Eleven federally recognized Native American tribes have interests in SPRNCA. These include:

- Ak-Chin Indian Community;
- Fort Sill (Chiricahua) Apache Tribe;
- Gila River Indian Community;
- Hopi Tribe;
- Mescalero Apache;
- Pascua Yaqui Tribe;
- Salt River Pima-Maricopa Indian Community;
- San Carlos Apache Tribe;
- Tohono O'odham Nation;
- White Mountain Apache Tribe; and
- Zuni.

Tribal Interests

Places (as opposed to other kinds of archaeological or historic sites) of traditional cultural importance to Native American people may include:

- Locations associated with traditional beliefs (such as tribal and human origins, oral tales and tribal history, religious and ceremonial practices, and past or present significance and use);
- Ancestral habitation and burial sites;
- Trails;
- Areas where food, mineral, and water resources possessing healing attributes or used for subsistence may be obtained.

Some of these locations may also be regarded as sacred by particular Native American tribes or individuals. Under the framework of existing laws (including the NHPA of 1966, the American Indian Religious Freedom Act of 1978, EO 13007 regarding Indian Sacred Sites, and the Native American Graves Protection and Repatriation Act of 1990), the BLM must take into account the effects of all federal undertakings that include all projects subject to Section 106 of the NHPA listed in the paragraph above.

2.7.2 Health and Safety

Hazardous Materials

The BLM hazardous materials program focuses on identifying, managing, and controlling all imminent hazards to human health and the environment. Past and current land uses, both authorized and illegal, have created a variety of threats to the public lands and natural systems. Illegal dumping and unlawful operations are the main problems.

BLM arranges emergency removal and cleanup of hazardous waste sites on public lands. These sites are usually identified by an inventory that ranks their potential for human health risks. Aggressively identifying, stabilizing, and cleaning up contaminated sites reduce future risks and liabilities. People making unlawful disposals or using illegal processes involving hazardous materials on public lands are prosecuted. Hazardous materials specialists minimize current risks by assuring compliance with applicable state and federal laws and working closely with other BLM programs that involve hazardous materials.

There are multiple remediated mill sites and one reclaimed lead mine on the SPRNCA. Remediation included capping of mine wastes in place.

Abandoned Mine Lands

Southeastern Arizona has historically been a hub of mining for copper, silver, molybdenum, gold, tungsten, lead, and zinc. Significant and widespread mining, both on- and off-site beneficiation, and smelting have occurred in Arizona's mining districts since the 1860s. Many of the lands originally mined were patented; however, abandoned mine sites commonly occur on public land near all of the historic mining districts. Numerous industrial mineral sites also occur in Arizona, but these typically are small and pose little risk to people or natural resources (BLM 2006).

Arizona currently has an inventory of 1,953 known abandoned hardrock mines on BLM-administered public lands. The upper San Pedro River valley, where the SPRNCA is located, has been identified as one of six high priority watersheds impacted by Abandoned Mine Land sites on public lands. Within SPRNCA, the San Pedro Mill Sites and the Charleston Lead Mine have been identified as project areas for closure of Abandoned Mine Land sites. Several hundred high-risk mine openings have been identified on BLM managed lands in Arizona including at the Brunckow Millsite, which is located in the SPRNCA (BLM 2006). The hazardous mine openings on public land at the Brunckow site were backfilled in 2014, effectively remediating hazards to the public.

2.7.3 Current Social and Economic Conditions and Trends

This section summarizes the social and economic aspects of the region that could be affected by a new RMP. Certain defining features of every area shape the nature of local economic and social activity. Among these are the local history and population, the presence of or proximity to large cities or regional population centers, types of longstanding industries such as agriculture and forestry, predominant land and water features, and unique area amenities. The BLM is a steward of many of these area resources and opportunities, and thereby plays a role in the

economic and social life of area communities. This discussion provides a description of the character and extent of these community connections.

Methodology for Analysis

The economic analysis focuses on the existing social and economic conditions within and surrounding the planning area, i.e. population and ethnicity, employment and income etc. It also looks at market contributions and ecosystems from BLM lands within the planning area. These lands contribute a wide range of economic values to people. Market goods such as minerals, livestock, and recreation generate employment and income, as well as payments to local communities and some revenue for the federal treasury. Nonmarket goods such as existence values of other unique ecosystems and habitats generate values everyone enjoys, but do not necessarily pay for. Other goods such as outdoor recreation and scenery are valued by the people who use them, but only a portion of this value is represented in market purchases.

While a value for ecological or recreational goods may exist, such values are often difficult to quantify. Direction provided in the Land Use Planning Handbook (Appendix D; pages 6, 7, and 10) suggests the use of "benefit transfer" to evaluate the effects of these nonmarket values. In the absence of quantitative information for these goods, they are discussed qualitatively where appropriate. If demand exists for these nonmarket products, employment and income would likely be supported in other areas if these goods and services are provided by other means. Therefore, it is important to consider nonmarket values as well as potential job and income generation from resource use.

Data from a BLM and USGS pilot project launched in early 2010 to assess the validity of ecosystem service valuation as an input to BLM's resource management decisions was also incorporated. The pilot project sought to: review the "land-scape" of tools for quantifying, mapping, and valuing ecosystem services; quantify ecosystem services using different tools, where feasible; compare the utility of model outputs for decision makers for a chosen management unit and for agency-wide application.

Two spatially explicit ecosystem service modeling systems designed to quantify tradeoffs between multiple services: Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) and Artificial Intelligence for Ecosystem Services (ARIES). Four broad categories of ecosystem services of interest were identified in the San Pedro River: carbon sequestration and storage, water supply, biodiversity, and other cultural services. Carbon, water, and viewshed models are included in both ARIES and InVEST, so quantification of these services and comparison of results were the focus of the analysis.

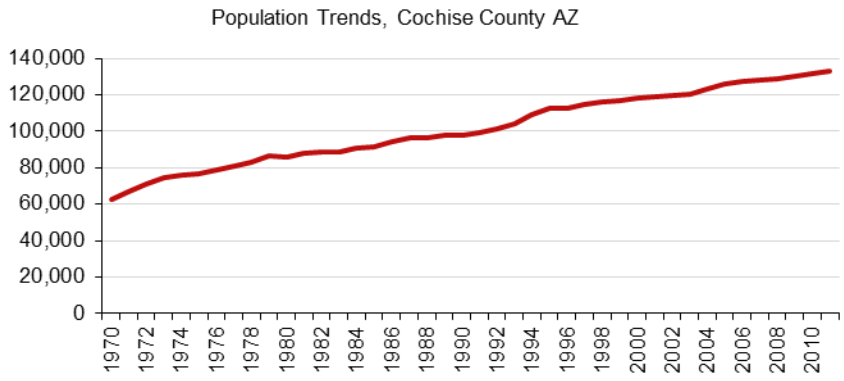
Planning Area

The planning area is bounded by the exterior boundary of the SPRNCA, which is located entirely in unincorporated Cochise County, Arizona (Figure 1-2). However, to accurately portray the relationship of current BLM management and the community, the social and economic geographic scope of analysis must be defined. The social and economic effects from changes on BLM lands extend beyond their physical boundaries. The role of BLM lands within the larger region must be addressed while not masking change within smaller communities in proximity to the planning area. This analysis will examine the role of BLM lands at a broad regional scale and at a smaller, county-level scale.

At the broad scale, the entire planning area is used to examine social and economic conditions, trends, and contributions from BLM. Analysis at only this scale would mask social and economic relationships with BLM in smaller communities in proximity to the planning area. Initially it was proposed to use census tracts to bound the socioeconomic analysis area. However, due to the size of census tracts in Cochise County, the SPRNCA boundary is not generally consistent with census tract boundaries. It was decided, therefore, to present demographic data primarily at the County level with additional focus on the city of Sierra Vista, which is the closest and largest municipality to SPRNCA and has the most visitor services. There are three other incorporated places within 20 miles of the study area with 2010 populations greater than 1,000. These communities are: Benson (5,105), Tombstone (1,380), and Bisbee (5,575). There are numerous other unincorporated communities within 20 miles of the SPRNCA that function with independent and/or shared services including water districts, sewer districts, and school districts. However, given Benson, Bisbee, and Tombstone size and proximity (within 20 miles) to the SPRNCA, and since visitation to the SPRNCA is often coupled with visitation to these other communities, it was decided to present data on these as well. Comparison with trends for the state of Arizona will be used to place Cochise County trends in context relative to larger regional trends.

Population, Ethnicity, and Education

In 2010, the estimated population of Arizona was 6,392,107 on a land area of 113,990 square miles (Arizona 2012). This resulted in a population density of 56 people per square mile, compared to a national average of 79.6 people per square mile. The 2010 population in Cochise County was about 131,346 (Census Bureau 2012) with a population density of 21 people per square mile. The 2010 population estimate represented a 24.6 percent increase since 2000 in Arizona as a whole and an 11 percent increase in the county. It also represents a growth of 32 percent since 1990, the year after the last RMP process was undertaken. Sierra Vista's population in 2010 was 43,888, a 16 percent increase since 2000. Since 1970, Cochise County's population has increased 112 percent (Figure 2.7-1). The state's population is projected to increase by 7,485,163 by 2020, an increase of 17 percent from 2010 (Arizona 2012). Of note is that while more recent data (2012) for Sierra Vista shows over a 4 percent population increase since 2010 (45,794), the County's population fell 0.4 percent to 130,752 during the same period (Cochise College 2013).



Source: US Department of Commerce n.d.

Figure 2.7-1. County Population Trends 1970 to 2010

Table 2.7-1 presents population data and ethnicity data for Cochise County, Sierra Vista, and several of the larger surrounding communities.

Table 2.7-1. Population and Ethnicity Demographic Units Surrounding SPRNCA

Study Area Populations by Race/Ethnicity							
Population	**Sierra Vista**	**Benson**	**Bisbee**	**Tombstone**	**Cochise County**	**Arizona**	**United States**
Hispanic or Latino ethnicity of any race	9,836	1,369	2,168	407	42,595	1,902,946	50,545,275
	22%	*26.8%*	*38.8%*	*29.1%*	*29.7%*	*32.5%*	*16.4%*
White alone	27,502	3,481	3,423	938	76,471	3,701,932	196,903,968
	61.4%	*68.2%*	*61.2%*	*67%*	*58.3%*	*57.7%*	*63.7%*
Black or African American alone	3,179	25	136	0	4,872	246,474	37,786,591
	7.1%	*.5%*	*3.4%*	*0*	*3.8%*	*3.7%*	*12.2%*
American Indian or Alaska Native alone	403	29	87	6	976	257,107	2,050,766
	0.9%	*.6%*	*1.6%*	*.4%*	*.7%*	*4.0%*	*0.7%*
Asian alone	1,711	14	14	25	2,202	173,231	14,692,794
	3.8%	*.3%*	*.3%*	*1.8%*	*1.7%*	*2.7%*	*4.8%*
Native Hawaiian and Other Pacific Islander alone	298	40	0	0	362	11,568	480,063
	0.7%	*.8%*	*0*	*0*	*.3%*	*.2%*	*0.2%*
Some Other Race	35	0	0	0	71	8,063	616,191
	.1%	*0*	*0*	*0*	*.1%*	*.1%*	*0.2%*
Two or more races	1,801	143	57	25	3,569	109,658	6,063,063
	4.0%	*2.8%*	*1.0%*	*1.8%*	*2.7%*	*1.7%*	*2.0%*
Combined minority population	38.6%	31.8%	38.8%	33%	41.7%	42.3%	36.3%

Source: US Census Bureau 2012a, US Census Bureau, 2008-2012

Note: American Community Survey estimates are based on data collected over five years. The estimates represent the average characteristics of populations between January 2008 and December 2012 and do not represent a single point in time.

Employment and Income

Based on the 2008 to 2012 American Community Survey, employment in Cochise County is primarily focused on the educational services, health care, and social assistance industry, with 20.5 percent of the population employed there. Several other industries have greater than 10 percent of the population employed within them (Table 2.7-2). These industry employment percentages are similar to that for Arizona as a whole with the exception of public administration in which Cochise County is almost 10 percent higher, likely due to the presence of Fort Huachuca. Due to its size, approximately 4,100 total, Fort Huachuca is a larger employer of those in the professional services, health care, and education industries.

Fort Huachuca is the largest employer in Cochise County and Sierra Vista and has been since at least 1999. The Fort employed 9,369 full time employees in 2012, which includes active duty military and civilians. The Fort also has had a large indirect employment impact on Cochise County. It has been estimated that 26,921 full time employees are supported by Fort Huachuca, which includes the 9,369 employees listed above as well as those employed in support of

government contracts and those supported by spending by the Fort and its employees. Nearly 83 percent of the indirect and induced employment generated by Fort Huachuca occurs in Cochise County's retail trade and services industries. General Dynamics Information Technology was the second largest employer in Sierra Vista in 2012 with 855 full time employees. They are followed by the Sierra Vista Unified School District (685) and the Sierra Vista Regional Health Center (611) and Mantech International (560) (Cochise College 2013).

Employment in the City of Sierra Vista is similarly very strong in the same industries as Cochise County (Table 2.7-2). A new hospital will continue to fuel the educational services, health care and social assistance industry. Retail (21.3 percent) and educational services, health care, and social assistance (21.2 percent) are the two strongest industries in Benson, almost double the next largest, public administration (10.9 percent). Traffic from Interstate 10 and the presence of Kartchner Caverns are just a couple of the drivers for these industries. Educational services, health care, and social assistance (25.1 percent) is far and away the largest industry in Bisbee followed by arts and entertainment, which is 9 percent less. Mining is expected to increase substantially there in the future. In Tombstone, the vast majority of employment (33.6 percent) is within the arts, entertainment, recreation, accommodation, and food services industry that is driven by tourism.

Overall employment in Cochise changed significantly from 1990 to 2000 with significant declines in the mining, manufacturing, and transportation and public utility sectors and increases in the services, finance, retail trade, construction, and farm sectors (Table 2.7-3).

Table 2.7-2. Employment

Industry	Cochise County (%)	Sierra Vista (%)	Benson (%)	Bisbee (%)	Tombstone (%)	Arizona (%)
Educational services, health care and social assistance	20.5	19.9	21.2	25.1	12.4	21.8
Public Administration	15.4	19.7	10.9	14.9	12.1	5.7
Professional, scientific, management, and administrative and waste management services	13.8	17.8	9.6	4.6	2	11.4
Retail	11.5%	9.6	21.3	13.5	10.2	12.3
Arts, entertainment, recreation, accommodation and food services	11	12.2	7.4	16	33.6	10.5

Source: US Census Bureau, 2008-2012

Table 2.7-3. Employment by Industry, 1970-2000

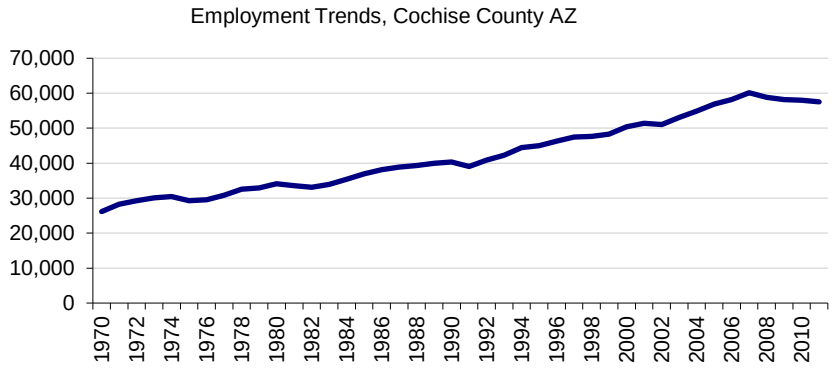
	1970	1980	1990	2000	Change 1990-2000
Total Employment (number of jobs)	26,150	34,124	40,361	50,369	10,008
Non-services related	5,689	5,921	5,252	6,555	1,303
Farm	1,276	1,279	1,278	1,666	388
Agricultural services, forestry, fishing & other	226	416	647	704	57
Mining (including fossil fuels)	1,948	437	135	75	-60
Construction	645	1,504	1,581	2,764	1,183
Manufacturing (including forest products)	1,594	2,285	1,611	1,346	-265
Services related	8,845	13,242	18,844	27,044	8,200
Transportation & public utilities	955	1,581	1,821	1,671	-150
Wholesale trade	273	507	681	802	121
Retail trade	3,490	4,611	6,543	8,838	2,295
Finance, insurance & real estate	694	1,737	1,559	2,795	1,236
Services	3,433	4,806	8,240	12,938	4,698
Government	11,616	14,961	16,576	16,770	194
Percent of Total					% Change 1990-2000
Total Employment					24.8%
Non-services related	21.8%	17.4%	13.0%	13.0%	24.8%
Farm	4.9%	3.7%	3.2%	3.3%	30.4%
Agricultural services, forestry, fishing & other	0.9%	1.2%	1.6%	1.4%	8.8%
Mining (including fossil fuels)	7.4%	1.3%	0.3%	0.1%	-44.4%
Construction	2.5%	4.4%	3.9%	5.5%	74.8%
Manufacturing (including forest products)	6.1%	6.7%	4.0%	2.7%	-16.4%
Services related	33.8%	38.8%	46.7%	53.7%	43.5%
Transportation & public utilities	3.7%	4.6%	4.5%	3.3%	-8.2%
Wholesale trade	1.0%	1.5%	1.7%	1.6%	17.8%
Retail trade	13.3%	13.5%	16.2%	17.5%	35.1%
Finance, insurance & real estate	2.7%	5.1%	3.9%	5.5%	79.3%
Services	13.1%	14.1%	20.4%	25.7%	57.0%
Government	44.4%	43.8%	41.1%	33.3%	1.2%

All employment data are reported by *place of work*. Estimates for data that were not disclosed are indicated with tildes (~).

The employment data above are organized according to the Standard Industrial Classification (SIC) system. The data end in 2000 because in 2001 the Bureau of Economic Analysis switched to organizing industry-level data according to the newer North American Industrial Classification System (NAICS). More recent employment trends, organized by NAICS, are shown in subsequent sections of this report.

Source: US Department of Commerce n.d.

Overall, employment in Cochise County increased 120 percent from 1970 to 2010 (Figure 2.7-2).



Source: US Department of Commerce n.d.

Figure 2.7-2. Employment Trends 1970 to 2010

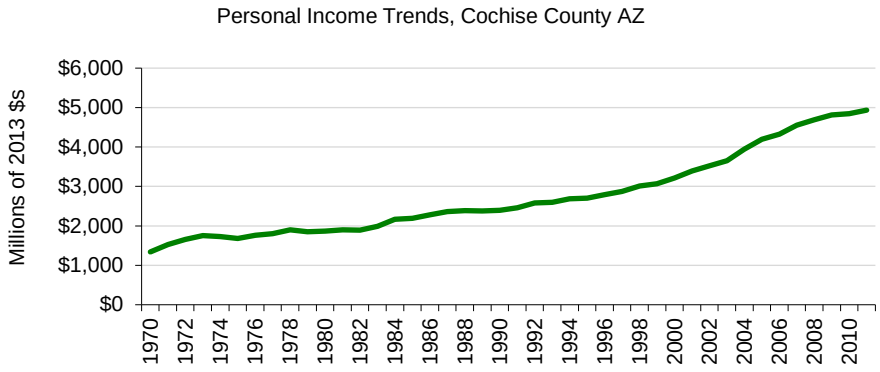
The median family income in Cochise County is $54,034 with a per capita income of $23,330 (Table 2.7-4). This is lower than the state of Arizona as a whole at $59,563 and $25,571. Sierra Vista has a significantly higher median family income and per capita income, which is likely due to its proximity to Fort Huachuca and the higher paying jobs located there. Benson and Bisbee are fairly close in both median family income and per capita income. Tombstone is by far the poorest of all the discussed population centers with a median family income approximately $18,000 less than the state as a whole and a per capita income that is $6,000 less than the County as a whole.

Table 2.7-4. Income

Income	Sierra Vista	Benson	Bisbee	Tombstone	Cochise County	Arizona
Median Family Income ($)	65,898	43,833	45,125	41,071	54,034	59,563
Per Capita ($)	27,566	20,421	21,424	17,078	23,330	25,571
Families below the Poverty Level (%)	6.5	12.7	18.5	22.7	11.7	12.4

Source: US Census Bureau, 2008-2012.

Personal income in Cochise County has grown 269 percent since 1970 (Figure 2.7-3).



Source: US Department of Commerce n.d.

Figure 2.7-3. Personal Income 1970 to 2010

Environmental Justice

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that federal agencies identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Environmental justice refers to the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, implementation, and enforcement of environmental laws, regulations, programs, and policies. It focuses on environmental hazards and human health to avoid disproportionately high and adverse human health or environmental effects on minority and low-income populations.

According to the Council on Environmental Quality's Environmental Justice Guidelines for NEPA (1997), "minority populations should be identified where either the minority population of the affected area exceeds 50 percent or where the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis."

Minorities are defined as individuals who are members of the following population groups:

- American Indian or Alaskan Native;
- Asian or Pacific Islander;
- Black, not of Hispanic origin; and
- Hispanic

Further, the Council on Environmental Quality states that in identifying minority communities, agencies may consider as a community either of the following:

- A group of individuals living in geographic proximity to one another.

- A geographically dispersed/transient set of individuals, where either type of group experiences common conditions of environmental exposure or effect.

A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds.

Low-income populations are defined as persons living below the poverty level, based on total income of $11,484 for an individual and $22,811 for a family of four for 2011 data (US Census Bureau 2012b). The BLM, Council on Environmental Quality, or USEPA guidance do not provide a quantitative threshold (e.g., a limit on the percent of persons in poverty) for determining whether a population should be considered a low-income population. Typically, the percent of persons in poverty in the study area is compared to that in another area, such as the state.

Low-Income Populations

Cochise County as a whole has a slightly smaller population of individuals below the poverty line (16.6 percent) than the state of Arizona, which is at 17.2 percent. Due to lack of population in the census tracks around the planning area, poverty data was not examined by Census tract; however, communities within the socioeconomic study were examined. Sierra Vista has the smallest population in poverty, at 10 percent of individuals, while Benson is slightly above state levels (19.7 percent). Tombstone (25.1 percent) and Bisbee (23.8 percent) have poverty levels more than 5 percent above that of the state.

Minority Populations

Based on 2008-2012 data, approximately 57.7 percent of Arizona's population was identified as White and not of Hispanic or Latino origin. The remaining 42.3 percent identified as ethnic or racial minorities or both. People of Hispanic or Latino descent (of any race) were the largest minority group and accounted for 32.5 percent of the total state population (US Census Bureau 2012a).

Cochise County is slightly less diverse than the state. In Cochise County, approximately 57.7 percent of the population was identified as White of non-Hispanic/Latino origin and the remaining 42.3 percent as ethnic or racial minority or both. The largest minority groups included those of Hispanic/Latino descent. All communities in the planning area were less than 26 diverse than the comparison population of Concise County or the state.

Visitor Usage

The SPRNCA provides opportunities for local residents as well as visitors from throughout the world to participate in opportunities such as wildlife viewing including birdwatching, picnicking, primitive camping, pre-historic and historic site visiting, hunting, hiking, fishing, biking, horseback riding, guided hikes, interpretive site visitation, and weekend children's programs. Parking, interpretive kiosks, and trailheads are located at multiple historic and prehistoric sites scattered across the SPRNCA, including Fairbank, Murray Springs, the San Pedro House, Land Corral, Terrenate, Millville, and Hereford Bridge. Parking and trailheads are also available at Hereford Road, Charleston Road, Palominas, Terrenate, Escapule, and Lehner, to accommodate

hikers, bikers, and equestrian users of the trails that allow visitor access into the heart of the SPRNCA.

The SPRNCA features the intact remains of the unique Spanish fortified hacienda, the Presidio Santa Cruz de Terrenante. This site marks the border of the northern Spanish expansion into the New World. This presidio was one of a string of fortified sites established by the Spanish to provide a garrison for troops and militia along Spain's northern frontier.

The Murray Springs Clovis Site is an important archaeological site that contains evidence of the earliest known people to inhabit North America. The Murray Springs Paleo Indian kill site was recently named an NHL, for the importance of the evidence of early North American occupation and resource uses found at the site. An interpretive trail leads visitors from a parking area and trailhead to the site. The area also features the ruins of the old mining town of Fairbank. The San Pedro House, a 1930s-era converted ranch house, serves as a bookstore and visitor center. Many of the buildings in Fairbank, such as the schoolhouse and general store, have been reconstructed or stabilized, and provide visitors with accurate examples of period architecture.

Current estimates of visitor use are difficult to quantify. As shown in Table 2.4-5 in Section 2.4.4, Recreation, records are not available for every year. Visitor records are not collected specifically for the SPRNCA by BLM. In addition, the San Pedro House access point represents just one of several access points. A 2002 study done by the University of Arizona (2002) observed the following larger visitor groups at the San Pedro House and The Nature Conservancy's Ramsey Canyon Preserve:

- Elder Hostel;
- Geronimo Educational Travel Studies;
- Cub Scouts;
- BLM research trainees; Columbia University;
- University of Arizona student field trips;
- Locally organized equestrian tours;
- Botanical Gardens Society of Tucson;
- FSPR guided tours; and
- Various school groups.

Recent data (Fiscal Year [FY] 2015) provides some insight into the level and type of recent visitor use. The FSPR recorded 357 participants on 18 history walks in FY 2015. Also Fairbank Day on Oct. 25, 2014 had an estimated 350 people in attendance including 50 children and two hikes, one to Presidio Santa Cruz de Terrenate and the other covering South Fairbank with 22 participants total. There were also 16 participants in a members-only walk at Charleston in March, 2015. During the prior fiscal year, there were 187 participants on 13 history walks. These constitute the bulk of the FSPR's cultural events each year. There are also school visits to the river, but these focus on natural rather than cultural resources. Roughly 48 percent (753 of 1,577 total participants in events like walks and festivals) attended cultural history events to historic sites (excluding off-site lectures and school trips to the river).

The FSPR do not have organized cycling nor equestrian events, so they maintain no data covering those recreational uses of the SPRNCA. Anecdotal evidence has shown that cyclists certainly use the trails on their own, but counters likely will not pick up most of them. Likewise, groups will bring their horses to trailheads like Fairbank for rides in the SPRNCA, but most are not commercial, for-profit events, so there are no SRPs and they are not recorded.

As SPRNCA, particularly San Pedro House, is a destination written about in birding guides and trip itineraries for tour companies like Victor Emanuel Nature Tours, Wings, Field Guides, and many others, there are many groups (including casual, noncommercial) not to mention individuals who come from all over the country and even from overseas to enjoy the diversity, quality, and sheer numbers of native birds and other natural resources. Such nonlocal visitors come to see specific "target" birds like yellow-billed cuckoo, as the SPRNCA is one of its remaining strongholds in the western US. Their visits are time sensitive, given their limited stays in the area, so are more focused than local birders, who can see the birds anytime. They may target FSPR bird walks for the free, local expertise they offer.

For culturally oriented visitors, custom tours at Fairbank are arranged by the FSPR for groups on their way to Tombstone, as Fairbank is very convenient for such itineraries. Likewise, motorcyclists target sites like Fairbank, as it is right on Highway 82 and fits into road tours easily. Bicyclists have visited the SPRNCA as part of VBT and other cycling tours that overnight at bed and breakfasts like Casa de San Pedro along the river in Hereford (Friends of the San Pedro 2015).

Economic Perceptions of the Study Area

Economic benefits of the SPRNCA include both market and nonmarket contributions. Traditional economic market contributions include activities such as grazing and recreation. Nonmarket values include ecosystem services, such as: water, carbon sequestration and storage, biodiversity, and cultural services, as well as positive contributions toward a more lush viewshed and a better quality of life for local residents.

Market Contributions

Resource uses within the SPRNCA currently have economic and social effects on the surrounding communities. Local ranchers have grazing allotments within the SPRNCA, and continue a ranching lifestyle which started with the Spanish occupation of the region. Within the SPRNCA alone there are approximately 264 AUMs on four allotments. These AUMS result in one job and approximately $11,000 in labor annually (Jaworski 2013). Including the allotments located both on and directly adjacent to the SPRNCA, grazing allotments are 1,500 AUM of grazing permitted.

Recreational opportunities in the SPRNCA also account for some economic impact to local communities. A study by the University of Arizona (2002) on nature-oriented visitors and their expenditures to the San Pedro River Basin found that on average, overnight visitors (those staying in hotels in the local area) spent an average of $97.18 per night, while day-trip visitors spent $24.42 per day. Overnight visitors averaged 4.7 nights in the study area, while day trip visitors spent an average of 4.9 hours in the study area (University of Arizona 2002). For an estimated 129,353 annual visits (5-year average for Fiscal Year 2011 to 2015) to the SPRNCA, in which visitors spent money on travel, food, accommodations, etc. and assuming that most

visitors are from outside the local area, estimated impacts include support of 188 jobs and $4,752,000 in labor income annually. This is approximately 0.32 percent of total employment and 0.12 percent of labor income in Cochise County (Jaworski 2013).

Ecosystem Services

The value of undeveloped areas can also be determined by examining ecosystem services, including the contributions from clean air and water. BLM Instruction Memorandum (IM 2013-131) explains that "Ecosystem goods and services include a range of human benefits resulting from appropriate ecosystem structure and function, such as flood control from intact wetlands and carbon sequestration from healthy forests. Some involve commodities sold in markets, for example, natural gas. Others, such as wetlands protection and carbon sequestration, do not commonly involve markets, and thus reflect nonmarket values" (BLM 2014).

Ecosystem service valuation has been a subject of academic interest for decades (Bagstad et al. 2013b). However, the development of tools that integrate ecology, economics, and geography to support decision-making is a more recent phenomenon (Bagstad et al. 2013a). Only recently has it matured to the point where it can inform policymaking (Bagstad et al. 2013b). Although ecosystem services analysis is appropriate for inclusion in agency planning documents, including those required by NEPA, to date they have been rarely used in this way, with the exception of historically well-quantified nonmarket values such as recreation (Bagstad et al. 2013b). Ecosystem service flow modeling enables the quantification of actual service provision and use, as opposed to just theoretical or in-situ service provision (Bagstad et al. 2013b). More recently, there has been a growing demand for more comprehensive analyses of the ecological and sociological consequences of land management decisions, particularly within the federal government's policy direction for environmental and natural resources planning (Bagstad et al. 2013a).

The San Pedro watershed was modeled in 2010 using two spatially explicit ecosystem service modeling systems: InVEST and ARIES. Two scenarios were modeled, an urban growth and a restoration management option. The urban growth scenarios were compared using year 2000 baseline data plus "open" and "constrained" development scenarios for 2020. These scenarios assume expansion in desert scrub (10 to 17 percent) and urban (179 to 507 percent) land cover types and reductions in agriculture (13 to 85 percent) and grasslands (17 to 21 percent). Four broad categories of ecosystem services of interest were identified in the San Pedro watershed: carbon sequestration and storage, water supply, biodiversity, and other cultural services (Bagstad et al. 2013b). These services were identified in coordination with various stakeholders. These services link to BLM Arizona State priorities such as healthy watersheds, intact habitats, habitat stabilization, climate, working landscapes, heritage resources, and recreation (Bagstad et al. 2012). Carbon, water, and viewshed models are included in both ARIES and InVEST so quantification and comparison of these services was performed (Bagstad et al. 2013b). The project did not provide monetary values for ecosystem services, but rather compared the model estimates for urban growth scenarios and a mesquite preservation scenario.

It should be noted that while other biodiversity and cultural services were not included in the ARIES and InVEST comparison, they have been measured and quantified using those or other tools. Biodiversity supports key recreational activities such as bird watching, wildlife viewing and hunting in the San Pedro. Cultural services include the nonmaterial benefits people obtain

through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences (Bagsted et al. 2012).

Carbon

InVEST results indicated a loss of 168 thousand tonnes per year of carbon storage under the open development scenario and 110 thousand tonnes per year under the constrained development scenario. ARIES results indicate relatively similar lost carbon sequestration under the urban-growth scenarios – a loss of 115 thousand and 110 thousand tonnes per year, respectively, under the open and constrained development scenarios. A relatively small change in carbon sequestration was quantified under the mesquite management scenario (loss of 148 tonnes per year) (Bagstad et al. 2013b).

Water

The InVEST water-yield model showed annual water-yield increases in the Upper San Pedro watershed of 8–12 percent for the open development scenario and 4–5 percent for the constrained development scenario based on the representative wet-and dry-year precipitation. This increase in water yield results from reduced infiltration and faster run off, which are a function of increased impervious surfaces with urban growth. This is generally an undesirable effect, as faster runoff causes problems with erosion, water quality, aquatic habitat, and groundwater recharge, though these impacts were not quantified (Bagstad et al. 2013b).

ARIES results are not directly comparable to those obtained using InVEST. ARIES quantified theoretical changes in water yield, independent of actual hydrologic flows, which it calculates as the reduction in infiltration and evapotranspiration under the urban-growth scenarios. ARIES quantified a decrease in theoretical (flow-independent) infiltration and evapotranspiration of 2.3 percent under the constrained development scenario and 2.7 percent under the open development scenario. Although the sign of the change is opposite to the InVEST results (which quantified increased water yield), they quantify the same type of change – reduced infiltration and evapotranspiration in the case of ARIES and increased water yield due to the reduced infiltration and evapotranspiration in the case of InVEST. In both the models, the predicted changes result largely from reduced infiltration, an undesirable change in a groundwater-driven system (Bagstad et al. 2013b).

Using InVEST, we found an increase in annual water yield of 0.3 to 0.8 percent for the mesquite management scenario. This result was expected given the lower evapotranspiration typical of grasslands relative to mesquite, as demonstrated by Nie et al. (2012) using similar scenarios as modeled using the Soil and Water Assessment Tool (SWAT) (Arnold and Fohrer 2005). As modeled by ARIES, mesquite management similarly reduced annual evapotranspiration within the SPRNCA by 0.3 percent. The finding that grasslands promote greater surface and groundwater flows and lower evapotranspiration, benefitting nearby riparian ecosystems, is theoretically consistent with field studies and disciplinary hydrologic models (Bagstad et al. 2013b).

Viewshed

The InVEST viewshed model quantified a substantial increase in the number of visible developed pixels (i.e., visual blight) across the landscape, with an 89 percent increase in the constrained development scenario and a 275 percent increase in the open development scenario.

However, these results tell only part of the story, as they do not comprehensively account for the locations of viewers, visual blight, and visually valued views. ARIES mapped the theoretical source (i.e., view-source quality, independent of the location of users) and actual use (dependent on user presence and ecosystem service flows via lines of sight) for viewsheds. There was a decrease in theoretical viewshed quality of 0.04 to 0.1 percent, as land-cover types with greater visual appeal were replaced by development. We also found an increase in actual viewshed use of 240 to 555 percent, with greater changes occurring in the open than the constrained development scenario because of the higher population growth associated with the former (Bagstad et al. 2013b).

The ARIES viewshed results illustrate a case of how landscape quality can decline while at the same time becoming more valuable as ecosystem-service use increases with more beneficiaries present on the landscape, in both the urbanization scenarios. This shows how rising demand for ecosystem services can lead to increases in their value, even as ecosystems are being degraded. It is thus important that rising ecosystem-service values not always be equated to improvements in ecosystem quality (Bagstad et al. 2013b).

3 Current Management Direction

This chapter describes the current management direction provided by the existing RMPs and amendments discussed below. This current management becomes the basis for the No Action Alternative in the new RMP/EIS. Management direction from these RMPs determined to be still valid may be carried forward to the SPRNCA RMP as an element of one or more action alternatives.

Current land use plan decisions for lands and resources in the planning area can be found in the following BLM decision documents:

- Eastern Arizona Grazing Final EIS – 1986;
- *San Pedro Riparian Management Plan* – 1989;
- *Safford RMP* – 1992 and 1994;
- Wild and Scenic River EIS – 1994;
- Arizona Statewide LUPA for Fire and Fuel Breaks – 2004;
- Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic EIS – 2007;
- San Pedro Intermodal Transportation Plan – 2009;
- Solar Energy Development Programmatic EIS – 2012; and
- Restoration Design Energy Project EIS – 2013.

This chapter is divided into five sections: Resources, Resource Uses, Special Designations, Support, and Social and Economic Conditions.

Section 3.1 Resources: Describes the current management direction for the natural, biological, and cultural components that make up the SPRNCA. These resources include air and climate change, soil, water, vegetation, special status species, fish and wildlife (including; allocated AUs for certain game species, riparian/meadow habitat, springs, and activity plans), wildland fire management, cultural resources, paleontological resources, visual resources, (Table 3.1-1, Current Management Direction for Air Quality, through Table 3.1-16, Current Management Direction for Wilderness Characteristics).

Section 3.2 Resource Uses: Describes the current management direction for activities that use the natural, biological, and cultural components of the SPRNCA. Resource uses livestock grazing, recreation and visitor services, comprehensive trail and travel management, and lands and realty (including: land use allocations and tenure adjustments, communication sites, and ROW): Table 3.2-1, Current Management Direction for Energy and Minerals, through Table 3.2-5, Current Management Direction for Transportation and Access.

Section 3.3 Special Designations: Describes ACECs and wild and scenic rivers within the SPRNCA: Table 3.3-1, Current Management Direction for Special Management Areas, through Table 3.3-2, Wild and Scenic Rivers.

Section 3.4 Support: Describes interpretation and environmental education and transportation systems and facilities used in the SPRNCA: Table 3.4-1, Current Management Direction for Scientific Research.

Section 3.5 Social and Economic Conditions: Describes the social and economic condition of the SPRNCA, including tribal interests, public safety, and socio-economic conditions. Table 3.5-1, Current Management Direction for Social and Economic Conditions.

3.1 Resources

The Planning Decision Numbers are from the *Safford RMP* Decisions File. Bold decision numbers indicate desired outcomes. Plain text decision numbers indicate implementation decisions. Italicized decision numbers indicate administrative actions. Under the Decision column, Objectives often, but not always, correlate to Desired Outcomes, while Actions correlate to Implementation Decisions or Administrative Actions.

3.1.1 Air Quality

Table 3.1-1 lists current management direction for air quality.

Table 3.1-1. Air Quality

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Under the *Clean Air Act* (1977, as amended), public lands within the Safford District were given Class II air quality classification. This classification allows for moderate deterioration of air quality associated with moderate, well-controlled population and industrial growth. Public lands will be managed as Class II areas unless excepted as non-attainment areas or their classification is changed as a result of state procedures prescribed under the *Clean Air Act.* Air quality reclassification is the responsibility of the state, not BLM. Impacts to air quality resulting from activities on public lands will be prevented or reduced to acceptable levels through mitigation prescribed in National Environmental Policy Act evaluations.	**WS32**	*Safford RMP* (Ch.2, p. 25), See also Partial ROD I (p. 10)	Ongoing		RMP
Objective: Continue to manage the airshed in accordance with State of Arizona Class II standards, unless redesignated.	**WS32**	*Safford RMP* (Ch.2, p.47), See also Partial ROD I (p. 10)	Ongoing,		RMP
Objective: Comply with all federal and State statutes pertaining to air quality and cooperate with the State of Arizona in carrying out the State Implementation Plan.	**WS34**	Ibid.	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Objective: Same as above. Action: When implementing BLM or BLM-approved activities, minimize surface disturbances to prevent the addition of large quantities of dust to the air. When surface disturbances occur, enforce stipulations to mitigate the impacts to air quality.	*WS33,* **WS34**	Ibid	Ongoing		Imp.
Objective: Same as above. Action: Conduct prescribed fire with prior approval of the Arizona Department of Environmental Quality, Office of Air Quality.	*WS33, WS36,* **WS34**	Ibid.	Ongoing		Imp.

3.1.2 Changing Climate Trends

There is no planning guidance in the 1989 *Riparian Management Plan* or the *Safford RMP* (BLM 1992 and 1994) for changing climate trends

3.1.3 Geology

PL 100-696, which is the enabling legislation for the SPRNCA stated specifically that all federal lands in the conservation area are, subject to valid existing rights, withdrawn from location, entry and patent under the United States mining laws; and from disposition under all laws pertaining to mineral and geothermal leasing and all amendments thereto. When the negotiated contract sale (AZA-022590) expired it was not renewed. There are no existing mineral leases within SPRNCA. The SPRNCA is withdrawn and there is no energy or minerals development or management direction.

3.1.4 Soil Resources

Table 3.1-2 discusses current management for soil resources.

Table 3.1-2. Soil Resources

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Objective: Maintain and enhance the soils/watershed resources of the EIS area to reduce future soil erosion.	**WS01,** *WS02*	*Riparian Management Plan* (Ch. 2, p. 25)	Ongoing		RMP
Objective: Same as above. Action: Remove the dikes or berms along the east and west sides of the abandoned farm fields and allow pre-existing drainages to re-establish.4-1	**WS01,** *WS02*	Ibid	Not Implemented	Effects of removal need to be evaluated and considered in light of potential negative impacts to erosion and loss of water retention.	Imp.

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Objective: Same as above. Action: Build side drainage erosion control structure only as needed to protect other resources and watershed values.	**WS01,** *WS02*	Ibid.	Not Implemented		Imp.
The Federal Land Policy and Management Act defines BLM's multiple use management mission to include protection of watersheds. In all alternatives in the Resource Management Plan, the overall goal is to minimize soil erosion and rehabilitate eroded areas to maintain and enhance watershed condition and reduce non-point source pollution that could result from rangeland management and use activities. Corrective measures include construction of erosion control structures, allocation of proper levels of vegetation use by livestock and wildlife, land treatment measures and control or mitigation of activities that may contribute to soil erosion and degradation of watershed condition. Activities proposed in areas prone to erosion are evaluated through the National Environmental Policy Act process to determine anticipated impacts and mitigating measures needed to approve the project.	**WS01**	*Safford RMP* (Ch.2, p. 24), See also Partial ROD I (p. 10)	Not Implemented. Ongoing		RMP
Objectives: Reduce accelerated erosion. Reduce non-point source pollution that could result from rangeland management and use activities.	**WS01**	*Safford RMP* (Ch.2, p. 44)	Ongoing		RMP
Objective: Same as above. Action: Develop activity plans, where needed to initiate rehabilitation of eroded areas.	**WS01,** *WS02*	Ibid.	Ongoing		Imp.
Objectives: Same as above. Action: Continue reseeding grasses and riparian vegetation on restored areas behind erosion control structures. Manage livestock with fencing or other methods to protect these areas.	**WS01**	Ibid.	Not implemented		Imp.

3.1.5 Water Resources

Table 3.1-3 discusses current management for water resources.

Table 3.1-3. Water Resources

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Maintain water quality in accordance with state and federal standards by implementing resource management actions.	**WS18**	*Riparian Management Plan* (Ch. 2, p. 5)	Ongoing		RMP
Plan activities to maintain existing surface and groundwater conditions. BLM will continuously monitor river flow and fluctuations of the groundwater table to determine if changes occur in the floodplain and regional aquifer.	**WS11, WS12**	Ibid.	Ongoing		RMP
Water quality monitoring will be an ongoing process.	**WS18,** WS20	Ibid.	Ongoing		RMP
Follow all available legal avenues to protect rights to surface and groundwater. This includes the protection of the Bureau's pending application for instream flow rights, those rights of the St. David Irrigation Company for the San Pedro River, and groundwater rights under a potential active management area designation.	**WS08**	Ibid.	Ongoing		Imp.
Objective**:** Conserve the groundwater resource while providing necessary support for other programs.	**WS11, WS12, WS08**	*Riparian Management Plan* (Ch. 2, p. 22)	Incomplete		RMP
Objectives: Same as above. Action: Pump most of the irrigation wells only to protect potential water rights. Protect water rights if the San Pedro River Watershed is designated as an Active Management Area. Pump for an emergency use if a resource value becomes jeopardized (such as fish populations due to reduced surface flow).	**WS11, WS12, WS08**	Ibid.	Outdated (?)		Imp.
Objective**:** Same as above. Action: Use one well on a short-term basis in one field for an experimental revegetation trial.	**WS11, WS12**	Ibid.	Completed	Implemented in area South of the San Pedro House	Imp.
Objective**:** Same as above. Action: Keep some of the non-irrigation wells operational to provide the required water for various resource activities and for administrative purposes.	**WS11, WS12**	Ibid.	Complete, Ongoing		Imp.

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Objective**:** Same as above. Action: Close and cap unnecessary irrigation and non-irrigation wells.	**WS13**	Ibid.	Complete		Imp.
The *Water Quality Act* (1987) and *Arizona Environmental Quality Act* (1986) provide direction on management and maintenance of water quality. Water is allocated in Arizona under the *Surface Water Code*, the *Groundwater Code* (1980) and applicable federal laws. Executive Order 11988 gives BLM guidance on management of floodplains. Specifically, the Executive Order prohibits use of federal funds for construction in floodplains. Acquisition of water rights for the quantities of water needed to accomplish BLM's programs will be obtained through the State of Arizona's appropriation procedure and adjudication process.	WS08, **RP15**	*Safford RMP* (Ch.2, p. 25), See also Partial ROD I (p. 10), For RP15 see also *Safford RMP*(Ch. 2, p. 33)	Ongoing		RMP
Water quality necessary to accomplish BLM's programs will be secured through quality monitoring programs, National Environmental Policy Act evaluations of activities proposed on public lands, and designation and management under the State of Arizona's Unique Waters Program. BLM resource activities will employ the best selected management practices to reduce non-point source pollution from rangeland management and use activities on the public lands.	**WS09, WS10, RP16**	Ibid. For RP16 see also *Safford RMP* (Ch. 2, p. 33)	Ongoing		RMP
Objective: The objective for management of groundwater is to conserve water for prudent resource management purposes.	**WS11, WS12,**	*Safford RMP* (Ch.2, p. 46), See also Partial ROD I (p. 10)	Ongoing		RMP
Objective: Same as Above. Action: Cap unusable or unsuitable wells to prevent contamination of aquifers and to contain highly saline water.	**WS11, WS12,** WS13	Ibid	Complete		Imp.
Objective: Same as above. Action: Restrict artesian flow to meet specific program needs.	**WS11, WS12,** WS14	Ibid.	Unknown		Imp.
Objective: Same as above. Action: Inspect and maintain water systems to prevent unnecessary loss of water.	**WS11, WS12,** WS15	Ibid.	Ongoing		Imp.

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Objective: The objective for management of water quality is to maintain or enhance water quality at or above established standards for designated uses to meet management goals for each water source. BLM will adhere to federal and state water quality laws and standards.	**WS18**	Ibid.	Ongoing		RMP
Objective: Same as above. Action: Support other resource programs in the implementation of this plan and monitor the effectiveness of planning decisions.	**WS18**	Ibid.	Ongoing		RMP
Objective: Same as above. Action: Continue the existing water quality testing program in the District.	**WS18,** WS20	Ibid., See also *Safford RMP* Appendix 9	Not Implemented, Ongoing	WQ testing is also being completed by agencies and organizations other than the BLM	Imp.
Objective: Same as above. Action: Initiate data collection where there is a suspected or known pollution threat or hazard to water quality.	**WS18,** *WS21*	Ibid.	Ongoing		Imp.
Objective: Same as above. Action: Develop an activity plan and initiate management actions needed to mitigate water quality degradation detected through monitoring.	**WS18,** *WS22*	Ibid.	Ongoing		Imp.
Objective: Same as above. Action: Develop a District Water Quality Monitoring Plan, including recommendations for Unique Waters.	**WS18,** *WS23*	Ibid.	Unknown		Imp.
Objective: Same as above. Action: Share data with other water quality managing agencies.	**WS18,** *WS24*	Ibid.	Ongoing		RMP
Objective: Manage stream segments through public lands designated as Unique Waters to maintain or enhance water quality standards, protect the associated resources, and use best management practices selected to reduce non-point source pollution that could result from rangeland management uses.	**WS27**	Ibid.	Unknown	Not designated as Unique Waters	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Objective: Evaluate the long-term District-wide resource management needs for ground and surface water.	*WS28*	Ibid.	Ongoing		RMP
Objective: Purchase water rights, when necessary, to protect threatened resource values.	WS31, **RP15**	Ibid. (p. 47), For RP15 see also *Safford RMP*(Ch. 2, p. 33)	Ongoing		RMP

3.1.6 Wetland Vegetation

Table 3.1-4 discusses wetland vegetation.

Table 3.1-4. Wetland Vegetation

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
The principal concern of management is to protect and enhance the riparian ecosystem along the San Pedro River. Acquisition of the lands was and is primarily for their riparian or water-related values.		*Riparian Management Plan* - Management Practices Common to All Alternatives (page 5)			
Bureau policy sets the following direction for management of riparian areas. Achieve riparian area improvement and maintenance objectives through the management of existing uses, wherever feasible. Ensure that new resource management plans and activity plans, and revisions of existing plans recognize the importance of riparian values and propose management to maintain, restore or improve them. Prescribe management of riparian values based on site-specific characteristics and settings. Give special attention to monitoring and evaluating management activities in riparian areas and revise management practices where site-specific objectives are not being met. Cooperate with and encourage the involvement of interested federal, State and local governments, organizations and private parties to share information, implement management, coordinate activities, and provide education on the value, productivity and management of riparian areas.		*Safford RMP*- Riparian Areas (page 20)			

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Retain riparian areas in public ownership unless disposal would be in the public interest, as determined by land use planning. Identify, encourage and support research and studies needed to ensure that riparian area management objectives can be properly defined and met. Provide environmental education materials to schools and other publics relating to riparian management.					
Arizona BLM has developed a strategic plan that outlines the overall riparian wetland management. The *"Arizona Riparian-Wetland Area Management Strat*egy" (BLM 1990) uses the Bureauwide policy presented above to develop more site-specific goals, objectives and actions to maintain or improve these valuable areas. One of the primary goals is to improve water quality and riparian areas to good or better ecological conditions by 1997 for 75 percent of the BLM-administered streams by implementing grazing systems and strategically planned enhancement projects.		*Safford RMP* -Riparian Areas (page 20)			
From 1986 to 1988, BLM acquired 47,668 acres along the upper San Pedro River between the Mexican border and St. David. In 1987, BLM began preparing the *San Pedro River Riparian Management Plan* (BLM 1989) to protect and enhance the significant natural and cultural resources of the property. The plan was completed in 1989. In 1988, during preparation of the plan, Congress designated 54,189 acres of public land as the San Pedro Riparian National Conservation Area. The additional 6,521 acres were acquired from the State of Arizona by exchange and are subject to existing livestock grazing leases. Since this designation came in the middle of the planning process, BLM decided to complete its plan for management of the 47,668 acres and address the remaining 6,521 acres of the National Conservation Area in this Resource Management Plan.		*Safford RMP* -Riparian Areas (page 20)			
The *San Pedro River Riparian Management Plan* provides management direction for the riparian corridor and the adjacent uplands in the National Conservation Area. Generally, the plan provides a framework for protection of the National Conservation Area, allowing those uses that are compatible with preservation of the National Conservation Area. Energy and mineral uses are not permitted, nor are sand and gravel operations.		*Safford RMP* -Riparian Areas (page 20)			
According to the San Pedro Plan, livestock grazing has been prohibited for the life of the plan on the original acreage. Dispersed and developed recreation is being carefully planned to avoid impacts to the abundant natural, cultural and paleontological (fossil) resources. Vehicles will be restricted to designated roads. Discharge of firearms is being restricted to ensure visitor safety. Many actions will be implemented to maintain and enhance the quality and quantity of the		*Safford RMP* -Riparian Areas (page 20)			

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
water, riparian vegetation, wildlife, cultural resources and paleontological resources. Administrative and visitor contact facilities are also planned.					
To accomplish this objective, the following actions will be implemented. 1. Incorporate riparian area objectives into existing and future activity plans. 2. In cooperation with Arizona Game and Fish Department, develop and implement a system to prioritize needed riparian area management. The priorities will be based on management objectives, resource condition, resource conflict and the potential or capability of a riparian area to respond to treatment. 3. Develop a riparian inventory system. Coordinate development and implementation of the system with other land managing agencies. 4. In cooperation with Arizona Game and Fish Department, complete the inventory of all riparian areas on public lands in the District to establish baseline condition. 5. Establish a monitoring plan for selected riparian areas based upon the management priority system. Implement the plan and evaluate monitoring data. Continue to carry out needed changes in riparian area management through activity plans. 6. Continue to file for in-stream flow water rights on perennial streams or rivers and water rights on springs and ponds to protect and maintain riparian vegetation. 7. Continue to develop grazing systems and modify existing allotment management plans, as necessary, to best manage livestock use for the improvement of riparian areas and reduce non-point source water pollution. 8. Do not permit firewood cutting in riparian areas. 9. Permit the removal of non-native vegetation for improvement of riparian vegetation. 10. Maintain and monitor representative relict riparian areas to provide a baseline for future management decisions. 11. Continue to manage the San Pedro Riparian National Conservation Area according to the guidance in the existing management plan. 12. Develop an environmental education program for schools and the public for riparian management.		*Safford RMP* -Preferred Alternative, Issue 4, Riparian Areas (page 32)			
Objective 2: Aquatic Habitat Improvement Increase aquatic habitat diversity, attain streambank cover of 70%, and reduce streambank soil alteration to lengthen the period of higher base flows by 2005. Planned actions:	AZ-046-03-005-EA	*San Pedro Riparian NCA Habitat Management Plan* (1993)			

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
1. Identify and evaluate transplant locations and develop a reintroduction proposal in accordance with the Arizona Game and Fish Department Big Game Transplant Procedures (AGFD, 2012a) and BLM Manual Section 1745. Insure local participation. 2. Capture beaver from a suitable source. Insure that the captured animals are free of Giardia infestation. 3. Release an appropriate number of beaver in the main stream San Pedro River upstream of the Lewis Springs Quad area. Monitor the movements and dispersal of beaver throughout the ecosystem. 4. Remove beaver from areas if they present problems for private land owners or if their activities prove counter-productive to HMP objectives. 5. Continue the RMP decision on the grazing moratorium and off-highway vehicle controls thorugh 2004.					
Objective 3: Restoration of Native Floodplain Habitat. Restore 2,000 acres of fallow fields to attain a desired native plant community of mixed mesquite-mixed scrub and sacaton-mixed scrub by 1998. Improve habitat quality for native bird, mammal, and reptile species. Planned actions: 1. 742 acres of abandoned farm field will be planted and restored to a desired plant community of sacaton grassland interspersed with mesquite and a variety of other shrubs and trees. The location of the proposed action is shown on map 3. [Native plants are listed as potential species for utilization] Achieve the following plant species targets through restoration by 1998: Increase the relative frequency of occurrence of sacaton from 0 to 20%. Increase the relative frequency of occurrence of young mesquite trees from 0 to 3%. Increase the number of native perennial grass species occurring in the field from none to nine. Increase the number of native shrub species occurring in the field from none to four. 2. Experimentally mow 80 acres of fallow field south of Hereford Road two or three times per year to reduce the relative frequency of occurrence of Russian thistle from 90% to 50% by 1998.	AZ-046-03-005-EA	*San Pedro Riparian NCA Habitat Management Plan* (1993)			

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Increase the relative occurrence of native grass species from 0% to 50% by 1998. Desirable shrub and tree species (those listed above) which colonize the field will be identified and avoided during mowing. 3. Manage for a desired plant community consisting of a native grassland interspersed with short trees and shrubs on 1178 acres of fallow farm fields where native grasses are naturally re-establishing along present trends. Allow for an increase in native grass species from 20% frequency of occurrence to 50% frequency of occurrence by 1999. Allow establishment of native trees and shrubs of up to 10% canopy cover by 1999. 4. Continue to review current management strategies for control of Johnson grass (*Sorgum halepense*). Consider implementing control practices on sites where Johnson grass invasion has occurred.					
Objective 7: Wetland Improvement Manage existing wetland habitat at four locations for a desired aquatic wetland plant community containing beneficial aquatic plants by 1999. Planned actions: Four existing wetland habitats will be maintained and improved for aquatic and terrestrial wildlife within the NCA. Sites for wetland improvement (Map 7) are: Palominas wetland (one acre) Contention detention pond (two acres) Carr Canyon detention area (one acre) SV Ready Mix Detention ponds (ten acres) 1. Obtain all necessary water rights to modify these areas into semi-permanent wetlands by 1995. 2. Re-contour and seal with bentonite the bottom of the SV Ready Mix detention ponds in 1996 and Palominas wetland, Carr Canyon wetland and Contention wetland in 1998. Maintain water levels in the range of one to two ft for migrating and nesting waterfowl through the spring and summer period. 3. Transplant desired wetland plants from existing stock inside the NCA if needed to promote the desired plant community. 4. Allow periodic dry-out of wetland area to prevent establishment of cattail. 5. Consider reactivating existing wells near each location if necessary to maintain the desired water level and aquatic plant community. Groundwater levels will be checked at the nearest monitoring	AZ-046-03-005-EA	*San Pedro Riparian NCA Habitat Management Plan* (1993)			

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
well. If a significant water level decline is detected pumping will be suspended. This will insure that groundwater pumping will not deplete the supply needed to support the desired riparian plant community. Negative impacts to the riparian resource will be avoided.					
Conservation Measures Related to Revegetation Treatments • Outside riparian areas, avoid hydro-mulching within buffer zones established at the local level. This precaution will limit adding sediments and nutrients and increasing water turbidity. • Within riparian areas, engage in consultation at the local level to ensure that revegetation activities incorporate knowledge of site-specific conditions and project design.		*Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS*, Biological Assessment			
Conservation Measures Related to Herbicide Treatments The complexity of this action within riparian areas requires local consultation, which will be based on herbicide risk assessments. Possible Conservation Measures: • Maintain equipment used for transportation, storage, or application of chemicals in a leak proof condition. • Do not store or mix herbicides, or conduct post-application cleaning within riparian areas. • Ensure that trained personnel monitor weather conditions at spray times during application. • Strictly enforce all herbicide labels. • Do not broadcast spray within 100 ft. of open water when wind velocity exceeds 5 mph. • Do not broadcast spray when wind velocity exceeds 10 mph. • Do not spray if precipitation is occurring or is imminent (within 24 hours). • Do not spray if air turbulence is sufficient to affect the normal spray pattern. • Do not broadcast spray herbicides in riparian areas that provide habitat for TEP aquatic species. Appropriate buffer distances should be determined at the local level to ensure that overhanging vegetation that provides habitat for TEP species is not removed from the site. • Do not use diquat, fluridone, terrestrial formulations of glyphosate, or triclopyr BEE, to treat aquatic vegetation in habitats where aquatic TEP species occur or may potentially occur. • Avoid using glyphosate formulations that include R-11 in the future, and either avoid using any formulations with POEA, or seek to use the formulation with the lowest amount of POEA available, to reduce risks to aquatic organisms.		*Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS*, Biological Assessment			

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
• Follow all instructions and SOPs to avoid spill and direct spray scenarios into aquatic habitats. Special care should be followed when transporting and applying 2,4-D, bromacil, clopyralid, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, tebuthiuron, and triclopyr. • Do not broadcast spray diuron, glyphosate, picloram, or triclopyr BEE in upland habitats adjacent to aquatic habitats that support (or may potentially support) aquatic TEP species under conditions that would likely result in off-site drift. • In watersheds that support TEP species or their habitat, do not apply bromacil, diuron, tebuthiuron, or triclopyr BEE in upland habitats within ½ mile upslope of aquatic habitats that support aquatic TEP species under conditions that would likely result in surface runoff.					

3.1.7 Upland Vegetation

Table 3.1-5 discusses upland vegetation.

Table 3.1-5. Upland Vegetation

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Prohibit firewood cutting (including the gathering of down and dead wood) within the SPRNCA.		*Riparian Management Plan* - Vegetation (page 5)	Implemented		
Maintain and enhance the vegetation communities in the SPRNCA.		*Riparian Management Plan* -Preferred Alternative, Vegetation, Objective (page 22)	Ongoing		
Use an abandoned farm field for experimental reseeding/revegetation plantings of native species. Use some non-native species now found in the area and considered beneficial. If the experimental reseeding is successful and beneficial, consider using it in other areas. Natural plant succession would occur on most of the SPRNCA. Plant trees in areas that can support wildlife and recreation activities. Consider streambank revegetation where necessary.		*Riparian Management Plan* -Preferred Alternative, Vegetation, Planned Actions (page 22)	Incomplete	Abandoned farm fields have been reseeded in some locations.	
Establish, if desirable, a native tree nursery.		*Riparian Management Plan* -Preferred	Not implemented.		

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
		Alternative, Vegetation, Planned Actions (page 22)			
The 9th Circuit Court of Appeals has issued an injunction that prohibits use of chemicals for vegetation manipulation on public lands. BLM is preparing an EIS assessing the use of chemicals. Several actions in this RMP involve the use of herbicides. Herbicides will be used only if permitted upon completion of the *Environmental impact Statement, Vegetation Treatment on BLM Lands in 13 Western States* (BLM 1989, in preparation) and relief from the 9th Circuit Court. If chemicals are approved for use, site-specific environmental analyses will be prepared for each project proposing the use of chemicals.		*Safford RMP* - Vegetation (page 24)		Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic EIS was finalized in 2007. Site-specific environmental analyses has been prepared for each project proposing the use of chemicals on SPRNCA (e.g. Russian knapweed control, giant reed control, tamarisk control).	
6.Issue permits for vegetation products, other than firewood, as determined by public demand and on-site evaluation.		*Safford RMP* - Preferred Alternative, Management Concern 7, Vegetation (page 45)	Implemented		
7. Initiate a study of the effects of climatic changes on vegetation communities as well as on other resources.		*Safford RMP* - Preferred Alternative, Management Concern 7, Vegetation (page 45)	Not started.		
Conservation Measures Related to Revegetation Treatments • Outside riparian areas, avoid hydro-mulching within buffer zones established at the local level. This precaution will limit adding sediments and nutrients and increasing water turbidity. • Within riparian areas, engage in consultation at the local level to ensure that revegetation activities incorporate knowledge of site-specific conditions and project design.		*Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS*, Biological Assessment	Ongoing.		

3.1.8 Fish and Wildlife Habitat

Table 3.1-6 discusses fish and wildlife habitat.

Table 3.1-6. Fish and Wildlife Habitat

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Manage terrestrial wildlife habitat to provide the best habitat for existing population levels of wildlife.		*Riparian Management Plan* - Wildlife Habitat (page 5)	Ongoing		RMP
Establish mitigation procedures to reduce impacts to wildlife and wildlife habitat.		*Riparian Management Plan* - Wildlife Habitat (page 5)	Ongoing	Mitigation is proposed during the NEPA process for proposed projects on SPRNCA.	RMP
Determine the condition and status of wildlife and their habitat.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Initial inventories of mammals, reptiles and amphibians, and birds were completed in 1989.	RMP
Inventory terrestrial and aquatic habitats.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing		RMP
Inventory terrestrial and aquatic invertebrates along with their associated food supplies.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Some research on invertebrates has occurred on SPRNCA. A non-exclusive list includes: Vegetation Use By Crayfish (Moody and Taylor 2012), Survey of Elmid Beetles (Higgins and Cobb 2013), Butterflies of St. David Cienega (Billings 2007), Water Sources for Terrestrial Arthropods (McCluney and Sabo 2009), Effect of Leaf	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
				Litter on Forest Floor Food Webs (Sabo 2008), Bee Communities (Williams 2002), Insect Ecology and Population Dynamics (Williams 2001), Butterfly Project (Ries and Sisk 2008).	
Monitor changes in terrestrial and aquatic habitats.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Changes in terrestrial habitats have been routinely monitored using pace frequency transects on 50 permanent plots located throughout the SPRNCA.	RMP
Mitigate potential impacts to terrestrial and aquatic habitats to assure existing habitat diversity through time.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Mitigation is proposed during the NEPA process for proposed projects on SPRNCA.	RMP
Prepare a habitat management plan (HMP) for the EIS area.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Completed		RMP
Evaluate the impact of visitor use on wildlife and the riparian ecosystem. Determine if these impacts are consistent with the overall management of the riparian ecosystem and the associated wildlife resource.		*Riparian Management Plan* , Wildlife, Planned Actions (page 22)	Not implemented		
Emphasize consumptive and non-consumptive use of fish and wildlife.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Outdated		

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Do not allow trapping in the EIS area except in cases that are determined in consultation with APHIS or AZGFD for administrative purposes.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Completed	Trapping is not permitted in the SPRNCA , except as allowed for research purposes. For example, beaver were live-trapped during 2008-2009 as part of a genetic study.	RMP
Minimize human disturbance around important wildlife areas.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Not completed	Increased human disturbance has occurred in some important wildlife areas (e.g. Palominas, Waters Road, Hereford Road, Hwy 90, Charleston Bridge, Fairbank).	RMP
Allow wildlife species collections only for administrative purposes. Coordinate collections with AZGFD.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Wildlife species collections have been used only for administrative or for research purposes. All collections require a permit and proper reporting to AZGFD.	RMP
Analyze the potential for wildlife-related research in the EIS area.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Wildlife-related research in the SPRNCA has occurred in the past and is ongoing.	RMP
Establish interpretation and environmental education programs on wildlife and their habitat, with emphasis on the riparian ecosystem.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	The Friends of the San Pedro River have been instrumental in establishment of interpretation and environmental education programs about wildlife and their habitat, with emphasis on the riparian ecosystem.	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Pursue establishment by AZGFD of hunting regulations for the EIS area. This relates to length of season, time of season, and the types of weapons permitted.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Completed	Some hunting regulations were established in 54 FR 36056, including trapping and firearms use. Hunting is subject to all the rules and regulations of the AZGFD ., with bow hunting permitted anywhere in accordance with state regulations during established hunting periods (except within ¼ mile of developed facilities).	RMP
Provide for the reintroduction of native wildlife species, including Threatened and Endangered species. Use habitat improvements to optimize habitat availability.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	White House Well was developed for aquatic habitat. Little Joe Spring was developed and desert pupfish were reintroduced. Desert pupfish and Gila topminnow were reintroduced at Ben Spring, Murray Spring, and Horsethief Spring. Huachuca water umbel has been reintroduced at Murray Spring, Horsethief Spring, and Frog Spring.	RMP
Plant one abandoned farm field, on an experimental basis, with preferred forage species.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Completed	Abandoned farm fields have been reseeded in some locations.	
Use prescribed fires to improve terrestrial habitat.		*Riparian Management Plan* -	Ongoing	Some prescribed fire has been used to maintain	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
		Preferred Alternative, Wildlife, Planned Actions (page 22)		wildlife habitat diversity and reduce build-up of fuels. In addition, fuel breaks have been designed and created in some areas to prevent possible spread of wildfire.	
Use prescribed fire to maintain wildlife habitat diversity and to reduce hazardous build-up of fuels.		*Riparian Management Plan* - Preferred Alternative, Vegetation, Planned Actions (page 22)	Ongoing	Some prescribed fire has been used to maintain wildlife habitat diversity and reduce build-up of fuels. In addition, fuel breaks have been designed and created in some areas to prevent possible spread of wildfire.	
Develop ponds and marshes for aquatic and terrestrial wildlife.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Ponds have been developed at White House Well and Little Joe Spring. The St. David Cienega has had some tamarisk control.	
Plant native trees (seedlings and poles) along the riparian corridor and other areas where desirable to enhance wildlife habitat.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Native trees, including 60 Arizona black walnut, 35 Mexican elderberry, 136 desert willow, 125 velvet mesquite, and 144 Arizona ash, were planted on 11.5 acres of an abandoned farm field in 1994 (American Forests Global ReLeaf Forests project).	
Pump non-irrigation wells in support of aquatic habitat improvements. Pump irrigation wells for emergency use if a resource becomes jeopardized (such as fish populations due to reduced flows).		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned	Not implemented	White House Well was developed for aquatic habitat. Irrigation wells have not been pumped in	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
		Actions (page 22)		emergencies for reduced flows.	
Provide wildlife waters in the drier upland portions of the EIS area.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Ongoing	Wildlife waters have been provided at Palominas, Boquillas, Fairbank, Contention, and Summers Well.	
Provide habitat for terrestrial wildlife species that use tree cavities (holes) through placement of nest boxes or other methods.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Not completed	Some nest boxes were provided, however, they are in a state of disrepair and are not used by any avian species.	
Consider plans for the removal of exotic fish from existing ponds in cooperation with AZGFD.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Not completed	Systematic removal of exotic fish has not occurred in existing ponds other than what has occurred by the fishing public on a random basis. Removal of exotic bullfrogs has occurred in the past on a planned basis, however, bullfrog removal is not currently conducted.	
Wildlife and their habitat are managed cooperatively by BLM and Arizona Game and Fish Department under a Memorandum of Understanding (1987).		*Safford RMP* -Wildlife Habitat (page 21)	Ongoing	Cooperative habitat management has been achieved in the past and is ongoing.	RMP
1.Maintain and enhance priority species and their habitats. 2. Focus management actions on a single species, only when required by the Endangered *Species Act.* Actively promote Threatened and Endangered species recovery to achieve eventual delisting. 3. Conserve candidate species to ensure that BLM-authorized actions do not contribute to the need to list any species as threatened or endangered.		*Safford RMP* -Preferred Alternative, Management Concern 1, Wildlife Habitat (page 33)	Ongoing	Special status species are considered during the NEPA process following the guidance in BLM Manual 6840 and by consulting the most current BLM sensitive species list.	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
4. Manage state-listed species to meet state objectives. Other special status species will be managed in accordance with inter and intra-agency management plans. 5. Manage priority wildlife species habitat (vegetation communities) or special features of that habitat (water, riparian vegetation, cliffs etc.) to maintain or enhance population levels. 6. Focus management efforts on enhancing biological diversity.					
1. Establish the following as priority species and habitats. Priority species and habitats in the District include federally listed, proposed and candidate Threatened and Endangered species and their habitat; State-listed Threatened and Endangered species and their habitat; important game species and their habitat; and other sensitive species and their habitat. a. Riparian/aquatic habitat and species dependent on riparian/aquatic habitat Gila topminnow, desert pupfish, southern bald eagle, loach minnow, spikedace, Gila chub, Colorado roundtail chub, razorback sucker, western yellow-billed cuckoo, gray hawk, Mississippi kite, common black-hawk, ferruginous pygmy-owl, willow flycatcher, leopard frog, black bear, turkey and waterfowl. b. Species identified for reintroduction in Fish and Wildlife Service plans are the aplomado falcon and woundfin. c. Desert tortoise. d. Desert and Rocky Mountain bighorn sheep. e. Mule deer. f . Pronghorn antelope. g. Oak woodlands and species dependent on oak woodland habitat white-tailed deer, turkey, black bear and Montezuma quail. h. Neotropical migratory birds. i. Other species and habitats of interest peregrine falcon, red bat, Sanborn's long-nosed bat, Mexican long-tongued bat, ferruginous and Swainson's hawks, javelina, mountain lion, dove, quail and bat roosts.		*Safford RMP* -Preferred Alternative, Management Concern 1, Wildlife Habitat (page 33)	Ongoing	The priority species list has not changed significantly since the Safford District RMP, except for the need for inclusion of current sensitive species, bird species of conservation concern, game birds below desired condition, and newly federally listed, proposed, and candidate species and critical habitat.	RMP
General management objectives for each of the priority species and habitats are identified in Appendix 4. Inventory public lands within the District to determine the presence and abundance of priority species and their habitat. Manage habitat for optimum wildlife populations, based on ecological conditions, taking into consideration local, yearly climatic variations. BLM will follow AZGFD's five-year strategic plans for the various species and will assist the Department in accomplishing its goals for the various species. Transplant and augment populations of priority wildlife species within historic ranges, if necessary, to reach management objectives.		*Safford RMP* -Preferred Alternative, Management Concern 1, Wildlife Habitat (page 33)	A number of prescribed burns have been conducted in SPRNCA since the NCA was created.	Beaver have been reintroduced to SPRNCA beginning in 1999. In addition, Huachuca water umbel, desert pupfish, and Gila topminnow have been reintroduced in selected springs. Inventories on mammals, birds, reptiles and amphibians, and	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Monitor priority habitat to determine condition and changes in condition. Conduct inventories to determine the impacts of other activities on wildlife populations and habitat prior to preparation of Habitat Management Plans. Identify opportunities in Habitat Management Plans to mitigate adverse impacts and implement the actions needed to correct the problems. Continue to maintain and improve wildlife habitat, emphasizing priority habitat. Protect springs and associated indigenous riparian vegetation for wildlife water, cover and forage. Develop prescribed burning plans in fire-dependent vegetation communities to improve habitat conditions for priority wildlife species. Suppress wildfire in sensitive vegetation communities (like palo verde/saguaro) to reduce the detrimental effects on priority wildlife dependent on those communities. Existing Habitat Management Plans address all public lands in the District except scattered parcels in Cochise County. Two Habitat Management Plans were completed prior to substantial land exchanges, and were not based on realistic ecological boundaries. To improve site-specific habitat management direction, redefine all Habitat Management Plan area boundaries. Develop Sikes Act Habitat Management Plans with AZGFD for the San Pedro. Priorities for revisions will be determined in coordination with AZGFD. Provide input into Allotment Management Plans in oak-woodland habitat to ensure perennial grasses are available to provide adequate cover for priority species. Close the following areas to animal damage control activities such as trapping, shooting, aerial gunning or use of M-44. a. Threatened and Endangered species habitat for those techniques that pose a threat to the species. b. Zones around residences and communities and in areas of concentrated recreation use for those techniques that pose a threat to the visitor or to dogs in areas where they are trained, exercised or used for hunting. c. Wilderness areas and Research Natural Areas except as individually authorized by the Arizona BLM State Director or the District/Area Manager.				fish have occurred. A Habitat Management Plan was completed. Prescribed fire has been conducted on almost 4,000 acres since 1998.	
Authorize areas that are open for animal damage control in coordination with the Animal and Plant Health Inspection Service on a yearly basis. Inventory and categorize desert tortoise habitat by 1992		*Safford RMP* -Preferred Alternative, Management Concern 1, Wildlife Habitat (page 33)	Complete and ongoing	Desert tortoise habitat has been categorized. Coordination with APHIS on animal damage control has occurred as needed, but not on a yearly basis.	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Objective 5: Re-establishment of Extirpated Species Improve the biological diversity of the NCA by following standard procedures to re-establish extirpated plant, bird, mammal, and fish species by 2000. Planned actions: 1. Incorporate the habitat needs of pronghorn, black-tailed prairie dog, and aplomado falcon into the design of prescribed fires and other land treatments (see objective 4, Special Status Raptors). Upon recovery of upland habitats, re-establish these species. 2. Re-establish riparian obligate species where feasible. Incorporated the habitat needs of Gould's turkey, muskrat, and ocelot into the design of tree plantings, re-seedings, floodplain restoration, and other actions (see objectives 1, 2, and 3). 3. Re-establish the Huachuca water umbel (*Liliaeopsis schaffneriana*). Transplant rooted plants and sod to suitable sites along the San Pedro River if feasible. 4. Reduce populations of non-native aquatic species that are limiting native aquatic species, if feasible. 5. Re-establish species known to inhabit small erosive desert streams: speckled dace, round-tailed chub, Gila sucker, spikedace, and loachminnow. 6. Re-establish species known to inhabit quiet backwaters or cienega habitats: Gila chub, Gila topminnow, desert pupfish. 7. Re-establish species known primarily from large desert rivers but which have been recorded from the San Pedro River in the recent past: razorback sucker, flannelmouth sucker, Colorado squawfish. 8. Develop Young Block ponds for use by native fishes and interpretation. Draw down the level of the pond with one or more large pumps. Remove all exotic fish. Chemical treatment with rotenone or antimycin may be necessary for complete elimination. Consider restocking game fish in nearby recreational fisheries. Determine the need for structures to prevent re-invasion of exotic fishes during floods. Determine the appropriate fish species to be stocked in the pond. Eliminate exotic species if they re-invade the ponds using the above mentioned methods. Develop (independently or in conjunction with the San Pedro visitor center) educational displays and programs to promote conservation of native fish species.	AZ-046-03-005-EA	San Pedro Riparian NCA Habitat Management Plan (1993)		Almost 4,000 acres of upland habitat has been treated with prescribed fire since 1998. Gould's turkey have become re-established on SPRNCA without human intervention, and nesting was documented south of Palominas in 2009. Desert pupfish and Gila topminnow have been reintroduced in Ben, Murray, and Horsethief Springs. Huachuca water umbel has been reintroduced in Frog, Murray, and Horsethief Springs. Systematic removal of exotic fish has not occurred in existing ponds other than what has occurred by the fishing public on a random basis. Removal of exotic bullfrogs has occurred in the past on a planned basis, however, bullfrog removal is not currently conducted.	
Objective 2: Aquatic Habitat Improvement Increase aquatic habitat diversity, attain streambank cover of 70%, and reduce streambank soil alteration to lengthen the period of higher base flows by 2005. Planned actions:	AZ-046-03-005-EA	San Pedro Riparian NCA Habitat Management Plan (1993)		Beaver were reintroduced on SPRNCA, after having been extirpated by fur trappers by 1894. A total of 15	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
6. Identify and evaluate transplant locations and develop a reintroduction proposal in accordance with the AZGFD Big Game Transplant Procedures (AGFD, 1992) and BLM Manual Section 1745. Insure local participation. 7. Capture beaver from a suitable source. Insure that the captured animals are free of Giardia infestation. 8. Release an appropriate number of beaver in the main stream San Pedro River upstream of the Lewis Springs Quad area. Monitor the movements and dispersal of beaver throughout the ecosystem. 9. Remove beaver from areas if they present problems for private land owners or if their activities prove counter-productive to HMP objectives. 10. Continue the RMP decision on the grazing moratorium and off-highway vehicle controls through 2004.				beaver were reintroduced during 1999, 2000, and 2002. Currently, the estimated beaver population on SPRNCA is about 50-100, based on approximately 10-20 colonies annually with an average of five beaver per colony.	
Objective 6: Wildlife Water Development Improve upland water sources to improve big game and upland game distribution by 1997. Planned actions: 1. Improvement of Summer's Well in Section 9, T. 19 S. R. 21 E. will consist of removal of existing barbed wire and other impediments, installation of a new ground-level drinker with wildlife escape ramp, and maintenance of existing windmill. Create a "green patch" for upland game by allowing limited overflow from storage tank. 2. Improvement of Contention Well in Section 21, T. 19 S. R. 21 E. will consist of installation of a submersible pump, installation of a solar panel or alternative power source, pipeline, storage tank, and ground-level drinker with wildlife escape ramp. Cover the existing well hole to prevent drowning by wildlife. Create a "green patch" for upland game. 3. Improvement of Boquillas Well in Section 14, T. 20 S. R. 21 E. will consist of installation of one quarter mile of pipeline, a storage tank, and ground-level drinker with wildlife escape ramp. 4. Maintain Palominas Well in Section 9, T. 24 S. R. 22 E. in working order with periodic maintenance. Create a "green patch" for upland game.	AZ-046-03-005-EA	San Pedro Riparian NCA Habitat Management Plan (1993)	Ongoing	No green patches have been created. Summer's Well wildlife water was improved in 2004 using AZGFD 's Special Big Game funding. Contention Well was developed for wildlife use in 1998; it was heavily used by wildlife when the river dries in the months preceding monsoon. The pipe to the drinker froze during February 2010 and water has not been available since that time. Boquillas Well was improved with a ground-level wedge drinker in 2006, however, pipe to the drinker froze and the drinker has not been functional since about 2010. An above-ground	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
				livestock trough at the Boquillas well is available to wildlife that can reach it. The Palominas Well was improved for wildlife use in 1992 and 2005. A damaged solar panel was replaced in 2010. Use by birds and small mammals remains high, however, large mammals do not utilize the large cistern. NEPA has been completed and AZGFD Special Big Game funds received to install a storage tank and drinker.	

3.1.9 Migratory Birds

Table 3.1-7 discusses migratory birds.

Table 3.1-7. Migratory Birds

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Identify special management guidance to protect areas important for raptors and herons.		*Riparian Management Plan* - Preferred Alternative, Wildlife, Planned Actions (page 22)	Not implemented		RMP
Objective 1: Riparian Obligate Bird Habitat Improve and increase the San Pedro River cottonwood/willow riparian community from 2,930 acres to 3,142 acres to increase riparian obligate bird numbers by 7% and increase densities by 3% by 2005. Planned actions: 1. Cottonwood and willow trees will be planted along the riparian corridor at nine low terrace sites in the Lewis Springs Quad Area to increase tree canopy	AZ-046-03-005-EA	*San Pedro Riparian NCA Habitat Management Plan* (1993)			

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
cover on a total of approximately 65 acres of riparian habitat (see map 2). On that portion of the NCA downstream of the Lewis Springs Quadrangle, manage for a desired riparian plant community without saltcedar. Reduce saltcedar acreage from 147 acres to 0 acres.					
Objective 4: Special Status Raptors Increase breeding use of the NCA to 20 pairs of gray hawks and 5 pairs of Swainson's hawk by 2020. Planned actions: 1. Design cottonwood/willow planting in objective 1 and native floodplain revegetation in objective 3 to improve conditions for gray hawk. Implement restoration efforts in the two previous objectives to produce approximately 55 acres of contiguous cottonwood/willow habitat next to 120 acres of mesquite habitat. 2. Use prescribed fire and erosion control on 40,000 upland acres to improve conditions for Swainson's hawk. Increase native grass cover from 5 to 30 percent (or up to the capability of the ecological site) and reduce the cover of invading scrub species. a. Implement prescribed fire in accordance with Bureau Manual 9214 to promote the return of good to excellent ecological condition on 5,100 acres of upland. The locations of prescribed fire areas area shown on map 4. The prescribed burns will be designed to improve habitat conditions for antelope, black-tailed prairie dog, and aplomado falcon where feasible. See objective 5 (Re-establishment of Extirpated Species) for a description of desired habitat for these species. b. Stabilize active gully erosion and head-cutting on 5,600 acres by implementing vegetation management and constructing erosion control structures. Achieve good to excellent ecological condition on all eroded sites. Establish at least 50% native herbaceous cover (or up to the capability of the ecological site) on these actively eroding areas (see map 5). c. Achieve good to excellent condition on 29,300 acres of upland ecological sites by continued grazing management. Manage recreation use around known and potential nest territories at levels that promote gray hawk and Swainson's hawk nesting success.	AZ-046-03-005-EA	San Pedro Riparian NCA Habitat Management Plan (1993)	Ongoing	During 2011, 27 pairs of nesting gray hawk were documented on SPRNCA (Johnson et al. 2013). Prescribed fire has been used on almost 4,000 acres since 1998. However, encroachment of invading scrub species has continued to increase, primarily due to mostly historic loss of topsoil. Active control of gully erosion has occurred in the past in the area east of St. David Cienega and in the area north of Terrenate.	

3.1.10 Invasive Species

Table 3.1-8 discusses invasive species.

Table 3.1-8. Invasive Species

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Several actions in this Resource Management Plan involve the use of herbicides. Herbicides will be used only if permitted upon completion of the *Environmental impact Statement, Vegetation Treatment on BLM Lands in 13 Western States* (BLM 1989, in preparation) and relief from the 9th Circuit Court. If chemicals are approved for use, site-specific environmental analyses will be prepared for each project proposing the use of chemicals.		*Safford RMP* - Vegetation (page 24)		Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Programmatic EIS was finalized in 2016. Site-specific environmental analyses has been prepared for each project proposing the use of chemicals on SPRNCA (e.g. Russian knapweed control, giant reed control, tamarisk control).	
3. Land treatments (vegetation manipulation) will be used to decrease invading woody plants and increase grasses and forbs for wildlife, watershed condition and livestock. Public lands, where vegetation condition is less than desired to meet management objectives, will be identified for treatment through activity plans. Treatments may include various artificial (mechanical, chemical or prescribed fire) methods. Management objectives for riparian vegetation can be found under Issue 4 Riparian Vegetation.		*Safford RMP* -Preferred Alternative, Management Concern 7, Vegetation (page 45)			
Objective 3: Restoration of Native Floodplain Habitat Restore 2,000 acres of fallow fields to attain a desired native plant community of mixed mesquite-mixed scrub and sacaton-mixed scrub by 1998. Improve habitat quality for native bird, mammal, and reptile species. Planned actions: 5. 742 acres of abandoned farm field will be planted and restored to a desired plant community of sacaton grassland interspersed with mesquite and a variety of other shrubs and trees. The location of the proposed action is shown on map 3. [Native plants are listed as potential species for utilization] Achieve the following plant species targets through restoration by 1998: Increase the relative frequency of occurrence of sacaton from 0 to 20%. Increase the relative frequency of occurrence of young mesquite trees from 0 to 3%.	AZ-046-03-005-EA	San Pedro Riparian NCA Habitat Management Plan (1993)			

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Increase the number of native perennial grass species occurring in the field from none to nine. Increase the number of native shrub species occurring in the field from none to four. 6. Experimentally mow 80 acres of fallow field south of Hereford Road two or three times per year to reduce the relative frequency of occurrence of Russian thistle from 90% to 50% by 1998. Increase the relative occurrence of native grass species from 0% to 50% by 1998. Desirable shrub and tree species (those listed above) which colonize the field will be identified and avoided during mowing. 7. Manage for a desired plant community consisting of a native grassland interspersed with short trees and shrubs on 1178 acres of fallow farm fields where native grasses are naturally re-establishing along present trends. Allow for an increase in native grass species from 20% frequency of occurrence to 50% frequency of occurrence by 1999. Allow establishment of native trees and shrubs of up to 10% canopy cover by 1999. Continue to review current management strategies for control of Johnson grass (Sorgum halepense). Consider implementing control practices on sites where Johnson grass invasion has occurred.					

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Conservation Measures Related to Herbicide Treatments The complexity of this action within riparian areas requires local consultation, which will be based on herbicide risk assessments. Possible Conservation Measures: • Maintain equipment used for transportation, storage, or application of chemicals in a leak proof condition. • Do not store or mix herbicides, or conduct post-application cleaning within riparian areas. • Ensure that trained personnel monitor weather conditions at spray times during application. • Strictly enforce all herbicide labels. • Do not broadcast spray within 100 ft. of open water when wind velocity exceeds 5 mph. • Do not broadcast spray when wind velocity exceeds 10 mph. • Do not spray if precipitation is occurring or is imminent (within 24 hours). • Do not spray if air turbulence is sufficient to affect the normal spray pattern. • Do not broadcast spray herbicides in riparian areas that provide habitat for TEP aquatic species. Appropriate buffer distances should be determined at the local level to ensure that overhanging vegetation that provides habitat for TEP species is not removed from the site. Buffer distances provided as conservation measures in the assessment of effects to plants (Chapter 4 of this BA) and fish and aquatic invertebrates should be consulted as guidance (Table 5-5). (Note: the Forest Service did not determine appropriate buffer distances for TEP fish and aquatic invertebrates when evaluating herbicides in Forest Service ERAs; buffer distances were only determined for non-TEP species.) • Do not use diquat, fluridone, terrestrial formulations of glyphosate, or triclopyr BEE, to treat aquatic vegetation in habitats where aquatic TEP species occur or may potentially occur. • Avoid using glyphosate formulations that include R-11 in the future, and either avoid using any formulations with POEA, or seek to use the formulation with the lowest amount of POEA available, to reduce risks to aquatic organisms. • Follow all instructions and SOPs to avoid spill and direct spray scenarios into aquatic habitats. Special care should be followed when transporting and applying 2,4-D, bromacil, clopyralid, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, tebuthiuron, and triclopyr. • Do not broadcast spray diuron, glyphosate, picloram, or triclopyr BEE in upland habitats adjacent to aquatic habitats that support (or may potentially support) aquatic TEP species under conditions that would likely result in off-site drift. • In watersheds that support TEP species or their habitat, do not apply bromacil, diuron, tebuthiuron, or triclopyr BEE in upland habitats within ½ mile upslope of aquatic habitats that support aquatic TEP species under conditions that would likely result in surface runoff.		*Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS*, Biological Assessment			

3.1.11 Special Status Species

Table 3.1-9 discusses special status species.

Table 3.1-9. Special Status Species

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Assess impacts to federally listed Threatened and Endangered species and state-listed species. BLM inventories have not identified any federally listed species in the San Pedro EIS area to date. BLM will not authorize actions that jeopardize potential populations or their habitat.		*Riparian Management Plan* - Wildlife Habitat (page 5)			RMP
Consider special status species (i.e., state listed species and candidate species listed in the Federal Register) on a case-by-case basis. Although candidate species have no legal protection under the Endangered Species Act, it is BLM's policy to manage their habitat at levels high enough to keep them from becoming federally listed.		*Riparian Management Plan* - Wildlife Habitat (page 5)	Ongoing	Candidate species are considered BLM sensitive species and policy is given in BLM Manual 6840.	RMP
Federally listed or proposed threatened and endangered wildlife are protected under provisions of the Endangered Species Act (1973, as amended). BLM Manual 6840 outlines the conservation of Threatened and Endangered species and the ecosystems they depend upon; ensures that all actions authorized, funded or carried out by BLM are in compliance with the Endangered Species Act; cooperates with the Fish and Wildlife Service and the National Marine Fisheries Service in planning and providing for the recovery of Threatened and Endangered species; and retains in public ownership all habitat essential to the survival or recovery of any Threatened and Endangered species, including habitat used historically by these species. It is also BLM policy to manage candidate species and their habitat to prevent the need to list them as threatened or endangered.		*Safford RMP* -Wildlife Habitat (page 21)	Ongoing		RMP
Under the Endangered Species Act, BLM will not jeopardize the continued existence of any species listed or proposed for listing as threatened or endangered and to actively promote species conservation and recovery. BLM will also manage candidate species to prevent listing as threatened or endangered.		*Safford RMP* - Vegetation (page 24)	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
The objective for management of threatened, endangered and special status plant species is to manage the public lands to preserve and enhance occurrences of special status species and to achieve the eventual delisting of threatened and endangered species. BLM will assist the Fish and Wildlife Service in the development of Threatened and Endangered species recovery plans. Implementation of recovery plans will be accomplished through activity plans.		*Safford RMP* -Preferred Alternative, Management Concern 7, Vegetation (page 45)	Ongoing		RMP
To accomplish the Threatened and Endangered plant species management objectives, inventory and develop Habitat Management Plans or include Threatened and Endangered plants in other Habitat Management Plans in the following priority order. a. Listed threatened *Coryphantha robbinsorum.* b. Candidate category I species *Aster lemonii* and *Rumex orthoneurus.* c. Reinventory and monitor other candidate species known to occur on public lands. d. Reinventory and monitor listed endangered species. *Echinocereus triglochicfiatus*		*Safford RMP* -Preferred Alternative, Management Concern 7, Vegetation (page 45)	Ongoing		RMP
All species □ The BLM's compliance with the Endangered Species Act and NEPA policy will contribute to the conservation of the species. □ BLM will not jeopardize the continued existence of any species listed or proposed for listing as threatened or endangered. □ All proposed activity-level plans will be evaluated to prevent or mitigate any impacts that could degrade or destroy listed or proposed species and their designated or proposed critical habitat. □ All activity-level plans will be reviewed for Section 7 compliance before becoming final. □ The potentially adverse effects of the FRMP will be tempered by legal guidelines that require the following: NEPA compliance and analysis, including threatened and endangered species evaluations, will be conducted for all future actions; compliance with the Endangered Species Act; avoidance of jeopardy situations; and promotion of recovery of listed and proposed species. □ The direction in the 'Arizona Standards for Rangeland Health and Guidelines for Grazing Administration' (effective August 21, 1995) will be incorporated in all plans affecting rangeland resources and grazing administration.	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Reinitiated Biological and Conference Opinion on the Effects of the Safford District RMP (page 31)	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions

Southwestern willow flycatcher
  For new access roads, bridges, utility lines, etc., through riparian areas, perform southwestern willow flycatcher surveys at a level sufficient to determine presence or absence in areas of potential conflict (potential habitat and critical habitat). Prepare detailed mitigation in consultation with USFWS and other agencies and groups.
  For existing roads, trails, utility corridors, bridges, etc., through riparian areas (especially critical and potentially suitable habitat) perform needed maintenance with the least possible habitat disturbance. Do not permit maintenance during the breeding season except in emergencies.
  For any land action, including land disposal, exchange, and mineral/energy exploration and development, institute consultation in cases where the following conditions are met:
o Critical or potentially suitable habitat for the southwestern willow flycatcher is present within the area influenced by the action, and
o The action could affect portions of riparian areas (or areas that have the potential to support riparian vegetation) so as to reduce the foliage height, riparian plant cover, or foliage density; increase human disturbance; or influence other factors important to the southwestern willow flycatcher.
  Institute willow flycatcher surveys as part of the monitoring program for riparian areas in the FRMP area as a means of assessing willow flycatcher response to management actions. Adjust management practices to increase the population. Use the number of breeding individuals as an indicator of population response.
  BLM will continue to implement the list of actions for the southwestern willow flycatcher identified in the Safford/Tucson Grazing BO on Pages 59-60, applying them to not only livestock management, but to all management when applicable.
	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Reinitiated Biological and Conference Opinion on the Effects of the Safford District RMP (page 32)	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Huachuca water umbel □ For new access roads, bridges, and utility lines through riparian areas, perform surveys at a level sufficient to determine the presence or absence within the construction zone. In critical habitat avoid existing plants and all microsites that could support the Huachuca water umbel. Re-route trails and roads to avoid erosion and damage to critical habitat. □ Prepare detailed mitigation in consultation with U.S. Fish and Wildlife Service and other agencies and groups. □ For existing roads, trails, utility corridors, and bridges through riparian areas, perform needed maintenance with the least possible habitat disturbance. Replant sites that cannot be avoided. Avoid existing plants and all microsites in critical habitat that could support Huachuca water umbel. Re-route trails and roads to avoid erosion and damage to critical habitat. □ For any land action, including sand and gravel operations, rights-of way, and mineral/energy exploration and development, institute consultation in cases where the following conditions are met: o Critical or potential habitat for Huachuca water umbel is present within the area influenced by the action, and o The action could affect riparian stream banks that support or could support the species. Avoid existing plants and all microsites in critical habitat that could potentially support the Huachuca water umbel. Re-route trails and roads to avoid erosion and damage to critical habitat and individual plants. □ Institute Huachuca water umbel surveys as part of the monitoring program to assess the response of the species to management actions. Adjust management practices to increase the population. Use the density of plant patches per mile of stream bank as an indicator of population response.	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Reinitiated Biological and Conference Opinion on the Effects of the Safford District RMP (page 32	Ongoing		RMP
Southwestern Willow Flycatcher We recommend that you: 1. Continue to support inventories and monitoring of flycatchers and their habitats. 2. Implement the flycatcher recovery plan, by considering the recommendations in that plan in all program and project-level activities under the FRMP. 3. Not implement saltcedar control in riparian patches that are suitable flycatcher habitat without careful evaluation and coordination with our office and the AZGFD.	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Biological and Conference Opinion on the Effects of the Safford District RMP, Conservation Recommendations (page 123	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Huachuca Water Umbel We recommend that you: 1. Monitor the effects of fire suppression activities on all populations of water umbel on the San Pedro River. 2. Monitor the effects of fire suppression activities on the spread of non-native species within the action area. 3. Actively participate in the recovery of, and recovery plan development for, the water umbel. 4. Fund, aid, or establish research or study projects regarding fire ecology and conservation of the water umbel on BLM lands. 5. Educate employees and your public users about conservation needs of the water umbel. 6. Work with the Border Patrol to reduce impacts of undocumented immigrants and smugglers on the San Pedro RNCA. 7. Continue to work with the Upper San Pedro River Partnership to develop and implement projects that help bring the water budget for the subwatershed into balance. 8. Determine effects of the recently reestablished beaver population on the water umbel and its critical habitat.	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Reinitiated Biological and Conference Opinion on the Effects of the Safford District RMP, Conservation Recommendations (page 123)	Ongoing		RMP
Chiricahua Leopard Frog We recommend that you: 1. Cooperate with adjacent landowners and managers, and with the AZGFD, in managing the watersheds of occupied and suitable habitats, including preventing introductions of and controlling non-native fishes, bullfrogs, crayfish, and other non-native organisms. 2. Continue to work with us on implementing emergency interim measures to protect frogs during plan preparation, and help us implement the recovery plan after it is completed. 3. Work with us and the AZGFD to re-establish CLFs at suitable sites within the planning area if deemed appropriate by the recovery team. 4. Develop and implement conservation measures for fire management projects other than fire suppression to minimize adverse effects to CLFs and their potential habitats in the action area. These measures would be similar to those outlined in reasonable and prudent measure number 3, term and condition number 1, for prescribed fire and natural fire plans as they affect CLF, as described in our June 10, 2004, biological and conference opinion on the Gila Box Riparian National Conservation Area Interdisciplinary Activity Plan (U. S. Fish and Wildlife Service 2004a).	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Reinitiated Biological and Conference Opinion on the Effects of the Safford District RMP, Conservation Recommendations (page 124)	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Loach Minnow We recommend that you: 1. Continue to support inventories and monitoring of occupied loach minnow habitats. This could include un-surveyed and incompletely surveyed sites. 2. Collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in occupied loach minnow and un-occupied suitable loach minnow habitats if such rights have not been previously obtained. 3. Work with us to implement the recovery plan for this species. 4. Coordinate with the AZGFD and us to begin an aggressive program to control non-native aquatic species on BLM lands.	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Reinitiated Biological and Conference Opinion on the Effects of the Safford District RMP, Conservation Recommendations (page 125)	Ongoing		RMP
Spikedace We recommend that you: 1. Continue to support inventories and monitoring of occupied spikedace habitats. This could include un-surveyed and incompletely surveyed sites. 2. Collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in occupied spikedace and un-occupied suitable spikedace habitats if such rights have not been previously obtained. 3. Work with us to implement the recovery plan for this species. 4. Coordinate with the AZGFD and us to begin an aggressive program to control non-native aquatic species on BLM lands.	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Reinitiated Biological and Conference Opinion on the Effects of the Safford District RMP, Conservation Recommendations (page 125)	Ongoing		RMP
Gila Chub We recommend that you: 1. Coordinate with us in development and implementation of a recovery plan for the Gila chub. 2. Coordinate with the AZGFD and us to translocate Gila chub into suitable habitat. 3. Conduct, fund, or otherwise support comprehensive surveys for the Gila chub in all potential or suitable habitats on BLM lands. Coordinate with the AZGFD and us to begin an aggressive program to control non-native aquatic species on BLM lands.	AESO 02-21-05-F-0086 and 02-21-88-F-0114	Reinitiated Biological and Conference Opinion on the Effects of the Safford District RMP, Conservation Recommendations (page 125)	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Objective 5: Re-establishment of Extirpated Species Improve the biological diversity of the NCA by following standard procedures to re-establish extirpated plant, bird, mammal, and fish species by 2000. Planned actions: 9. Incorporate the habitat needs of pronghorn, black-tailed prairie dog, and aplomado falcon into the design of prescribed fires and other land treatments (see objective 4, Special Status Raptors). Upon recovery of upland habitats, re-establish these species. 10. Re-establish riparian obligate species where feasible. Incorporate the habitat needs of Gould's turkey, muskrat, and ocelot into the design of tree plantings, re-seedings, floodplain restoration, and other actions (see objectives 1, 2, and 3). 11. Re-establish the Huachuca water umbel (*Liliaeopsis schaffneriana*). Transplant rooted plants and sod to suitable sites along the San Pedro River if feasible. 12. Reduce populations of non-native aquatic species that are limiting native aquatic species, if feasible. 13. Re-establish species known to inhabit small erosive desert streams: speckled dace, round-tailed chub, Gila sucker, spikedace, and loachminnow. 14. Re-establish species known to inhabit quiet backwaters or cienega habitats: Gila chub, Gila topminnow, desert pupfish. 15. Re-establish species known primarily from large desert rivers but which have been recorded from the San Pedro River in the recent past: razorback sucker, flannelmouth sucker, Colorado squawfish. 16. Develop Young Block ponds for use by native fishes and interpretation. Draw down the level of the pond with one or more large pumps. Remove all exotic fish. Chemical treatment with rotenone or antimycin may be necessary for complete elimination. Consider restocking game fish in nearby recreational fisheries. Determine the need for structures to prevent re-invasion of exotic fishes during floods. Determine the appropriate fish species to be stocked in the pond. Eliminate exotic species if they re-invade the ponds using the above mentioned methods. Develop (independently or in conjunction with the San Pedro visitor center) educational displays and programs to promote conservation of native fish species.	AZ-046-03-005-EA	San Pedro Riparian NCA Habitat Management Plan (1993)	Some ongoing, some incomplete	Some prescribed fire has been used for land treatments on SPRNCA from 1998 to 2007, with about 3,775 acres burned. Huachuca water umbel has been reintroduced at three sites (Frog, Murray, and Horsethief Springs). Gila topminnow and desert pupfish have been reintroduced to Ben Murray, and Horsethief Springs.	RMP
7.1.1 Wildland Fire Suppression (FS)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire,	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
		Fuels, and Air Quality			
7.1.2 Fuels Treatments (prescribed burning and other fuels management) (FT)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.1.3 Rehabilitation and Restoration (RR)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.2.1 Wildland Fire Suppression and Rehabilitation	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.2.2 Fuels Treatments (prescribed fire; mechanical, chemical, and biological treatments)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
7.3 Species Specific Conservation Measures	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.2.2 California brown pelican	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing	The conservation measures for fire management in riparian and aquatic habitats are followed.	RMP
7.3.2.5 Southwestern willow flycatcher (FE)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.2.7 Bald eagle (FT)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.2.9 Yellow-billed cuckoo (FC)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
7.3.3 Fish	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.3.2 Desert pupfish (FE,CH)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.3.3 Gila topminnow (FE)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.3.8 Loach minnow (FT, CH); Spikedace (FT, CH)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.3.9 Gila chub (PE, Proposed CH)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
7.3.4 Flowering Plants	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
Huachuca Water Umbel (*Lilaeopsis schaffneriana* var. *recurva*) [FE, CH]	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.5.3 Jaguar (FE)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.5.4 Lesser long-nosed bat (FE)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.5.5 Mexican gray wolf (FE; 10(j) species)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
7.3.5.8 Black-tailed prairie dog (FC)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
7.3.6 Reptiles 7.3.6.1 Desert tortoise, Mojave population (FT)	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP
3.7.4 Desert tortoise, Sonoran population Implement the Conservations Measures for Desert Tortoise, Mojave population, as appropriate, for fire suppression and fuels treatment activities (prescribed fire, vegetation treatments), excluding requirements for notification to USFWS.	AESO/SE 02-21-03-F-0210	Biological Opinion on the Statewide LUP Amendment for Fire, Fuels, and Air Quality	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
General Measures: General measures will be implemented for all livestock grazing actions, including maintenance or construction of range improvements in the Gila District unless otherwise modified in species or site specific measures. The BLM will: 1. Consider effects to listed species and designated critical habitat during grazing allotment evaluations. Realistic and achievable habitat elements that benefit listed species will be included when determining desired resource condition. 2. Review, for every proposed project, the FWS county list and conduct appropriate surveys and clearances for threatened and endangered species. 3. Submit an annual monitoring report to the FWS Arizona Ecological Services Field Office on or before March 15. These reports shall briefly summarize for the previous calendar year: 1) implementation and effectiveness of these measures and 2) documentation of incidental take, if any. The report shall also summarize livestock grazing actions on allotments that may affect occupied, suitable and critical habitat for listed species, including: any inventories, monitoring, evaluations, range improvement projects, and known unauthorized livestock use in areas excluded or otherwise closed to grazing that benefit listed species. 4. Work to remove unauthorized livestock from areas excluded or otherwise closed to grazing that provide a benefit to listed species and their habitat (see Table 4 for a current list of exclosures). The BLM will contact the owner of the livestock as soon as possible after the unauthorized use is reported and request removal. The unauthorized use will be resolved through CFR authorities (43 CFR Sec. 4150). The BLM will work as quickly as practical to repair exclosure fences or notify permittees to repair fences. Where unauthorized use is a recurrent problem, alteration or additional barriers to livestock movement will be considered. 5. Provide a biologist to present instruction for activities in the field in areas with listed species and act as a spot monitor where the potential for take exists. 6. Require all trucks and heavy equipment associated with BLM projects to use existing roads. Washes and stream beds will be avoided. 7. Continue to implement all reasonable efforts to minimize adverse effects to listed fish for actions in and adjacent to stream channels (fence, road, or water development activities). 8. Require all heavy equipment associated with BLM projects to be pressure washed to remove mud and seeds, before transporting to project site. Field equipment will be decontaminated according to established protocols. Employees, contractors and other associates will be advised of any special site specific or species protocols. 9. Require, during any BLM construction project, equipment to be parked well away from stream channels and washes to prevent potential contamination. Equipment will be checked daily for leaks.	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing	Rangeland health assessments, including utilization, frequency, and monitoring, was completed on the following allotments during 2012: Susnow, El Capitan, Limestone, Clyne, Brunchow Hill, Box O, Coyote, Willow Springs, and Christmas. Occupied, suitable, or critical habitat for listed species occurs on the Susnow, Clyne, Brunchow Hill and Christmas Allotments. Evaluations and monitoring on these allotments indicates that land health standards are being met.	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
10. Not construct new permanent roads or trails within listed species' habitats, with the possible exception of lesser long-nosed bat foraging areas. Fence lines will not be bladed prior to fence installation. Some vegetation work, including limbing and off-road travel, may be authorized on a case-by-case basis. 11. Require large surface disturbing actions to use straw waddles or other approved sediment catching measures in place. 12. Avoid, to the extent possible, impacts to native riparian vegetation. 13. Manage for appropriate vegetation species in riparian areas that support listed species. At a minimum this will likely be seasonal grazing use (winter use only), but complete exclusion will also be considered. After riparian areas are closed to grazing, livestock use will not be authorized until fencing or other control methods are in place. 14. Inspect fences used for excluding livestock from BLM managed riparian areas/pastures before livestock are turned out. 15. Place livestock supplements, including salt, at least a quarter mile away from riparian areas. 16. Conduct, in order to minimize impacts, trailing through BLM riparian areas so that 1) livestock are present for the shortest period of time possible in riparian/aquatic areas, 2) the shortest route across the stream/river is taken, 3) trailing across streams/rivers is conducted as infrequently as possible, and 4) whenever possible, trailing is conducted when bankline soil moisture is relatively low. 17. Continue to evaluate all existing and proposed stock water sources on BLM-managed lands with regard to their degree of risk for introducing nonnative aquatic species to habitat with listed aquatic species or designated as Critical Habitat. The BLM will then, in conjunction with the FWS and Arizona Game and Fish Department (AZGFD), develop and implement management techniques or practices for the tanks with perennial water. Management techniques may include, but are not limited to, seasonal drying, replacement of the existing tanks with troughs, or other appropriate methods. 18. Coordinate control efforts with the FWS and AZGFD if invasive aquatic species are discovered in developed water on BLM land. The water will be dried or treated with piscicide through a coordinated effort to eliminate the invasive species. Where appropriate, grazing permits will have a standard term and condition that non-native aquatic species will not be stocked in waters on public lands. 19. Locate new facilities away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function or goals for threatened and endangered species (TES). Existing facilities will be managed in a way that does not conflict with riparian-wetland function or TES goals, or will be relocated or modified when incompatible with riparian wetland function or TES goals.					

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
I. Southwestern willow flycatcher (*Empidonax traillii extimus*) 1. Mapping: The BLM will maintain maps that convey information about flycatcher habitat. These maps will be reassessed as conditions change, (example; fire and floods). Maps will include the following information: a. Location, size, shape, and spacing of habitat areas. b. Habitat stage with respect to flycatchers according to the following classification: suitable occupied, suitable-unoccupied, suitable un-surveyed, potential in the short-term (1 to 3 years), and potential in the long-term (greater than 3 years). c. Status of flycatcher surveys for each area of suitable habitat: either the date(s) surveyed or indication that the area has not been surveyed. 2. Habitat Management Guidelines: The BLM will implement the following guidelines: a. Livestock grazing will be excluded within occupied and un-surveyed, suitable habitat during the breeding season (April 1-September 1). b. Manage suitable flycatcher habitat so that suitable characteristics are not eliminated or degraded. c. Manage riparian areas to allow natural regeneration and, therefore, allow those sites with potential to progress into suitable habitat. 3. Range Improvements: The BLM will locate range improvement projects outside of flycatcher occupied areas, except for fences, cattle guards, and gates needed to exclude or better manage livestock. Within breeding habitat, implement construction, maintenance, or management activities outside of the flycatcher breeding season. Any range improvement project within two miles of occupied, suitable or critical habitat, including those proposed to improve flycatcher habitat, will be reviewed by the FWS for compliance with the Biological opinion. 4. Cowbird Control: To reduce the likelihood of nest abandonment and loss of flycatcher productivity owing to cowbird parasitism associated with BLM-authorized grazing activities in or near occupied habitats, BLM will implement the following: a. Investigate, identify, and assess livestock concentration areas on BLM lands in the action areas that are likely foraging areas for cowbirds. This will be done within a 5-mile radius of occupied or un-surveyed suitable southwestern willow flycatcher habitat. The BLM will evaluate ways to reduce any concentration areas found. The BLM will pay special attention to those facilities within two miles of breeding habitat, since this is the range in which alteration of concentration areas are most effective. b. c. If cowbird parasitism in monitored areas is determined to be ten percent of nests or greater, the BLM and the FWS will meet and discuss reasons for the parasitism and possible management actions. 5. On BLM lands with suitable or potential willow flycatcher habitat, restrict livestock grazing on riparian vegetation to winter use only from November 1 to March 30, and monitoring will be done to ensure	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing	AZGFD mapped and monitored SWFL breeding habitat in Arizona using remote sensing in 2004. The BLM Bio Tech surveyed areas for suitable and potential SWFL nesting habitat on SPRNCA during 2000. On SPRNCA, potential habitat was found from Hwy 92 to Hereford, from the International Boundary to Hwy 92, and from Escalante Crossing to Clifford Wash. The riparian portions of the SPRNCA and are also excluded from grazing year-round by fencing, although sometimes trespass cattle enter through broken fences or watergaps.	Implementation

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
utilization levels do not exceed 30 percent limits on apical meristems of woody vegetation 0-6 ft. tall (e.g. cottonwoods and willows). Monitoring will be done prior to, during, and after the livestock have used a riparian pasture. Once the 30 percent utilization limit is met, all livestock will be removed from the pasture. To the extent feasible, the BLM shall offer to assist the permittee in managing livestock use in the non-BLM portions of the allotment for the benefit of the flycatcher. 6. Work with private landowners in the Brunchow Hill allotment to exclude livestock from BLM lands in that allotment within the SPRNCA. 7. The BLM will ensure that livestock are removed from occupied or unsurveyed suitable habitat before the start of each southwestern willow flycatcher breeding season (April 1); this could include sweeps (checking within exclosures for livestock and removing any livestock found). Conservation Recommendations (page 108): 1. We recommend that BLM continue supporting and participating in southwestern willow flycatcher survey and monitoring efforts on BLM-administered lands in Arizona. 2. We recommend that BLM work toward restoring native riparian vegetation in sites that have the potential to support future breeding habitat for this species. 3. We recommend that BLM collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in rivers supporting willow flycatcher habitat on or downstream of BLM lands in order to protect and maintain these habitats, if such rights have not been previously obtained. 4. We recommend that BLM not consider land exchanges that would transfer riparian area river channels, floodplains, and terraces out of Federal ownership, and carefully examine all exchanges that could affect water flows (either groundwater or surface water) to ensure that development on those lands would not affect riparian habitats. 5. We recommend that the BLM work with non-Federal landowners on allotments within and near breeding flycatchers to extend cowbird trapping efforts, if implemented, onto private property as appropriate for the protection of breeding flycatchers and to implement riparian habitat protection and restoration. 6. We recommend that BLM work with the FWS and other partners to implement the flycatcher recovery plan.				BLM lands in the action area include the SPRNCA. Assessment of livestock concentrations will be ongoing as land health evaluations occur in these areas. In 2008, the BLM met with the permittee of the Brunchow Hill allotment and USDA-NRCS to establish a Coordinated Resource Management Plan for the Brunchow allotment. On 6 May 2008 and 31 July 2008, fence materials were delivered for repair and construction of the Brunchow allotment boundary fence. BLM staff met with the permittee of the Brunchow Hill allotment in March 2009 to ensure fence lines are in place, to assist with range monitoring, and to maintain communication	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
				between the BLM and adjacent ranch landowners. Due to a decades-old land withdrawal for a Bureau of Reclamation proposed dam, BLM was unable to participate in the CRMP for Brunckow Hill allotment, as BLM may not have the authority because of this withdrawal. The lessee was given information to proceed with the CRMP process, and currently has a CRMP with NRCS. The fences are currently functional along the SPRNCA boundary and run alongside the old railroad grade on the east side of the riparian zone. BLM staff met twice with the permittee of the Brunchow Hill allotment in 2012 to ensure fence lines are in place, to assist with range monitoring, and to maintain communication between the BLM and adjacent ranch landowners. The riparian portions of the SPRNCA is excluded from	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
				grazing year-round by fencing, although sometimes trespass cattle enter through broken fences or watergaps.	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
II. Fish-General 1. The BLM will conduct informational and educational programs pertaining to Arizona's native fishes and their habitats. 2. In occupied or suitable aquatic habitat for listed species or their designated critical habitat, the BLM will monitor appropriate aquatic habitat variables, riparian vegetation, and streambanks as they relate to livestock management and unauthorized livestock use, at least annually, using accepted BLM standards and methodologies. 4.The BLM will monitor populations of Gila topminnow, desert pupfish, loach minnow, spikedace, Little Colorado spinedace, and Gila chub at least annually. For All Fish Species Conservation Recommendations (page 109): 1. We recommend that BLM coordinate with AZGFD and FWS in efforts to work with private landowners upstream of known locations to eradicate any source populations of non-native aquatic species from their lands. 2. We recommend that BLM collect flow data to apply for instream flow rights with the Arizona Department of Water Resources in occupied fish sites, if such rights have not been previously obtained. 5. We recommend that the BLM keep accurate records as to the successes and complications encountered with stocking efforts. These records will assist others in future stocking efforts. 6. We recommend that the BLM work with FWS on developing, if necessary, and implementing the recovery plan for each fish, and assist in establishing additional populations. 7. We recommend that the BLM coordinate with other land managers and landowners to develop cooperative projects to improve watershed conditions. 8. We recommend that the BLM coordinate with FWS on identifying locations that apparently no longer support a species, and provide any recommendations on habitat suitability and extant/extirpated population status.	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing	A Proper Functioning Condition assessment was conducted in April 2012 with the help of the National Riparian Service Team. Impacts from grazing were limited in scope but did occur in some reaches. The trespass grazing on the SPRNCA is being addressed though improvements in fencing and monitoring by staff. However, complete exclusion of livestock is elusive due to the approximately 200 miles of perimeter fencing that borders the SPRNCA. Reintroduced populations of Gila topminnow and desert pupfish are monitored at sites on the SPRNCA.	RMP
Desert pupfish and Gila topminnow (*Cyprinodon m. macularius and Poeciliopsis o. occidentalis*) 1. The BLM will conduct habitat restoration activities for Gila topminnow and desert pupfish and continue to augment existing populations. 2. The BLM will ensure the timely repair and maintenance of structures required to maintain aquatic ecosystem function for Gila topminnow and desert pupfish. 3. The BLM will notify the FWS and AZGFD by telephone or e-mail upon detection of more than 20 dead or dying fish of any species. This will be a clear indicator something is wrong and does not require specialized biological knowledge, as opposed to the skills needed to identify (specifically) Gila topminnow or desert pupfish.	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing	On the SPRNCA, we have restored the wetland function of Little Joe Spring which is now ready for the release of desert pupfish and Gila topminnow by AZGFD in 2013. Concentrations of dead or dying fish have been noted on the San Pedro	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
4. The BLM will cooperate with the FWS and AZGFD to identify other project-level measures to protect populations of pupfish and topminnow from grazing program impacts as specific impacts are identified.				River. The Fishery Biologist has conducted water quality analysis at the time of the detection, and low oxygen levels due to aquatic plant growth, increased water temperatures, and decreased water quantity has been identified as the cause. Ponds with Gila topminnow and desert pupfish in the SPRNCA are protected from livestock with steel pipe fences.	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
IV. Loach minnow and spikedace (*Tiaroga cobitis and Meda fulgid*a) 1. The BLM will cooperate with the FWS and the AZGFD to identify site-specific measures to protect loach minnow and spikedace populations from effects of the grazing program as specific effects are identified.	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing	Tucson Field Office only has a limited area with some potential for these species in the Dudleyville reach of the San Pedro River.	RMP
V. Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*) 1. The BLM will install and maintain range improvements to keep unauthorized livestock use out of the SPRNCA. 2.The BLM will work with private landowners in the Brunchow Hill allotment to exclude livestock from BLM-administered lands in that allotment within the riparian zone of the SPRNCA. 3. The BLM will continue to work with Natural Resource Conservation Service, FWS, and landowners in the allotments to develop and implement watershed improvement projects that will increase infiltration. <u>Conservation Recommendations</u> 1. We recommend that the BLM participate in the development of the recovery plan for this species. 2. We recommend that the BLM evaluate habitats along the Babocomari River, in the Babocomari Allotment, for umbel habitat, and coordinate with the permittee, the private land owner within the allotment, and FWS on actions to enhance the habitat. 4. We recommend that the BLM work with FWS and the Tucson Sector of the U.S. Border Patrol on plans to reduce the impact of illegal activities and associated law enforcement response along the SPRNCA. 5. We recommend that the BLM continue to work with the Upper San Pedro River Partnership to develop and implement projects that help bring the water budget for the subwatershed into balance.	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Jaguar and Ocelot (*Panthera onca* and *Leopardus pardalis*) 1. The BLM will work with Wildlife Services, the AGFD, and the FWS as necessary with regard to minimizing the potential for effects to jaguars and ocelots related to predator control on BLM lands. 2. The BLM will inform any entity associated with the livestock grazing program to not subject jaguars or ocelots to any predator control activities. 3. The BLM will continue, at least annually, to inform permittees with allotments within the range of the jaguar or ocelot, as appropriate, of the potential occurrence of jaguars or ocelots in their allotments, the status of the jaguar and ocelot, and that take of jaguar or ocelot, including harm and harassment, is prohibited under the Act and could result in prosecution. 4. The BLM will maintain dense, low vegetation (mesquite, cottonwood, willow, etc.) in major riparian or xero-riparian corridors on BLM-administered lands within the jaguar and ocelot ranges to the extent possible under the BLM's grazing program. 5.The BLM will continue to implement grazing actions that improve conditions of riparian areas. 6. The BLM will appropriately report any observations of jaguars or ocelots. The BLM, FWS, and AZGFD will share information concerning general jaguar and ocelot locations andmovement so that appropriate grazing related notifications and actions can be taken to protect against adverse effects.	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing	No predator control on BLM lands has been authorized. BLM informed lessees about jaguar in the 2013 grazing bills. Dense, low vegetation is maintained in major riparian or xero-riparian corridors under the grazing program. Impacts to native riparian vegetation is avoided through BLM's policies (*BLM Arizona Standards and Guidelines*, Upland Livestock Utilization Standard, Safford Drought Policy, Arizona Ephemeral Policy, and Riparian Area Policy) in order to result in long-term upward trends in all allotments. Trespass cattle continue to impact riparian vegetation (both native and exotic within areas of the SPRNCA, particularly in the northern area of the NCA.	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
VIII. Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) 1. The BLM will ensure that grazing related actions do not directly or indirectly affect day roost sites on BLM land as they are identified. The BLM will ensure that grazing program actions such as road construction and maintenance do not facilitate public access to known lesser long-nosed bat roosts. 2. The BLM will support surveys for lesser long-nosed bats to facilitate better management of lesser long-nosed bats and their habitat. Within the foraging range of lesser long-nosed bats, the BLM will consider the bat's forage base in any allotment evaluation, and, if necessary, modify grazing actions appropriately to reduce adverse effects. 3. The BLM will conduct, prior to construction of range improvement projects, pre-construction surveys for paniculate agaves and saguaros that may be directly affected by construction activities, or in the case of new water sources, may occur within 0.5 mi of the proposed water source. If agaves or saguaros are found during pre-construction surveys, the following measures shall be implemented: a. Locate fences, pipelines, waters, and other range improvement projects to reduce as much as possible injury and mortality of agaves and saguaros. b. Limit disturbance to the smallest area practicable and locate projects in previously disturbed areas whenever possible. c. Limit vehicle use to existing routes and areas of disturbance except as necessary to access or define boundaries for new areas of construction or operation. d. Limit all workers' activities and vehicles to designated areas. 4. The BLM will not seed/plant non-native plants on any allotments in which paniculate agaves or saguaros occur.	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing	No range improvement projects or road construction and maintenance have been authorized near roost sites. Bat surveys on SPRNCA occurred during 2007-2008 by Bat Research and Consulting, and included inventory of 44 mines in the Charleston area. Previously, Duncan (1989) identified 11 bat species of the 24 that may occur within SPRNCA or within the upper San Pedro River Valley. No range improvement projects have occurred on the SPRNCA, except for fencelines. No seeding or planting of non-native plants has occurred within SPRNCA where paniculate agaves occur.	RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
IX. Chiricahua leopard frog (*Lithobates chiricahuensis*) 1. Coordinate with FWS and AZGFD in removing non-native aquatic species from livestock ponds that, through surveys, are found to be occupied by Chiricahua leopard frogs.	22410-2006-F-04014	Biological Opinion on the Gila District Grazing Program	Ongoing	There are no livestock ponds on SPRNCA. Non-native crayfish and bullfrogs widely occur in the San Pedro River within SPRNCA.	RMP
Conservation Measures for Site Access and Fueling/Equipment Maintenance For treatments occurring in watersheds with TEP species or designated or undesignated critical habitat (i.e., unoccupied habitat critical to species recovery): • Where feasible, access work site only on existing roads, and limit all travel on roads when damage to the road surface will result or is occurring. • Where TEP aquatic species occur, consider ground-disturbing activities on a case by case basis, and implement SOPs to ensure minimal erosion or impact to the aquatic habitat. • Within riparian areas, do not use vehicle equipment off of established roads. • Outside of riparian areas, allow driving off of established roads only on slopes of 20% or less. • Except in emergencies, land helicopters outside of riparian areas. • Within 150 ft. of wetlands or riparian areas, do not fuel/refuel equipment, store fuel, or perform equipment maintenance (locate all fueling and fuel storage areas, as well as service landings outside of protected riparian areas). • Prior to helicopter fueling operations prepare a transportation, storage, and emergency spill plan and obtain the appropriate approvals; for other heavy equipment fueling operations use a slip-tank not greater than 250 gallons; Prepare spill containment and cleanup provisions for maintenance operations. • Do not conduct biomass removal (harvest) activities that will alter the timing, magnitude, duration, and spatial distribution of peak, high, and low flows outside the range of natural variability.		Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS, Biological Assessment	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Numerous conservation measures were developed from information provided in ERAs. The measures listed below would apply to TEP fish and other aquatic species at the programmatic level in all 17 western states. However, local BLM field offices could use interactive spreadsheets and other information contained in the ERAs to develop more site-specific conservation measures and management plans based on local conditions (soil type, rainfall, vegetation type, and herbicide treatment method). It is possible that conservation measures would be less restrictive than those listed below if local site conditions were evaluated using the ERAs when developing project-level conservation measures.		Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS, Biological Assessment	Ongoing		RMP
Conservation Measures Related to Prescribed Fire Within riparian areas, in watersheds with TEP species or their habitats: • Conduct prescribed burning only when long-term maintenance of the riparian area is the primary objective, and where low intensity fires can be maintained. • Do not construct black lines, except by non-mechanized methods. • Utilize/create only the following firelines: natural barriers; hand-built lines parallel to the stream channel and outside of buffer zones established at the local level; or hand built lines perpendicular to the stream channel with waterbars and the same distance requirement. • Do not ignite fires using aerial methods. • In forested riparian areas, keep fires to low severity levels to ensure that excessive vegetation removal does not occur. • Do not camp, unless allowed by local consultation. • Have a fisheries biologist determine whether pumping activity can occur in streams with TEP species. • During water drafting/pumping, maintain a continuous surface flow of the stream that does not alter original wetted stream width. • Do not alter dams or channels in order to pump in streams occupied by TEP species. • Do not allow helicopter dipping from waters occupied by TEP species, except in lakes outside of the spawning period. • Consult with a local fisheries biologist prior to helicopter dipping in order to avoid entrainment and harassment of TEP species.		Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS, Biological Assessment	Ongoing		RMP
Conservation Measures Related to Mechanical Treatments Note: these measures apply only to treatments occurring in watersheds that support TEP species or in unoccupied habitat critical to species recovery (including but not limited to critical habitat, as designated by USFWS). Outside riparian areas in watersheds with TEP species or designated or undesignated critical habitat (i.e., unoccupied habitat critical to species recovery): • Conduct soil-disturbing treatments only on slopes of 20% or less, where feasible. • Do not conduct log hauling activities on native surface roads prone to erosion, where feasible.		Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS, Biological Assessment	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Within riparian areas in these watersheds, more protective measures will be required to avoid negatively affecting TEP species or their habitat: • Do not use vehicles or heavy equipment, except when crossing at established crossings. • Do not remove large woody debris or snags during mechanical treatment activities. • Do not conduct ground disturbing activities (e.g., disking, drilling, chaining, and plowing). • Ensure that all mowing follows guidance to avoid negative effects to streambanks and riparian vegetation and major effects to streamside shade. • Do not use equipment in perennial channels or in intermittent channels with water, except at crossings that already exist. • Leave suitable quantities (to be determined at the local level) of excess vegetation and slash on site. • Do not apply fertilizers or seed mixtures that contain chemicals by aerial methods. • Do not apply fertilizer within 25 ft. of streams and supersaturated soils; apply fertilizer following labeling instructions. • Do not apply fertilizer in desert habitats. • Do not completely remove trees and shrubs.					
Conservation Measures Related to Biological Control Treatments using Livestock For treatments occurring in watersheds that support TEP species or in critical habitat: • Where terrain permits, locate stock handling facilities, camp facilities, and improvements at least 300 ft. from lakes, streams, and springs. • Educate stock handlers about at-risk fish species and how to minimize negative effects to the species and their associated habitat. • Employ appropriate dispersion techniques to range management, including judicial placement of saltblocks, troughs, and fencing, to prevent damage to riparian areas but increase weed control. • Equip each watering trough with a float valve. Within riparian areas of these watersheds, more protective measures are required. • Do not conduct weed treatments involving domestic animals, except where it is determined that these treatments will not damage the riparian system, or will provide long-term benefits to riparian and adjacent aquatic habitats. • Do not locate troughs, storage tanks, or guzzlers near streams with TEP species, unless their placement will enhance weed-control effectiveness without damaging the riparian system.		Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS, Biological Assessment	Ongoing		RMP

3.1.12 Fire

Table 3.1-10 discusses fire management.

Table 3.1-10. Fire Management

Current Management Decision	**Planning Decision Number**	**Decision Source**	**Decision Status**	**Decision Status Comments**	**RMP or Implementation decisions**
Use prescribed fire to maintain wildlife habitat diversity and to reduce hazardous build-up of fuels.		*San Pedro River Riparian Management Plan*- Preferred Alternative, Vegetation, Planned Actions (page 22)	Ongoing	Some prescribed fire has been used to maintain wildlife habitat diversity and reduce build-up of fuels. In addition, fuel breaks have been designed and created in some areas to prevent possible spread of wildfire.	
Fire management policy within the Safford District will be in accordance with Departmental Manual 910 and Bureau Manuals 9200 and 8560. Essentially, the policy states that every wildland fire is either a wildfire or a prescribed burn and that all wildfires will be suppressed unless a pre-approved prescribed burn plan exists and the fire meets all the prescription criteria.		Safford District RMP-Management Guidance Common to All Alternatives (page 18)	Ongoing	Human caused fires need to be suppressed. atural cause can manage for multiple resource objectives. Refer to the 2013 FMP.	
Any wildfire escaping initial attack suppression efforts will be dealt with through the Escaped Fire Situation Analysis process to determine further suppression actions. Wildfires occurring within designated wilderness areas will be handled in accordance with Bureau Wilderness Management Policy (BLM Manual 8560). Suppression actions in the wilderness must be executed to minimize surface disturbance, alterations to the natural landscape and fire suppression costs while being consistent with management objectives and constraints. Fire management methods and equipment which alter the landscape or disturb the land are considered to be the best.		Safford District RMP-Management Guidance Common to All Alternatives (page 18)	Ongoing	Refer to the 2013 FMP.	
The *Safford District Fire Management Activity Plan* (BLM 1989) sets direction for management of wild and prescribed fire. Wildfires will be put out. Prescribed fire (either a natural start or a planned ignition) will be used to accomplish resource management objectives. Prescribed fire will be used only with a "pre-approved" burning plan.		Safford District RMP-Vegetation (page 24)		Refer to the 2013 FMP.	
	BLM Handbook H 1741-5	Prescribed Fire Handbook			

3.1.13 Cultural and Heritage Resources

Table 3.1-11 discusses cultural and heritage resources.

Table 3.1-11. Cultural and Heritage Resources

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
Allocate each site to one or more of the following use categories: scientific use; management use, public use; socio-cultural use; and conservation for future use.		SPRNCA Riparian Mgmt. plan page 25	Incomplete	Many sites still need evaluation; although a small number of higher public visibility sites have been designated into use categories	
Nominate eligible properties to the National Register of Historic Places		SPRNCA Riparian Mgmt. plan page 25	Incomplete / Ongoing	Many sites still need evaluation; although half of all sites have not received official NRHP designation.	
Manage sites to realize their allocated use while protecting the site's other cultural values from impact		SPRNCA Riparian	Not implemented / Incomplete		
Complete a Class III field inventory of entire EIS area and record all cultural resource sites.		SPRNCA Riparia	Incomplete	Funding issues; while portions of the SPRNCA area have completed Class III field inventories many gaps remain	
Maximize site management through the development of cooperative agreements and use of volunteers.		SPRNCA Riparian	Ongoing	Working with site steward groups; university groups and friends groups	
Promote and fund scientific studies when appropriate to fulfill regional research objectives		SPRNCA Riparian	Incomplete / Unknown	Limited work with CRM non profit groups provided data recovery work on BLM Lands; regional research objectives unclear or unknown	
Allocate specific archaeological sites to scientific use and manage these sites to preserve scientific values		SPRNCA Riparian	Ongoing	Scientific testing has occurred on a limited number of sites within	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
				SPRNCA; however , goals to gain scientific knowledge have been more research driven	
Manage a small number of sites for public values; promote interpretation of cultural resources to educate the public on the area's history as well as the value of cultural resources.		SPRNCA Riparian	Implemented / Ongoing	Takes place on a small number of highly public used sites	
Allocate specific sites for public use		SPRNCA Riparian	Implemented / Ongoing	Takes place on a small number of highly public used sites	
Complete stabilization/restoration work at specific sites to preserve cultural values important to the public		SPRNCA Riparian	Ongoing / Completed	Some sites have received highly focused stabilization efforts while other sites have not	
Provide support in the planning, designing and development of interpretive sites along with creation of interpretative display items.		SPRNCA Riparian	Ongoing	Many high public use sites have interpretative displays; signage etc. regular public tours	
Achieve cultural resource management objectives in development plans, designs, development actions and operations.		SPRNCA Riparian	Incomplete / Not implemented	No comprehensive or site specific CRMPs have been developed.	
Manage a number of sites primarily for conservation (to protect and preserve representative samples of sites)		SPRNCA Riparian	Unknown		
Protect sites potentially eligible for allocation to conservation for future use to preserve their scientific and cultural values.		SPRNCA Riparian	Incomplete / Unknown		
Allocate a representative sample of sites in each "historic" context for future use.		SPRNCA Riparian	Not implemented		
Evaluate and release sites if needed, from conservation for future use if they meet the required conditions		SPRNCA Riparian	Not implemented		
Cultural resources located on public land within the Safford District will be managed for the broad objectives of information potential, public values and conservation.	CL01	*Safford RMP*	Ongoing		Imp.
Prioritize implementation of cultural resource management actions into five categories. RMP pages 41 & 42. 1. First priority will be given to planned actions protecting threatened and significant cultural resources that would otherwise be lost.	CL02	*Safford RMP*	Limited implementation on the SPRNCA; ongoing.		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
2. Second priority will be given to the preparation of management plans directing how the district manages its cultural resources. 3. Third priority will be given in cases where there is good reason to believe that cultural resources are being adversely affected even though they are not located in any area of proposed activity. 4. Fourth priority will be given to collecting cultural resource field data for planning purposes and for resource utilization not part of any protection or mitigation measure. 5. Fifth priority will be given to non-field studies designed to collect data for management or scientific purposes and for nominating properties to the National Register of Historic Places (NRHP).					
Use administrative and physical measures such as signing, withdrawal, access barriers, patrols, fire control, stabilization, detailed recordings and public education to protect cultural resource values.	CL03	*Safford RMP*	Ongoing		
Promote the development of a rigorous predictive model for the occurrence of cultural resources.	CL06	*Safford RMP* page 44	Not implemented	Funding issues	
Provide maximum protection to the National Historic Landmark sites (NHL) as well as all designated National Register of Historic Places (NRHP) sites;		*Safford RMP*	Ongoing		
In accordance with law and policy, require cultural resources clearances and mitigations on all projects involving surface-disturbing activities prior to development or construction.		*Safford RMP*	Ongoing		
Complete a cultural resource inventory and map depicting site densities and archaeological values within the planning area. The map will be used as a planning tool to identify avoidance areas and gauge potential impacts to cultural resources before projects are proposed which may affect cultural resources.		*Safford RMP*	Incomplete/ Not implemented	Limited portions of the SPRNCA area have received Class III inventory and mapping	

3.1.14 Paleontological Resources

Table 3.1-12 discusses paleontological resources.

Table 3.1-12. Paleontological Resources

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
Manage all paleontological sites to preserve their scientific values and potential public use values.		*San Pedro River Riparian Management Plan* p. 6	Ongoing.		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
Objective: Preserve and enhance the scientific and potential public use values of paleontological resources to increase the knowledge of the San Pedro EIS area's natural history. Planned Actions: Inventory any future land acquisitions for paleontological resources. Check known sites periodically (every 3-5 years) and collect exposed fossils. Check high potential areas periodically. Promote the excavation and collection of the Diack site, Horsethief Draw Mammoth site, and Horsethief No. 2 site. Promote new paleontological research. Fund new paleontological research when appropriate to meet top priority management objectives. Protect significant paleontological resources by controlling other resources and land uses through avoidance, mitigation, and other measures. Collect significant fossils threatened by natural and human disturbance.		*San Pedro River Riparian Management Plan* p.26	Ongoing.		RMP
Paleontological collection permits from the Safford District will be required for scientific studies on public lands on the District.	**VI-C**	*Safford RPM* page 26.	Ongoing.		RMP
Preserve a representative sample of Class I (see appendix 12) paleontological localities.	**I**	*Safford RMP* page 47.	Ongoing.		RMP
Ensure that BLM actions avoid inadvertent damage to paleontological resources.	**I**	*Safford RMP* page 47.	Ongoing.		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
Manage paleontological resources to preserve their scientific and interpretative values.	**I**	*Safford RMP* page 47. Partial ROD I page 11.	Ongoing.		RMP
Emphasize management of Class I sites.	**I**	*Safford RMP* page 47.	Incomplete	PFYC have been prepared.	RMP
Provide opportunities for education and interpretation.	**VI-C**	*Safford RMP* page 47.	Ongoing.		RMP
Provide opportunities for scientific research.	**VI-C**	*Safford RMP* page 47.	Ongoing.		RMP
Continue inventories in areas of proposed activities to identify the presence of paleontological resources and determine measures to mitigate anticipated impacts.	**VI-A**	*Safford RMP* page 47.	Incomplete.		RMP
Prepare a Paleontological Resources management Plan for the District.	**VI-B**	*Safford RMP* page 47. Partial ROD I page 11.	Not implemented.		RMP
Write a detailed overview of the biological and geologic history of the District emphasizing paleontological resources important to scientific research. RMP page 47. Partial ROD I page 11. **VI-C**	**VI-C**	*Safford RMP* page 47. Partial ROD I page 11.	Not implemented.		RMP

3.1.15 Visual Resources

Table 3.1-13 discusses visual resources.

Table 3.1-13. Visual Resources

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
Objective: Manage the EIS area's visual resources to preserve the outstanding scenery and to enhance areas impaired by human disturbance. Planned actions: Designate the visual resources of the subject lands into the following Visual Resource Management classes: Class I: 2,060 acres Class II: 8,311 acres Class III: 11,926 acres Class IV: 25,371 acres Preservation oriented management will occur in the Class I areas (the proposed RNAs) and Class II areas (most of the scenic valley bottom along the San Pedro River). Enhancement actions will take place in those areas previously impacted by human disturbance.		*San Pedro River Riparian Management Plan* p. 26			

3.1.16 Lands with Wilderness Characteristics

The potential for wilderness in the SPRNCA was considered but not included in the *Riparian Management Plan* (1989). An inventory applied the size criterion (greater than 5,000 roadless acres and found two eligible regions. One (the Boquillas unit) is in the west central portion of the EIS area and the other is in the southwestern portion of the EIS area (the West del Valle unit).

The Boquillas unit did not meet the naturalness criterion. The unit contained boundary and interior roads and ways, railroad tracks, powerlines, old railroad grades and bridge abutments, ruins of a farming settlement and its fields, ruins of the town of Charleston, and livestock facilities. The Boquillas unit also lacked outstanding opportunities for solitude and primitive recreation because of boundary roads and vehicles on them, an extensive network of interior roads and ways, the railroad lines and the other evidence of human activities.

The West del Valle unit is mostly natural in appearance has few visible human impacts, and meets the criterion for naturalness. The unit lacked outstanding opportunities for solitude and primitive recreation because of boundary roads and vehicles on them, the long and thin alignment of the unit, the lack of topographic relief and the lack of vegetative screening.

Since these two units failed to meet some of the requirements for wilderness, they were not carried forward and were not an issue in the Final Environmental Impact Statement.

3.2 Resource Uses

3.2.1 Energy and Minerals

Table 3.2-1 discusses energy and minerals.

Table 3.2-1. Energy and Minerals

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
Negotiated contract sale (AZA025590) at one location near the river will continue until the lease period expires.		*San Pedro River Riparian Management Plan* (Page 3)	Expired		
Withdraw the San Pedro River property from mineral entry and mineral leasing laws.		*San Pedro River Riparian Management Plan* (Page 6)	Completed		The withdrawal of SPRNCA lands from mineral entry is mandated by law and is not subject to a BLM decision.
Management Concern 4 – Energy and Minerals Sale of mineral materials (sand, gravel, etc) will not be permitted in areas with riparian vegetation.		Safford District RMP-Management Alternative A (page 40)	Completed		RMP

3.2.2 Lands and Realty

Table 3.2-2 discusses lands and realty.

Table 3.2-2. Lands and Realty

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
Maintain and use existing rights-of-way, subject to stipulations that will protect resource values.		*San Pedro River Riparian Management Plan* (Page 5)	Ongoing		
Obtain additional lands within the San Pedro River Boundaries by mutual agreement via exchange or purchase to block up the land ownership pattern or for riparian values. Obtain adjacent lands outside the boundaries for the protection and enhancement of the resource values found inside the EIS area.		*San Pedro River Riparian Management Plan* (Page 5)	Ongoing	6 Exchanges completed 21 Acquisitions completed 2504.441 Acres 17 Parcels remaining (Approximately 1289 Acres)	
Establish protective withdrawals for administrative and interpretive facilities as necessary for management of the EIS area.		*San Pedro River Riparian Management Plan* (Page 5)	Ongoing	1 Designated (Hereford House) 1 acre 1 Power Site Withdrawal 1 Reclamation Withdrawal (Charleston Dam & Reservoir) 850.49 acres	
Retain existing roads in the area for public and/or administrative use or close and rehabilitate them, depending on the alternatives.		*San Pedro River Riparian Management Plan* (Page 5)	Ongoing	11 Road Rights-of-Way 1 Pending	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
• Provide for future rights-of-way across the EIS area and for other lands actions compatible with the subject lands. • Restrict rights-of-way and other uses to areas where they would not significantly impact resources. • Allow maintenance on existing rights-of-way, subject to protection of resource values • Designate a right-of-way corridor at Charleston. The northern boundary will be no farther north than the existing northern right-of-way and the southern boundary will be 660 ft south (See Map 2-4). Issue land use authorizations on a case-by-case basis, minimizing disturbances and consistent with the management objectives of the EIS area.		*San Pedro River Riparian Management Plan* (Page 21 and 22)	Ongoing	11 Railroad Rights-of-Way 1 Border Fence Right-of-way 1 Remote Video Site Right-of-way 1 Well Site Right-of-way	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
Land Ownership Adjustment: • Lands identified for disposal by sale must comply with Section 203 of The Federal Land Policy and Management Act of 1976. • Arizona State Office IM guidance includes land disposal actions All public lands will be disposed of at fair market value, except for lands disposed of under the Recreation and Public Purposes Act or state indemnity selection. Disposals are subject to valid existing rights. It is Bureau policy not to dispose of public lands encumbered with properly recorded unpatented mining claims. These lands, however, may be disposed of if the mining claims are found to be void; a mining claimant relinquishes the mining claims to the United States; a mining claim is contested and found to be invalid; or policy is changed. State Indemnity Selection is another method of disposal of public lands. BLM may acquire lands and interests in lands needed to manage, protect, develop, maintain and use resources on public lands. Land may also be acquired to provide access for public use and enjoyment. Public lands are often repositioned under the exchange authority of Section 206 of the Federal Land Policy and Management Act of 1976. Exchanges are negotiated with the state, as well as with private landowners. Exchange is the preferred method of land disposal, as it provides an opportunity to acquire desired tracts of nonpublic land. Other methods are to purchase or condemnation of private lands. • Condemnation of lands by the government for acquisition under the authority of PL 91646 Uniform Relocation and Real Property Acquisition Policy Act of 1970 is the least preferred method.		Safford District RMP-Management Guidance Common to All Alternatives (page 21)	Completed Ongoing Ongoing Ongoing	No lands available for disposal. Arizona State Law was passed in 2012 allowing land exchanges with the federal government.	RMP
Land Use Authorizations		Safford District RMP-	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
ROW, leases, and permits will be considered on a case by case basis. Major rights-of-way, however, will be directed to designated corridors where possible. <u>Communication Sites</u> Communication Site ROW grants will be issued for newly designated communication sites. Where designated sites do no meet needs, additional new sites will be considered on a case by case basis.		Management Guidance Common to All Alternatives (page 22)	Ongoing		RMP
Management Concern 2 – Lands and Realty 2.The following are objectives for land acquisition: • Acquire lands with high public values that complement existing management programs. • Consolidate ownership patterns to improve management efficiency. • Improve service to the public. To accomplish these objectives, acquire State of Arizona and private land in the areas shown on Map 27 if they become available. These lands would have one or more of the following characteristics, generally within or adjacent to public lands shown on the map. a. riparian habitat. b. watersheds of important riparian areas. c. high value wildlife habitat, such as Threatened and Endangered species areas and major migration corridors. d. administrative sites. e. land for developed recreation sites. f. land providing access to public lands. g. significant cultural and paleontological properties. h. other lands with high public resource values such as inholdings in Area of Critical Environmental Concerns and other types of special management areas. i. other private lands that will accomplish BLM's acquisition objectives. Designate the following existing utility lines as corridors for future utility needs across the District. d. San Pedro River 1-mile wide (660 feet wide where it crosses SPRNCA).		Safford District RMP-Alternative A (Page 35-37)	Ongoing		RMP

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP level decision
• Any future major District utility ROW proposals will be encouraged to use these corridors.					

3.2.3 Livestock Grazing Management

Table 3.2-3 discusses livestock grazing management.

Table 3.2-3. Livestock Grazing Management

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
Activities occurring when BLM obtained the land consisted of livestock grazing, sand and gravel operations, rights-of-way and some unauthorized recreation uses. Neighboring lands have these same uses with the addition of rural residences and subdivisions. Southern Cochise County is one of the fastest growing areas of southeastern Arizona for this type of use. The Escapule subdivision and its residences (about 200 acres in sections 18 and 19, T. 21S., R. 22 E.) are located just north of the San Rafael del Vahe land grant, bordering the FEIS area. Military operations occur on the adjacent hands of Fort Huachuca.		*SPRNCA Riparian Management Plan* 1989			RMP
While BLM does not regard livestock grazing to be incompatible with the continued existence of the riparian ecosystem, a decision was made to prohibit livestock grazing for the 15-year life of this plan. At the end of that time livestock grazing in the EIS area will be re-evaluated.		SPRNCA River Management Plan 1989			RMP
Decisions concerning management of livestock on public lands in the Upper San Pedro River Watershed and management of the San Pedro Riparian National Conservation Area have been developed through the Eastern Arizona Grazing Environmental Impact Statement (BLM 1986) and *San Pedro River Riparian Management Plan* and Environmental Impact Statement (BLM 1989). Through the above authorizing documents, BLM will continue to issue grazing permits and licenses, implement, monitor and modify allotment management plans and increase or decrease grazing authorizations as determined through the allotment evaluation processes. As necessary, National Environmental Policy Act compliance documents will be prepared prior to any action being implemented. The		Safford District Resource Management Plan FEIS (1991) p. 17	Ongoing. Grazing is limited to the four allotments where it is allowed under the land exchange.		RMP

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
grazing decisions are incorporated into this Resource Management Plan/Environmental Impact Statem by reference and are common to all alternatives.					
From 1986 to 1988, BLM acquired 47,668 acres along the upper San Pedro River between the Mexican border and St. David. In 1987, BLM began preparing the *San Pedro River Riparian Management Plan* (BLM 1989) to protect and enhance the significant natural and cultural resources of the property. The plan was completed in 1989. In 1988, during preparation of the plan, Congress designated 54,189 acres of public land as the San Pedro Riparian National Conservation Area. The additional 6,521 acres were acquired from the State of Arizona by exchange and are subject to existing livestock grazing leases. Since this designation came in the middle of the planning process, BLM decided to complete its plan for management of the 47,668 acres and address the remaining 6,521 acres of the National Conservation Area in this Resource Management Plan. The *San Pedro River Riparian Management Plan* provides management direction for the riparian corridor and the adjacent uplands in the National Conservation Area. Generally, the plan provides a framework for protection of the National Conservation Area, allowing those uses that are compatible with preservation of the National Conservation Area. Energy and mineral uses are not permitted, nor are sand and gravel operations. According to the San Pedro Plan, livestock grazing has been prohibited for the life of the plan on the original acreage. Dispersed and developed recreation is being carefully planned to avoid impacts to the abundant natural, cultural and paleontological (fossil) resources. Vehicles will be restricted to designated roads. Discharge of firearms is being restricted to ensure visitor safety. Many actions will be implemented to maintain and enhance the quality and quantity of the water, riparian vegetation, wildlife, cultural resources and paleontological resources. Administrative and visitor contact facilities are also planned. The decisions of the San Pedro River Riparian Management Plan will apply to the 6,521 acres of the		Safford District RMP-Riparian Areas (page 20-21)	Not complete. Leases for the four allotments have never been completed, only extended. Not all four of the allotments have management plans.		RMP

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
National Conservation Area not covered in the plan, with the following exceptions. 1. Livestock grazing will continue on the added 6,521acre area in accordance with the State exchange agreements. This area includes state lands acquired through exchange; state grazing leases will be recognized for the term of these leases. 2. Allotment categorization will be changed from "Maintain" to "Improve" to intensively manage livestock on all allotments in the 6,521 -acre area. 3. Allotment management plans will be prepared for all allotments in the 6,521 -acre area to provide for continued livestock grazing and protection of the riparian values of the National Conservation Area.					

3.2.4 Recreation

Table 3.2-4 discusses recreation.

Table 3.2-4. Recreation

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Designate the entire EIS as a Special Recreation Management Area.		*San Pedro River Riparian Management Plan* & EIS (SPRRMP&EIS) p.14	Complete	New BLM 8320 policy will require reassessment of SRMA classification(s).	RMP
Prepare project plans for all proposed facilities.		(SPRRMP&EIS) p.14	Ongoing	Project plans are included and evaluated within NEPA process.	IMP
Apply the Limits of Acceptable Change (LAC) planning system.		(SPRRMP&EIS) p.14	Ongoing		IMP

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
Make the San Pedro River available for recreation research.		(SPRRMP&EIS) p.14	Ongoing	Several studies have been conducted investigating visitor satisfaction, and regional expenditures.	IMP
Allow commercial uses only if compatible with the management of San Pedro River.		(SPRRMP&EIS) p.14	Ongoing	Plans of Operation are included and evaluated within NEPA process.	IMP
Develop a small parking area on the north end of the EIS area.		(SPRRMP&EIS) p.14	Complete. Monitoring of the facilities are ongoing.	St. David Cienega / Land Corral.	IMP
Designate the entire EIS area under the OHV management regulations as "Limited to Designated Roads".		(SPRRMP&EIS) p.14 Federal Register Vol. 54, No. 168, August 31, 1989: Off-road Vehicle Designation, Livestock Grazing Notice, and Establishment of Supplemental Rules for the SPRNCA, AZ.	Complete, however roads have never been designated within SPRNCA for public use.	Signed at every access point and portal. Off-road vehicle (OHV's) travel has been prohibited. A Travel Management Plan will be drafted for inclusion in the SPRNCA RMP.	IMP / RMP
Allow public vehicle and mountain bike use on the designated roads.		(SPRRMP&EIS) p.14	Ongoing	Public vehicle use is largely limited to trailhead parking areas, or by special permission.	IMP
Close all public lands in that portion of the EIS area between Charleston Road and the Hereford area, and all public lands within 1/4 mile of developed facilities to the discharge of firearms at any time during the year.		(SPRRMP&EIS) pp.14, 21 Federal Register Vol. 54, No. 168, August 31, 1989	Complete	Signed at every access point and portal. Successful compliance subject to regular patrol by law enforcement EIS-wide.	IMP / RMP?

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
The discharge of firearms in the remainder of the EIS area will be allowed only for the purpose of regulated hunting as authorized by the laws of the State of Arizona, but only during the period of September 1 through March 31.		(SPRRMP&EIS) pp.14, 21 Federal Register Vol. 54, No. 168, August 31, 1989	Complete	Signed at every access point and portal. Successful compliance subject to regular patrol by law enforcement EIS-wide.	IMP / RMP
Allow the use of archery equipment anywhere in the EIS area, except within 1/4 mile of developed facilities, only for the purpose of regulated hunting as authorized by the laws of the State of Arizona.		(SPRRMP&EIS) p.21 Federal Register Vol. 54, No. 168, August 31, 1989	Complete	Signed at every access point and portal. Successful compliance subject to regular patrol by law enforcement EIS-wide.	IMP / RMP
Limit the length of stay [at campgrounds] to seven days.		(SPRRMP&EIS) p.21 Federal Register Vol. 54, No. 168, August 31, 1989	Complete. Monitoring of the rule is on the honor system.	Signed at every access point and portal. Only one campground has been developed: Miller Backcountry Campground. All other camping is dispersed.	IMP / RMP
Allow dispersed recreation.		(SPRRMP&EIS) p.21	Ongoing	Signed at every access point and portal. Dispersed overnight camping is currently not permitted in the SPRNCA south of AZ Highway 92.	IMP
Restrict campfires to designated locations		(SPRRMP&EIS) p.21 Federal Register Vol. 54, No. 168, August 31, 1989	Complete. Monitoring of the facilities are ongoing.	Signed at every access point and portal. Designated locations are at Miller Backcountry Campground and Fairbank Historic Townsite.	IMP

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
Allow overnight use by permit only.		(SPRRMP&EIS) p.21 Federal Register Vol. 54, No. 168, August 31, 1989	Incomplete	Only four of ten trailhead / parking areas have permits & fee tubes--none of which are currently acceptable by BLM standards.	IMP
Require pets to be leashed in posted areas.		(SPRRMP&EIS) p.21 Federal Register Vol. 54, No. 168, August 31, 1989	Complete. Monitoring of the rule is ongoing.	Signed at every access point and portal.	IMP
Develop 30 - 50 unit campground at AZ Highway 90 – the San Pedro House area.		(SPRRMP&EIS) p.21	Not Implemented		IMP
Develop large visitor contact & interpretive facility at AZ Highway 90 – the San Pedro House area.		(SPRRMP&EIS) p.21	Complete. Monitoring of the facilities are ongoing.	A trailhead / parking area was developed with interpretive and regulatory information and location map.	IMP
Develop interpretive displays & interpretive trail to the river in the San Pedro House area. Also provide the facility as the headquarters of the Friends of the San Pedro River.		(SPRRMP&EIS) p.21	Complete. Monitoring of the facilities are ongoing.		IMP
Develop highway pullout at AZ Highway 90 – the San Pedro House area.		(SPRRMP&EIS) p.21	Complete. Monitoring of the facilities are ongoing.		IMP
Rebuild the San Rafael del Valle Road from AZ Highway 90 to Hereford (Road) for use as a motorized interpretive route, with the following: day-use only; gravel surface; 7 - 10 interpretive pullouts; up to 2 pullouts to small parking areas; 1 - 2 picnic sites; 1 - 2 overlooks with interpretive displays.		(SPRRMP&EIS) p.21	Not implemented		IMP

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
Develop 15 - 30 unit campground in the Hereford area, with the following: gravel access road; parking area with interpretive display & information station; a small picnic site.		(SPRRMP&EIS) p.21	Development of campground not implemented. Remainder has been completed. Monitoring of the facilities are ongoing.	A trailhead / parking area was developed with interpretive and regulatory information and location map.	IMP
Develop small visitor contact & interpretive facility at AZ Highway 82 in the Fairbank area, with the following: parking area and small picnic site.		(SPRRMP&EIS) p.21	Complete. Monitoring of the facilities are ongoing.	In this decision, the Fairbank Schoolhouse was stabilized and preserved, and serves as the visitor contact & interpretive facility. Monitoring of the facilities are ongoing.	IMP
Control access to the Presidio of Santa Cruz de Terrenate and build an interpretive trail through the site.		(SPRRMP&EIS) p.21	Complete. Monitoring of the facilities are ongoing.	Monitoring of the facilities are ongoing.	IMP
At the [Little] Boquillas Ranch, build an interpretive display for the ranch house and old railroad commissary building, and restrict use of the area.		(SPRRMP&EIS) p.21	Complete.	The interpretive display for the ranch house and adjacent area was constructed at the trailhead / parking area approximately four miles away at AZ Highway 82. Access to the site by the public is non-motorized.	IMP
Develop along the Babocomari River a trail adjacent to the river along the old railroad grade; a small parking area and trailhead near the river's mouth; and an interpretive site.		(SPRRMP&EIS) p.21	Complete.	Access to the Babocomari river is open, via the trailhead / parking area at the Fairbank Historic townsite.	IMP

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
Develop the Boquillas Road as a gravel road, closed to public use, between Fairbank and Charleston Road		(SPRRMP&EIS) p.21	Not completed.	The Boquillas Road is maintained to the ranch area, and not beyond. The area remains open to non-motorized public use.	IMP
Develop the Lewis Springs [area] and road, with the following: graded access road; parking areas; group picnic site; primitive camping area and interpretive displays.		(SPRRMP&EIS) p.21	Not implemented		IMP
Develop the following at Murray Springs: an interpretive display; and interpretive trail through the site; and a small graded access road to a small parking area.		(SPRRMP&EIS) p.21	Complete. Monitoring of the facilities are ongoing.		IMP
Develop the following at Lehner Ranch: an interpretive display; and interpretive trail through the site.		(SPRRMP&EIS) p.21	Incomplete	Project planning has proceeded. Final site and interpretive plans and NEPA submission has not been completed.	IMP
Develop the following in the Charleston [Millville Historic Townsite] area: a highway pullout with information and directions and interpretive signs; and interpretive trail to the ruins; and a small picnic site.		(SPRRMP&EIS) p.21	Complete. Monitoring of the facilities are ongoing.		IMP
Develop the following at Palominas: a highway pullout with information and directions and interpretive signs; a graded access road; and a small picnic site.		(SPRRMP&EIS) p.21	Complete. Monitoring of the facilities are ongoing.		IMP

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
Develop 2 to 3 dedicated outdoor environmental education field study areas of 5 to 10 acres each. Facilities will include shade shelters, tables, signs, and small parking areas. Restrict access to the use of these sites.		(SPRRMP&EIS) p.21	Complete.	From north to south, at 10 trailhead / parking areas in the SPRNCA, , 3 provide shade shelters, 5 provide tables, and all facilities provide interpretive and regulatory information, and location maps. From these locations the entire 56,000+ acres are available for environmental education field study.	IMP
Should the railroad corridor become abandoned [and/or] available, the BLM will develop the existing railroad corridor for recreational use; with the following: access/parking/corrals at Hereford, Highway 90, Charleston, Fairbank and the north end of the EIS area.		(SPRRMP&EIS) p.21	Incomplete.	The operators of the railroad filed for abandonment, and removed and sold the corridor's infrastructure from the north end of the SPRNCA to Naco and Bisbee. At the time, (2005 - 2007) local and national BLM, and local recreational groups, NGOs, and governments investigated the possible conversion of the corridor to a rail-trail, however, the entire corridor is now owned by Union Pacific. There are no plans for immediate reconstruction of the corridor as a viable railroad route.	IMP
Management of 86% of the San Pedro River's scenic corridor will be managed as VRM Class I & II ....most [other proposed developments] are in areas previously		(SPRRMP&EIS) p.61	Completed.	A new (2012-2013) visual resources inventory of the upper San Pedro	IMP

Current Management Decision	Planning Decision Number	Decision Source	Status	Status Description	Implementation or RMP level decision
disturbed...in lands classified as VRM Class III and IV.				River basin south of Pomerene and north of the U.S. - Mexico international border has been conducted.	

3.2.5 Transportation and Access

Table 3.2-5 discusses transportation and access.

Table 3.2-5. Transportation and Access

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
Through the Resource Management Plan, decisions will be made where legal access for vehicle, horse, and foot travel is needed across state, other federal, and private lands; where construction of roads or trails is needed to provide access to public lands; and where existing access needs to be closed to protect resource values. Upon completion of the Resource Management Plan these decisions will be incorporated into the District Transportation Plan. The plan will also address road and trail maintenance needs.	**II**	*Safford RMP* page 18.	In progress. A TMP for the SPRNCA is in progress. The decisions outlined by the *Safford RMP* have not been completed for the SPRNCA. A District Transportation Plan was not completed.		Implementation Level
Obtain public and administrative access to the public lands.	**II**	*Safford RMP* page 27.	Completed.		
Close roads as needed, to manage visitors, protect resources and meet objectives.	**II**	*Safford RMP* page 27.	Completed.		
Obtain legal access, for public and/or administrative use, across private lands in 39 locations Districtwide (see Appendix 1) and across other state and private lands as determined in the future.	**V**	*Safford RMP* page 27.	Completed.	BLM has access across Murray Springs Road with the State of Arizona. BLM has access to St. David Cienega Road across Cary Road but this is not through a formal agreement. BLM has an agreement with the County for Charleston Admin Road.	
Designate the entire EIS area under the OHV management regulations as "Limited to Designated Roads".		*San Pedro River Riparian Management Plan*	Completed.		

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	Implementation or RMP Level Decision
		p.14			
Develop a small parking area on the north end of the EIS area.		*San Pedro River Riparian Management Plan*	Completed.	A parking area was developed at Land Corral.	
Develop a planned managed trail system that will encourage use out of the riparian zone, maintain one trail in busy areas where there are currently several, and decrease the overall impacts to the area by visitors.		San Pedro Intermodal Transportatio n System EA	Completed.	The main part was the completion of the San Pedro Trail.	Implementation.

3.3 Special Designations

3.3.1 Special Management Areas

Table 3.3-1 discusses Special Management Areas.

Table 3.3-1. Special Management Areas

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Individual management plans will be written for each Area of Critical Environmental Concern designated through the approved Resource Management Plan. These management plans will identify the actions BLM will take to implement the specific management prescriptions. The complexity of the issues surrounding a particular Area of Critical Environmental Concern will determine the detail of the management plan.		Safford District RMP-Areas of Critical Environmenta l Concern and Other Types of Special Management (page 19)	Incomplete.	Management plans were not prepared for any of the three RNAs.	
The three Research Natural Areas Areas of Critical Environmental Concerns recommended in the *San Pedro River Riparian Management Plan and Environmental impact Statement* (BLM 1989) will be designated in this plan under all alternatives. Management plans will be prepared for each area following designation.		Safford District RMP-Areas of Critical Environmenta l Concern and Other Types of Special Management (page 19)	Ongoing	The three RNA of Critical Environmental Concern recommended in the *San Pedro River Riparian Management Plan* were designated in the Safford District RMP, and included San Rafael, San Pedro River, and St. David Cienega. However, management plans were not prepared for any of the three RNAs.	

3.3.2 Wild and Scenic River Suitability

Table 3.3-2 discusses wild and scenic river suitability.

Table 3.3-2. Wild and Scenic Rivers

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
As required by The Federal Land Po/icy and Management Act of 7976 and the subsequent Guidelines for Fulfilling Requirements of the Wild and Scenic Rivers Act, BLM must study those rivers which qualify as potential additions to the National Wild and Scenic Rivers System. The Wild and Scenic River study process involves making an eligibility, classification and suitability determination. This Resource Management Plan/ Environmental Impact Statement addresses only eligibility and classification as required by the Guidelines and will defer the suitability determination until a later date due to the need for further public involvement. Only through the detailed suitability assessment and further public involvement will BLM make a recommendation through the Secretary of Interior to Congress on suitable Wild and Scenic Rivers designations. Only Congress has the authority to designate a Wild and Scenic River through this process. Appendix 3 includes a discussion of the eligibility and classification criteria used to evaluate rivers in the Safford District. Those waterways which demonstrated individual outstandingly remarkable hydrologic values include the Gila and San Francisco Rivers within the Gila Box, the Gila River below Coolidge Dam, Aravaipa Creek, Turkey Creek, Swamp Springs, Hot Springs Canyon, Bonita Creek and the San Pedro River. All other areas have been determined ineligible under the criteria. The above rivers which have been determined eligible for consideration under the requirements of the Wild and Scenic Rivers Act will be afforded adequate interim protection until a final decision is reached on suitability for designation. Management activities and authorized uses will not be allowed to adversely affect the rivers' eligibility or future suitability. Subject to valid existing rights, outstandingly		Safford District RMP-Areas of Critical Environmenta l Concern and Other Types of Special Management (page 19)	Completed.	The portion of the San Pedro River that passes through SPRNCA was evaluated in the Arizona Statewide Wild and Scenic Rivers Legislative EIS, 1994, and determined to be suitable for inclusion under the "Recreational" classification.	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
remarkable values of the river must be protected and enhanced if possible.					
Based on requirements in the Wild and Scenic Rivers Act, and BLM policy, it was recommended that 2 segments totaling 44 miles of the San Pedro River be considered suitable for inclusion in the Wild and Scenic Rivers System. The classification recommended for the segments is Recreational.		Arizona Statewide Wild and Scenic Rivers Legislative EIS, 1994 (page 519-520)	Completed.		
In accordance with the Bureau of Land Management Wild and Scenic Manual (MS 8351, August 19, 1992) the following would occur in the implementation of the recommended alternative for the two Wild segments of the San Pedro River study area. Where the wild and scenic river management actions would overlap ongoing management actions, the more stringent would apply. • Water quality would be maintained or improved to meet state standards. • New hydroelectric power facilities would be prohibited. • Existing low dams, diversion works, riprap, and other minor structures would be permitted. • New waterway structures could be allowed. • Existing parallel roads would be maintained. • Motorized travel is permitted. • Interpretive centers, administrative headquarters, campgrounds, and picnic areas could be established. • Recreation use would be encouraged but public use and access may be regulated and distributed to protect and enhance recreational river values. • New minor structures for fish and wildlife habitat protection would be permitted. • New rights-of-was, transmission lines, natural gas lines, water lines would be discouraged. Where no reasonable alternate location exists, additional or new facilities would be restricted to existing rights-of-way. • Instream flow would be quantified. An assessment was developed in order to secure instream flows associated		Arizona Statewide Wild and Scenic Rivers Legislative EIS, 1994 (page 519-520)	Incomplete.	BLM is constantly working to improve water quality. Motorized travel is only permitted on administrative and designated routes. There are interpretive centers and picnic areas in proximity to the river. There is only one backcountry campsite established.	

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
with protecting the outstanding remarkable values. Ongoing management actions in the San Pedro River study area would continue regardless of wild and scenic river designation. [A list is given of selected management actions from the San Pedro River Riparian MP and the Safford District RMP.]					
44 miles of the San Pedro River were recommended as suitable for designation as components of the National Wild and Scenic Rivers System under the Recreational Classification by Congress through the W&SR Act. Management and protection considerations are addressed in Section 5 of the ROD.		Arizona Statewide Wild and Scenic Rivers Legislative EIS, 1996 Record of Deicsion	Complete		

3.4 Support

3.4.1 Interpretation and Environmental Education and Scientific Reserach

There are no current management directions for interpretation and environmental education. All management guidance related to this area are found in other resource areas such as cultural resources and recreation.

3.4.2 Scientific Research

Table 3.4-1 discusses scientific research.

Table 3.4-1. Scientific Research

Current Management Decision	Planning Decision Number	Decision Source	Decision Status	Decision Status Comments	RMP or Implementation decisions
Provide facilities for a variety of research in the EIS area.		*San Pedro River Riparian Management Plan-* Preferred Alternative, Research, Objective (page 27)	Completed.	Research facilities were provided for a number of years at Boquillas Ranch. Due to needed contaminant remediation, facilities are no longer provided.	
Develop an adequate facility at either Fairbank or the Highway 90 area for research in such fields as biology, hydrology, archaeology, paleontology, soils and botany.		*San Pedro River Riparian Management Plan-*	Outdated	Research facilities were provided for a number of years at Boquillas	

Current Management Decision	**Planning Decision Number**	**Decision Source**	**Decision Status**	**Decision Status Comments**	**RMP or Implementation decisions**
		Preferred Alternative, Research, Planned Actions (page 27)		Ranch (approximately 3 miles south of Fairbank). Due to needed contaminant remediation, facilities are no longer provided.	

3.5 Social and Economic Conditions

There are no existing management guidelines in the *Riparian Management Plan* (BLM 1989) or the *Safford RMP* (BLM 1992 and 1994) that directly address social and economic conditions.

4 Management Opportunities/Management Adequacy

This chapter describes resource management activities under current management that may, or may not, be meeting the goals specified in *Riparian Management Plan* and the *Safford RMP* (BLM 1992 and 1994). Therefore, these goals may be adjusted accordingly in the new RMP. This chapter also discusses management issues that have arisen since completion of these documents, which have created the need for new management objectives.

This chapter is divided into five sections: Resources, Resource Uses, Special Designations, Support, and Social and Economic Conditions.

Section 4.1, Resources: Describes the current management decisions, rationale, and options for change for the natural, biological, and cultural components that make up the SPRNCA. These resources include air, changing climate trends, soil, water, vegetation, special status species, fish and wildlife, wildland fire ecology management, cultural resources, paleontological resources, visual resources, and wilderness characteristics.

Section 4.2, Resource Uses: Describes the current management decisions, rationale, and options for change for activities that use the natural, biological, and cultural components of the SPRNCA. Resource uses include livestock grazing, recreation and visitor services, comprehensive trail and travel management, and lands and realty (including land use allocations, tenure adjustments, and ROWs).

Section 4.3, Special Designations: Describes management decisions, rationale, and options for change for special management areas and wild and scenic rivers within the SPRNCA.

Section 4.4, Support: Describes the current management decisions, rationale, and options for change for research, interpretation, and environmental education.

Section 4.5, Social and Economic Conditions: Describes management decisions, rationale, and options for change for the social and economic condition of the SPRNCA, including tribal interests, public safety, and socio-economic conditions.

4.1 Resources

4.1.1 Air Quality

Current Management

Current air quality management decisions dictate that the BLM must comply with state and federal air quality standards, minimize soil disturbances that produce fugitive particle pollution, and coordinate with ADEQ when administering prescribed fires.

Management Opportunities

By law, the BLM must comply with state and federal regulations for air quality. The BLM has an opportunity to stipulate air quality mitigation guidelines to maintain these regulations. Three

areas of concern for Air Quality management are future climate scenarios, recreational activity, and fire management.

It is likely that the average temperature for the region will increase and the current drought may persist, making the environment more conducive to fugitive particle pollution (IPCC 2014). In the event that the current trends in climate continue, BLM management should incorporate adaptive management into its management of air quality, which could result in the creation of mitigation and limited use restrictions on certain activities if the air quality parameters, e.g. fugitive particle pollution, reach a critical threshold.

Recreational activities, particularly motor vehicle operation, are a source of air pollution. To avoid exceeding air quality thresholds, the BLM may wish to further restrict the use of motor vehicles in the SPRNCA through the route designation process. Motor vehicle use on unpaved roads can produce fugitive particle pollution and this may be mitigated by seasonal road restrictions, even for administrative purposes. Other options include the application of nonpotable water, tacifiers, and moisture attractants to high use roads in certain areas for dust abatement purposes.

The BLM should continue its coordination with ADEQ when administering prescribed fires, to avoid exceeding air quality thresholds in the region.

4.1.2 Changing Climate Trends

Adequacy of Current Management Direction

There is no analysis of changing climate trends or their impacts in the *Safford RMP* (BLM 1992 and 1994) or the *Riparian Management Plan* (BLM 1989).

Management Opportunities

According to Secretary Order (SO) 3289 (Amendment No. 1; 2010), “each bureau and office of the Department must consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, developing multi-year management plans, and making major decisions regarding potential use of resources under the Department’s purview.” The SO also established a network of Climate Science Centers, to analyze climate impacts and inform land managers, and developed Landscape Conservation Cooperatives to coordinate climate change adaptation efforts with federal, state, local, tribal, and private land owners in the respective regions. The USDI’s Climate Change Adaptation Plan for Fiscal Year 2013 reasserts the needs expressed in the secretarial order and highlights major impacts to resources of which the Department is responsible.

In adherence to SO 3289, the BLM’s Landscape Approach to resource planning and management takes into account the knowledge and ideas of local scientists, land managers, and stakeholders to create a landscape-scale plan. One of the first and most important steps to the Landscape Approach is the development of a REA. The SPRNCA lies within the Madrean Archipelago REA. The Madrean Archipelago REA has now been completed and has analyzed the landscape scale responses to climate change and highlight priority areas for focused management. This

information can be utilized by the BLM to evaluate, integrate, and analyze further the findings of the REA with respect to changing climate and the SPRNCA.

With the SPRNCA RMP, BLM Management has the opportunity to fully analyze the impacts of climate trends on the planning area and incorporate those findings into an adaptive management strategy.

Another opportunity is to integrate scenario planning into the management framework for the SPRNCA. Scenario planning provides the opportunity to explore how climate trends may interact with other drivers and alter options for the future, to identify robust management actions, and to prioritize ecological monitoring efforts. Through collaboratively envisioning different plausible climatic scenarios, management actions are evaluated under each of these possible futures.

4.1.3 Soils

Adequacy of Current Management Direction

Current impacts to soil resources, as determined by land health assessments indicate that current management may result in undesired impacts:

1. Throughout the SPRNCA, utility lines contribute to the prevalence of invasive species, runoff from access roads, and increased soil compaction.
2. Recreational use (e.g., by foot, horse, and motorized vehicles) continues to impact soil resources as heavy use deteriorates road/trail conditions impairing the function of drainage structures. As a result, runoff from roads and trails is causing accelerated erosion.
3. OHV use in and near the river channel continues to deteriorate stream banks in the riparian area.

Management Opportunities

Key opportunities to improve Soil resources include:

1. Improve water quality to prevent impairment related to sedimentation;
2. Decrease accelerated erosion/sedimentation;
3. Increase aggradation to restore/rebuild soil profile;
4. Maintain flushing flows;
5. Maintain riparian vegetation;
6. Maintain watershed function by evaluating soil characteristics and soil correlation data from the ecological site inventory (ESI) on a project specific basis and developing appropriate mitigation measures to protect soils;
7. Collaborate with Mexico (Nature Conservancy and a nature preserve in Mexico), US Forest Service, Fort Huachuca, the state, the City of Sierra Vista, Cochise County, and private land owners to to identify feasible watershed improvements to reduce accelerated erosion, improve water quality and enhance natural groundwater recharge.

8. North of Highway 82 soils are in a lower precipitation zone so the sites are 8-12 in. zones instead of the others south at 12-16 in. and should be focus of restoration work to keep soils in place.

4.1.4 Water Resources

Adequacy of Current Management Direction

The enabling legislation for the SPRNCA, PL 100–696 (Nov. 18, 1988) states that:

> "The Secretary shall manage the conservation area in a manner that conserves, protects, and enhances the riparian area and the aquatic, wildlife, archeological, paleontological, scientific, cultural, educational, and recreational resources of the conservation area."

Water rights are explicitly addressed in Section 102. (d), which states that:

> "Congress reserves for the purposes of this reservation, a quantity of water sufficient to fulfill the purposes of the SPRNCA created by this title. The priority date of such reserve rights shall be the date of enactment of this title. The Secretary shall file a claim for the quantification of such rights in an appropriate stream adjudication."

To date, no such reserved water right has been adjudicated. Population growth with related increased demand for groundwater have resuled in aquifer depletions and a cone of depression has been identified that would intercept and likely dry up the related portions of the San Pedro River in the SPRNCA. Much activity has been focused in Sierra Vista, Fort Huachuca and surrounding areas to reduce water usage and the impact to the SPRNCA. Since 1988 the BLM has participated in several local partnerships addressing water resources, as any opportunity to successfully mitigate these impacts will necessarily be focused primarily outside the SPRNCA boundaries The latest and current one is the Upper San Pedro Partnership, which was formed in 2004 as authorized under Section 321 of the Defense Authorization Act of 2004, PL 108-136.

Climate trends and a growing number of water related and land use issues in the subwatershed heighten concerns about the long-term sustainability of the SPRNCA.

Management Opportunities

Management opportunities for BLM to achieve or maintain desired water quality conditions include:

1. Manage a quantity of water sufficient to fulfill the purposes of the SPRNCA;
2. Develop and implement a water quality plan for the SPRNCA;
3. Develop criteria to prioritize projects to conserve, protect, and enhance healthy landscapes through grassland restorations, watershed improvements, erosion control, recharge enhancements, and stormwater harvesting, and any other methods to "Slow the Flow" to promote infiltration/percolation;

4. Participate in and work with outside partners to develop, and support educational and outreach programs on water conservation, healthy landscapes, properly functioning watersheds, groundwater resources;
5. Prepare for climate change (warmer, drier weather and less frequent but more intense storms), through implementation of the land health improvements mentioned above to promote infiltration/percolation and protect our soil resources from accelerated erosion (Grassland restorations, watershed improvements, erosion control, recharge enhancements, and stormwater harvesting, and any other methods to "slow the flow"); and fund an updated fluvial geomorphology study;

Assess conditions, trends and risks for quality and quantity of water, and the related effects on public lands;

6. Identify any sources of contaminants and engage in remediation efforts; identify and remediate water quality concerns;
7. Manage for aggradation of the entrenched channel and increased river sinuosity;
8. Identify and protect the sediment regime of the river;
9. Enhance base flow in the San Pedro River by restoring stream function to proper dimension, pattern and profile;
10. Work with public and private partners on removal of invasives in uplands areas which can result in restoration of flows in riparian areas;
11. Diligently complete land health assessments in the SPRNCA and work with outside partners to accomplish this on tributary watersheds with attention to trends in conditions of flow;
12. Install signage to alert the public that output at Murray Springs is treated effluent;
13. The NRST recommended additional monitoring as a result of the PFC assessment of the San Pero River. Among these recommendation**s** were a LIDAR survey and updating the "Leenhouts-Stromberg" multiple-indicator transects which collected groundwater level, surface flow, vegetation and topographic data at 14 interspaced locations along the SPRNCA;
14. Explore working with private land owners and partners to create emergent marshes in the San Pedro River watershed to address water quality; and,
15. Continue efforts with partners, to identify, prioritize and remediate watersheds at risk on BLM managed lands and surrounding tributary watersheds in the Upper San Pedro River.

4.1.5 Wetland Vegetation

Management Adequacy

The *Safford RMP* has a management objective for riparian areas to maintain or improve 75 percent of the acreage of riparian vegetation on public lands within the District in good or excellent condition by 1997. This objective is outdated and does not meet the SPRNCA legislation of "conserve, protect, and enhance."

The objective for restoration of floodplain habitat is outdated and needs to be updated using ecological site potential and floodplain function (flood attenuation and aquifer recharge).

Of the 13 actions that are listed for activity plans, however, many of these still apply to riparian area management in the SPRNCA. Several management items could be moved forward:

- Incorporate riparian area objectives into existing and future activity plans;
- Develop and implement a system to prioritize needed riparian area management;
- Base the priorities on management objectives, resource condition, resource conflict and the potential or capability of a riparian area to respond to treatment. Complete the inventory of all riparian areas on public lands in the District to establish baseline condition;
- Establish a monitoring plan for selected riparian areas based upon the management priority system;
- Implement the plan and evaluate monitoring data. Continue to carry out needed changes in riparian area management through activity plans;
- Continue to manage a quantity of water on perennial streams, springs, wetlands and ponds to protect and maintain wetland vegetation;
- Continue to develop grazing systems and modify existing AMPs, as necessary, to best manage livestock use for the improvement of riparian areas and reduce nonpoint source water pollution;
- Do not permit firewood cutting in riparian areas; and
- Develop an environmental education program for schools and the public for riparian management.

Management Opportunities

Riparian, aquatic and wetland plant communities would benefit from improved stream function in the San Pedro River and tributaries

Management opportunities for BLM to improve resource conditions for wetland vegetation include:

1. Identify and remediate, as needed, the hydrologic impacts of agricultural dikes (e.g., south of Palominas and between Miller Wash and Highway 90), railroad grades, and ROWs on the San Pedro River and cienegas to understand the extent of their impact or benefit to groundwater recharge. Where there is evidence that diverted flow patterns are creating increases in peak discharge and increased erosive potential, steps should be taken to remedy the situation;
2. Conduct a thorough field investigation of reaches with little or no meandering or other channel impairment to understand the extent of stream impairment and feasibility/risk of restoration using structures that induce meandering and restore other channel characteristics. Where there is evidence that induced meandering and other treatments

would improve riparian-wetland function, restoration and implementation plans should be developed;

3. Protect the processes that perpetuate a healthy, diverse riparian cottonwood gallery forest through vegetation and FMPs in order to provide for energy dissipation, streambank protection, floodwater capture and storage, and wildlife habitat;
4. Utilize active restoration such as native grass seeding, cottonwood, and willow pole planting, and/or native tree and shrub plantings in areas where needed after invasive plant control or other vegetation management actions;
5. Adjust authorized grazing on the Babocomari River to meet PFC;
6. Burn wetlands periodically to keep them open and prevent their conversion to wet meadow or grassland;
7. Continue wet-dry mapping, which not only provides highly valuable information to management about river conditions but is also a highly educational activity that increases public support for the San Pedro River;
8. Implement a groundwater augmentation (regional system) project in collaboration with regional partners;
9. Develop a replacement for water now being used to supply farmers by St. David's diversion;
10. Establish a monitoring strategy to measure change over time in key Proper Function Condition checklist items identified as being inadequate;
11. Work collaboratively with The Nature Conservancy and Cochise County to assesse effectiveness and to identify locations within the watershed to construct additional recharge facilities;
12. Develop monitoring, analyze data, and provide peer reviewed results on the effects of recharge basins (i.e., retention/detention basins) on groundwater levels on the Upper San Pedro River;
13. Focus specifically on Reach J to improve the rating of FAR with a downward trend to Functional;
14. Prevent unauthorized OHV traffic, livestock grazing and unregulated foot traffic that compact soil, trample and destroy wetland vegetation, alter streambanks and increase channel erosion;
15. Manage foot trails to limit damage to banks and floodplains through methods such as closing trails on fragile soils with poor stability (sandy soils), installation of cross logs and water turn-outs to check flooded trails from eroding;
16. Explore various options to assess possible contaminants, remediate as necessary, and retire or acquire the ROW for the abandoned railroad;
17. Conduct tamarisk removal;
18. Where existing resource conditions and potential for the site allow, conduct vegetation treatments aimed at woody invasives in upland areas;

19. Increase public education and outreach about the purpose of the SPRNCA and riparian resource values;
20. Increase efforts to work cooperatively throughout the watershed with landowners; and

4.1.6 Upland Vegetation

Adequacy of Current Management

Both the current *Riparian Management Plan* and *Safford RMP* lack sufficient management direction specifically for natural vegetative communities within the SPRNCA.

The record of decision for the *Riparian Management Plan* states:

- The Vegetation objective in the *Riparian Management Plan* is to maintain and enhance the vegetation communities in the SPRNCA. The *Riparian Management Plan* does not identify specific management strategies to achieve this objective except for the following:
  - Major vegetation improvement will be through natural processes.
  - Abandoned farm fields may be used for experimental plantings or reseedings of native species. Some non-native species presently found within the area may also be utilized.
  - Prescribed fires on a limited basis using prescriptions defined in the FMP are authorized to improve vegetation resource or eliminate hazardous situations.

The *Safford RMP* defers development of desired plant communities to activity level plans and emphasizes management of federally listed plant species. The *Safford RMP* prescribes land treatments including strategies to decrease invading woody plants and increase grasses and forbs for wildlife, watershed condition, and livestock. Treatments may include various mechanical, chemical, or prescribed fire methods.

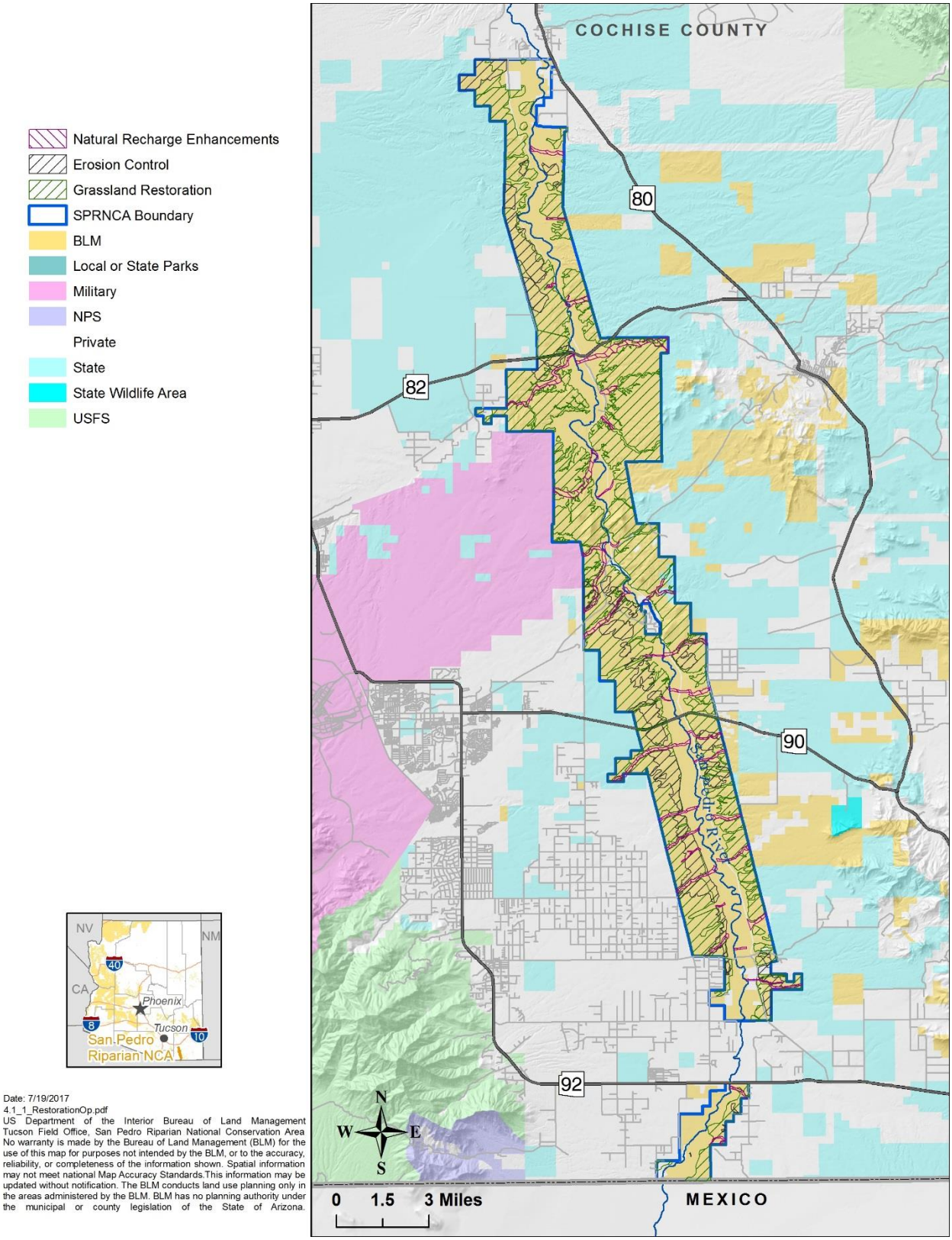


Figure 4.1-1. SPRNCA Restoration Opportunities

Management Opportunities

Management opportunities for BLM to improve resource conditions for upland vegetation include:

1. Define clear DFCs and vegetation objectives for the SPRNCA;
2. Identify priority vegetation communities and priority plant species;
3. Initiate upland-grassland restoration and erosion control based on ecological site description and associated soils,specifically related to the control of shrubs (whitethorn and acacia and mesquite, creosote, tarbush);
4. Conduct vegetation management that results in the Historic Climax Plant Community where feasible in areas where a large departure exists and as existing natural resource values allow; and
5. Identify special status plant species that would be most vulnerable to climate change and vegetation communities that can best be maintained and enhanced through fire, chemical, or mechanical control.

See Section 4.1.10, Fire Management, for other management opportunities for upland vegetation.

4.1.7 Fish and Wildlife Habitat

Adequacy of Current Management

Adequacy of Current Management for Terrestial Wildlife Habitat

SPRNCA is managed under the *Safford RMP* (BLM 1992 and 1994) and the *Riparian Management Plan* (BLM 1989). Much has changed in the SPRNCA and in the surrounding area in the 25 years since inception of these management plans.

Now the riparian area in places is little more than one mile from the nearest developments, and demand for access from these developments is expected to continue to increase dramatically. These increases in use will result in direct disturbance to wildlife and behavioral modification, vegetation trampling, soil erosion, and impediment to movement.

Some of these changes include the following:

1. Adjacent development of subdivisions and growth of once rural areas has resulted in increasing demand for recreational use of the SPRNCA, including hiking, equestrian, mountain biking, and unauthorized OHV activities;
2. An escalation in unauthorized trail building and social trails (especially between Hereford Road and Highway 90);
3. Increased activities associated with border enforcement strategies and associated impacts;
4. Small numbers of unauthorized livestock utilizing areas along the San Pedro and Babocomari rivers, is slowing recovery of wildlife habitat (BLM 2012a); and,

5. Other changes that have occurred over the past 25 years which are not effectively addressed in current management include a steady decline in baseflow in the San Pedro River due to water diversions (e.g., St. David Diversion Dam), flow regulations (e.g., Fort Huachuca, City of Sierra Vista, and developers' retention/detention basins), and groundwater pumping in the Sierra Vista subwatershed. Water sources that were once permanent have become intermittent or ephemeral. Augmented flows (e.g., Murray, Horsethief, and Moson Springs) are present downstream from the City of Sierra Vista Environmental Operations Park. Emerging contaminants have been documented in these augmented flows, and it is unknown what impact these contaminants have on fish and wildlife. Water quality concerns (e.g., E. coli) also exist along portions of the San Pedro River.

Adequacy of Current Management for Aquatic Habitat

The objective for aquatic habitat improvement in the *Riparian Management Plan* is directed at increased habitat diversity and stream bank cover (stability). The objective is outdated and needs to reflect larger scale processes such as the dimension, pattern and profile of the San Pedro River and other riparian areas in tributary streams. The need for beaver reintroductions is listed as a means to improve stream conditions. This has already been accomplished.

The *Safford RMP* and *Riparian Management Plan* emphasize managing priority species and their habitats (see Section, 4.1.9, Special Status Species), but also mentions the need to "focus" management efforts on enhancing biological diversity.

Management Opportunities

Management Opportunities for Terrestial Wildlife Habitat

Management opportunities for BLM to support desired conditions for terrestrial wildlife habitat include:

1. Manage a quantity of water sufficient to fulfill the purposes of the SPRNCA;
2. Identify new methods to remediate water quality concerns;
3. Manage for aggradation of the entrenchment channel and increased river sinuosity;
4. Identify and protect the sediment regime of the river;
5. Identify and remediate as needed the hydrologic impacts of agricultural dikes (e.g., south of Palominas and between Miller Wash and Highway 90), railroad grades, and ROWs on the river and cienegas;
6. Pprotect the cottonwood gallery forest which provides energy dissipation, streambank protection, floodwater capture and storage, and wildlife habitat;
7. On Babocomari River, opportunity to review and adjust livestock management practices;
8. Continue to treat Russian knapweed, tamarisk, giant reed, and other invasive weeds to improve habitat conditions for native species;
9. Utilize active restoration such as native grass seeding, cottonwood and willow pole planting, and/or native tree and shrub plantings in areas where needed after invasive plant control or other vegetation management actions;
10. Identify any sources of contaminants and engage in remediation efforts;
11. Describe desired habitat conditions for priority species;

12. Provide objectives to achieve desired habitat conditions;
13. Recommend management actions to achieve objectives;
14. Initiate management actions in accordance with the ecological potential and existing resource conditions of the site;
15. Provide habitat conditions for species nested within a landscape that provides a mosaic of habitat for multiple species;
16. Manage for increased cover of grasses, forbs, and emergent plants where needed within the entrenchment channel, without decreasing adequate coarse and/or large woody material needed for maintenance/recovery (BLM 1998);
17. Utilize prescribed fire, which in addition to removing hazardous fuels to limit spread of wildfire, improves wildlife habitat and supports management for desired vegetative communities and improved watershed conditions;
18. Reduce habitat fragmentation, soil erosion, vegetation impacts, and wildlife disturbance through planned recreation and travel management across all habitat types;
19. Manage for improved land health standards in the SPRNCA to meet desired wildlife habitat goals and objectives;
20. Engage with Border Patrol to mitigate effects of border law enforcement activities to mitigate effects on wildlife and their habitat;
21. Manage isolated BLM parcels in the watershed to provide improved land health, watershed improvements, vegetation treatments, etc. beneficial to wildlife and habitats in the SPRNCA;
22. Provide for additional permanent wildlife waters using guzzlers or existing wells;
23. Collaborate with private landowners, ASLD, Fort Huachuca, USFS, and NPS to manage for wildlife corridors;
24. Coordinate with Fort Huachuca on military flights over the SPRNCA to minimize disturbance to wildlife;
25. Increased demand and use of the SPRNCA for hunting provides opportunities for focused law enforcement patrols and for outreach to hunter groups, including to collaborate with the AZGFD to identify specific messaging that could be included in hunting regulations pamphlets to increase hunter awareness and engagement in reducing impacts habitat for wildlife;
26. Participate and coordinate with the SWAP per Sikes Act, Fish and Wildlife Coordination Act, and 43 CFR Parts 24.1-4;
27. Ensure that wildlife ingress and escape ramps are used in all artificial water structures (e.g., livestock tanks and troughs, wildlife waters);
28. Restorataion of impacts from historic land use, such as wood harvesting, agriculture, intensive livestock grazing, mining, and motorized travel (old roads). These residual impacts include loss of topsoil, rills, gullies, entrenchment, and woody plant species invasion; amd
29. Identify crucial habitat and corridors in a compatible manner with the AZGFD using HabiMap per WO IM-2012-039 (Identification and Uniform Mapping of Wildlife Corridors and Crucial Habitat Pursuant to an MOU with the Western Governors' Association).

Management Opportunities for Aquatic Habitat
Riparian, aquatic and wetland plant communities would benefit from improved stream function in the San Pedro River and tributaries through elimination and mitigation of some current uses and implementation of restoration activities.

Direction in the *Safford RMP* included several items that should be considered to carry forward into the new RMP and are presented as Management Opportunities.

1. Monitor priority habitat to determine condition and changes in condition;
2. Conduct inventories to determine the impacts of other activities on wildlife populations and habitat prior to preparation of Habitat Management Plans;
3. Identify opportunities in Habitat Management Plans to mitigate adverse impacts and implement the actions needed to correct the problems;
4. Continue to maintain and improve wildlife habitat, emphasizing priority habitat;
5. Protect springs and associated indigenous riparian vegetation for wildlife water, cover and forage; and
6. Develop prescribed burning plans in fire-dependent vegetation communities to improve habitat conditions for priority wildlife species.

Direction in the *Riparian Management Plan* included several items that should be considered to carry forward into the new RMP:

1. Inventory terrestrial and aquatic habitats;
2. Monitor changes in terrestrial and aquatic habitats;
3. Inventory terrestrial and aquatic invertebrates along with their associated food supplies;
4. Establish interpretation and environmental education programs on wildlife and their habitat, with emphasis on the riparian ecosystem;
5. Prepare (update) a habitat management plan for the SPRNCA;
6. Develop ponds and marshes for aquatic and terrestrial wildlife;
7. Pump nonirrigation wells in support of aquatic habitat improvements;
8. Pump irrigation wells for emergency use if a resource becomes jeopardized (such as fish populations due to reduced flows);
9. Consider plans for the removal of exotic fish from existing ponds in cooperation with the AZGFD; and
10. Reduce populations of non-native aquatic species that are limiting native aquatic species, if feasible.

4.1.8 Migratory Birds

Adequacy of Current Management

New policy for management of migratory birds was established with the 2010 MOU between BLM and the USFWS (MOU-WO-230-2010-04). Although the Migratory Bird Treaty Act is the ultimate law for protection of migratory birds, the 2010 MOU provided clearer direction on how this law was to be implemented. The purpose of the MOU was to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or

minimize adverse impacts on migratory birds. In many instances, current management does not address the needs of migratory birds.

For example, uncapped mine claim markers, usually made of PVC pipe, reportedly kill thousands of migratory birds, bats, reptiles, and other wildlife each year; lack of bird diverters can result in mortality of migratory birds due to collisions with communication site antennaes and certain maintenance activities can impact breeding or nesting activities of migratory birds. These issues were not identified in current management plans. In addition, existing pipes for abandoned irrigation wells, historic railroad features, livestock facilities, and other man-made structures within the SPRNCA may create entrapment hazards for birds and other wildlife.

Current management does not address increases in unauthorized OHV use, unauthorized trail building, and unregulated equestrian use and resultant impacts on migratory birds. In addition, impacts on migratory birds from border enforcement activities are not addressed.

Residual impacts from historic uses include loss of topsoil, rills, gullies, entrenchment, and woody species invasion. Current authorized grazing in the riparian zone of the Babocomari River has resulted in impacts on vegetation, soils, and corresponding habitat, and the river is FAR with a downward trend for two and a half miles. A small number of unauthorized livestock have utilized the St. David Cienega, Dunlavy Wetlands, San Pedro River, and uplands with impacts to marsh vegetation and bird species that nest in the cienega.

Groundwater depletion threatens the amount and location of surface water available for nesting and migrating birds. Water quality issues are present with emerging contaminants from the City of Sierra Vista's Environmental Operations Park and with E. coli present in some locations. Although the Environmental Operations Park meets existing water quality standards and requirements, currently there are no regulatory standards for emerging contaminants. Elevated levels of heavy metals have also been found in the river. Permanent good quality water sources are needed for migratory birds to make their long journeys from central and south America to their northern breeding grounds.

Prescribed fire was used until 2008 with several hundreds of acres burned annually in the SPRNCA. Since then, the fire management program has focused on fuel breaks and fuel reduction projects.

Many of the management adequacy and opportunities for migratory birds are the same as for fish and wildlife. However, other opportunities for management exist because of the unique characteristics of nesting behavior, flight characteristics, and temporal nature of migratory birds.

Management Opportunities

Management opportunities for BLM to support desired conditions for migratory birds include examples from several specific agreements, strategies, and policies:

The following management opportunities are specific examples from the 2010 MOU between BLM and USFWS:

1. During planning, consider existing special designations such as IBAs;

2. Participate in planning efforts of Bird Conservation Regions to facilitate development of conservation actions that benefit migratory birds across multiple land ownerships, such as large-scale watershed restoration projects;
3. At the project level, evaluate the effects of BLM's actions on migratory birds and implement approaches that lessen take;
4. Develop conservation measures and ensure monitoring of the effectiveness of conservation measures to minimize, reduce, or avoid unintentional take, such as:
    a. Avoid identified raptor nests during planned recreational events or other activities that concentrate human disturbance in a small area;
    b. Prevent bird entry into uncapped mine markers (or other structures such as uncapped wells) that create entrapment hazards to migratory birds;
    c. Avoid areas of raptor concentration when placing wind turbines (or communication towers);
    d. Avoid nesting season during rangeland improvements, such as prescribed fire;
    e. Manage livestock to minimize impacts on nesting birds and to improve migratory bird habitat;
    f. Modify activities to minimize disturbance of migratory birds during the breeding season;
    g. Retain snags for nesting structures where snags are underrepresented;
    h. Retain the integrity of breeding sites;
    i. Minimize collisions with fences, meteorological (or communication) towers, and other structures through construction and marking stipulations;
5. Collaborate with federal and nonfederal partners to integrate migratory birds and habitat into planning efforts;
6. Integrate migratory bird conservation measures into future activity level planning such as grazing, recreation, and nonrenewable and renewable energy NEPA mitigation;
7. Prevent and manage invasive species for the benefit of migratory birds through collaboration in invasive species plans and efforts;
8. Minimize or prevent the pollution or detrimental alteration of the environment by assessing contaminants and other stressors relevant to migratory bird conservation;
9. Support management studies and research to identify habitat conditions needed to conserve migratory birds and evaluate the effects of management on habitat and populations of migratory birds;
10. Recognize and promote the value of migratory birds through public events that focus on bird conservation;
11. Continue and enhance partnerships with nonfederal entities to further bird conservation in regional planning, outreach, and education; and
12. Follow all migratory bird permitting requirements for activities subject to 50 CFR Part 21 and minimize take of species of concern.

The following management strategies are from the BLM Draft Strategic Plan for Migratory Bird Conservation, Appendix B.

1. Effect long term improvement and restoration of game bird (white-winged dove and mourning dove) habitat;
2. Provide suitable habitat for birds of prey through conservation and management of essential habitat components including habitat for prey species;

3. Determine status and trends of nongame birds and identify their habitats;
4. Restore, maintain, and enhance populations of nongame birds through habitat management;
5. Conduct research and studies to gain knowledge needed for informed decision-making for management of nongame birds and their habitats;
6. Develop awareness and understanding of the importance of nongame bird species and their habitats;
7. Build on existing relationships and create new partnerships to foster conservation programs for nongame species and their habitats;
8. Identify and implement avoidance measures to limit maintenance to outside of the nesting bird season, and to complete required bird surveys and clearances when vegetation treatments under power lines must occur in the case of emergency during avian breeding seasons. There are also opportunities to measure the frequency, and use mitigation to reduce the risk of bird electrocutions and the number of nests being located on utility structures;
9. Establish avoidance dates for nesting birds and to expand on pre-project surveys to locate and avoid bird nests in the area of proposed ground disturbing activities.
10. Evaluate the success of the existing trail system in providing appropriate access, and expanding environmental education;
11. Utilize the most current scientific information to establish nesting avoidance dates for soil- or vegetation-disturbing activities and high recreational use activities in the breeding habitats of migratory birds, and to prohibit surface- or vegetation-disturbing activity during avoidance dates unless an avian nesting survey conducted by a biologist confirms an absence of nesting birds in the affected area;
12. Work with partners to incorporate conservation measures for migratory birds, as well as a monitoring component, into projects completed with BLM cooperation and funding that alter vegetation, disturb soil, or involve concentrated recreational use;
13. Ensure that all pipes, posts, irrigation wells and equipment, and similar entrapment hazards are remediated;
14. Establish international relationships to enhance conservation programs for migratory birds;
15. Manage wetlands and other habitats to perpetuate a diversity and abundance of waterfowl;
16. Ensure that all pipes, posts, irrigation wells and equipment, and similar entrapment hazards are remediated; and
17. Modify or construct new facilities (i.e., poles, substations, lines, switches, etc.) with features designed to prevent bird electrocution.

Other management opportunities in the SPRNCA that may benefit migratory bird and habitat are discussed in Section 4.1.7, Fish and Wildlife; Section 4.1.9, Invasives; and Section 4.1.10, Special Status Species.

4.1.9 Invasives

4.1.9.1 Adequacy of Current Management

There has been an active invasive species control or eradication program in the SPRNCA in the past because of the potential for invasives to outcompete and displace native species. Invasive aquatic species, such as bullfrog, crayfish, and spiny softshell turtle, are present in high numbers and occur over most areas of aquatic habitat in the SPRNCA. Other non-native animal species documented in the SPRNCA that have the potential to cause competition, predation, or behavioral disturbances to wildlife include domesticated feral animals. In the future, invertebrate pests, pathogens, or other organisms detrimental to native plants and animals could also become introduced.

The noxious weed control program has focused on early detection and control of new invasive plants, and control or eradication of existing infestations depending upon species and extent of infestation. The tamarisk control program in the SPRNCA has removed tamarisk along the San Pedro River, tributaries, and springs since 2009 from the International Boundary to north of Fairbank near Willow Wash. The subtropical tamarisk beetle is modeled to arrive at the lower San Pedro River during spring of 2017 (Tracy 2013), and is expected to move up the San Pedro River and eventually reach the SPRNCA at some point in time in the future. It may be necessary to plan for the arrival of the subtropical tamarisk beetle with a restoration plan to establish native plants and address erosion once tamarisk is controlled or killed by subtropical tamarisk beetle.

Russian knapweed control has occurred sporadically in the past, but on an annual basis since 2008 and complete eradication is currently expected. Giant reed has been controlled in the SPRNCA since 2009, but one patch occurs on private property within the SPRNCA boundary. A small patch of Malta starthistle was discovered and the patch was hand-grubbed and periodically monitored. No Malta star-thistle has since been observed, demonstrating the importance of early weed detection and control.

Several native, woody, perennial plants may also cause concern for maintenance of native grasslands. Decades of overgrazing and fire suppression activities may have resulted in the expansion of these species into grassland habitats. To-date there has been little attempt at control of these species in the SPRNCA and a very minor prescribed fire program that has focused mainly on agricultural fields and fuel breaks. Invasive species may include mesquite (particularly in upland grassland locations), several acacia species, broom snakeweed, creosote, tarbush, and other species in semidesert grassland habitat.

Management Opportunities

Management opportunities for BLM to support desired conditions for invasive plant and animal species include:

1. Conduct intensive inventory of the SPRNCA and isolated BLM parcels in the watershed on an ongoing basis to detect invasive species infestations early before spread;
2. Respond quickly to newly reported infestations with appropriate control or eradication;
3. Continue to monitor old infestation sites and control or eradicate as necessary;
4. Pursue cooperative agreements with private property owners for control or eradication of invasive species infestations within the SPRNCA (e.g., giant reed at Escapule);

5. Coordinate with other agencies, Non-governmental Organizations, and individuals on invasive species education and control or eradication on other land ownership before spread onto BLM land;
6. Continue to treat Russian knapweed, tamarisk, giant reed, and Russian olive to improve habitat conditions for native species;
7. When feasible, develop monitoring, control, and eradication efforts for American bullfrog, crayfish species, or other invasive species if they become established;
8. Monitor effects of tamarisk beetle if beetles become established, identify areas needing restoration, and develop strategies to accomplish riparian vegetation recovery and erosion control if natural regeneration of native vegetation is not occurring; and
9. Renovation of aquatic habitats such as the San Pedro River and Government Draw using newly developed piscicides (concentrated ammonia) that can eliminate bullfrog tadpoles, invasive fishes, and crayfish (Minckley pers. comm.).

Stabilize headcut erosion in Curry Draw and Government draw in such a way that they double as fish barriers to protect habitat from invasive species. Work with friends groups to manage restored wetlands and ponds (with bullfrog exclusion fencing) to monitor and eliminate bullfrogs as necessary and to manage vegetation that encroaches on open water.

1. Continue to use bullfrog exclusion fencing where needed for species reintroduction efforts;
2. Utilize new methods as they become available to control or eradicate invasive species;
3. Create a proactive restoration plan for revegetation and erosion control as needed in areas with tamarisk control or mortality with the establishment of subtropical tamarisk beetle;
4. Actively restore (e.g., seedings, plantings, erosion control) as needed areas with tamarisk control or mortality from subtropical tamarisk beetle;
5. Continue to control or eradicate tamarisk from roughly Willow Wash north to the northern SPRNCA boundary and utilize active restoration techniques (e.g., seeding, plantings, erosion control) where needed;
6. Identify locations where semidesert grassland or giant sacaton grassland has been invaded by woody species to the point that biological resources are negatively impacted, and where natural resources (e.g., soils, cultural, biological, topography, special designations) allow treatment of woody invasive species;
7. Identify and conduct appropriate treatment methods for control of woody invasive species depending upon existing natural resources;
8. Plan for and manage an active prescribed fire program using an interdisciplinary approach;
9. Utilize restoration techniques (e.g., seedings, plantings) as needed in areas that are susceptible to weed invasion after wild or prescribed fires;
10. Utilize techniques as Zeedyke and Clothier did (2009) as needed proactively before prescribed fire and as needed afterwards to prevent weed infestations by preparing areas for desired plant establishment and to limit soil erosion;

11. Encourage monitoring or research in the SPRNCA to determine effective methods of control for species with currently ineffective control methods (e.g., Lehmann lovegrass, Johnson grass, Bermuda grass); and
12. Create best management practices specific to the SPRNCA for vegetation management while protecting conservation values.

4.1.10 Special Status Species

Adequacy of Current Management

The Safford District RMP emphasizes managing special status species and their habitats, but also mentions the need to "focus" management efforts on enhancing biological diversity, which is still relevant.

The *Safford RMP* objective for management of threatened, endangered and plant species is to manage the public lands to preserve and enhance occurrences of species and to achieve the eventual delisting of threatened and endangered species. When the SPRNCA was designated only two federally listed species were observed in riparian and wildlife inventories. Therefore, management decisions and guidance in the *Safford District RMP* and *San Pedro Riparian Management Plan* are out of date and many of the priorities and management actions are no longer relevant.

The objective concerning re-establishment of extirpated species is ongoing. Additional species have been federally proposed or listed as candidate species within the planning area since the *Safford RMP* (BLM 1992 and 1994) and the *Riparian Management Plan* (BLM 1989). Few species that occur within the SPRNCA have been delisted (i.e., bald eagle and American peregrine falcon). Newly designated critical habitat has been established for jaguar in the SPRNCA watershed, and critical habitat is currently proposed for the threatened Mexican gartersnake and yellow-billed cuckoo within the SPRNCA. Designated critical habitat for Huachuca water umbel has occurred in the SPRNCA since 1999. As a result, the new RMP should reflect these changes, as well as management needed to prevent adverse effects on listed or sensitive species or critical habitat that was not considered in the 1992 RMP or 1993 *Habitat Management Plan*. Some of the management actions from these plans that are still relevant include the following:

1. Incorporate the habitat needs of pronghorn, black-tailed prairie dog, and aplomado falcon into the design of prescribed fires and other land treatments (see Objective 4, Special Status Raptors). Upon recovery of upland habitats, re-establish these species;
2. Re-establish the Huachuca water umbel. Transplant rooted plants and sod to suitable sites along the San Pedro River if feasible. These are currently available at Fort Huachuca and at the Desert Botanical Garden;
3. Reduce populations of non-native aquatic species that are limiting native aquatic species, if feasible;
4. Re-establish species known to inhabit small erosive desert streams: speckled dace, round-tailed chub, Gila sucker (*Catostomus insignis*), spikedace, and loach minnow;

5. Re-establish species known to inhabit quiet backwaters or cienega habitats: Gila chub, Gila topminnow, desert pupfish;
6. Re-establish species known primarily from large desert rivers but which have been recorded from the San Pedro River in the recent past: razorback sucker, flannelmouth sucker, Colorado squawfish; and
7. Develop (independently or in conjunction with a visitor center) educational displays and programs to promote conservation of native fish and other listed species.

BLM Manual 6840 on Special Status Species Management was updated in 2008, and current management should be consistent with this newer policy. The objective of the BLM special status species policy is to conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for the species, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood and need for federal listing under the ESA. The changes not accounted for by current management such as proliferation of unauthorized trails, expansion of border enforcement activities and facilities, and continued impacts of unauthorized grazing that affect general fish and wildlife are also applicable to special status species. Because of the sensitive nature of these species the impacts are magnified. These changed circumstances make it imperative that the new RMP identify opportunities to resolve these issues.

The impacts to water resources are of particular concern for special status species and require additional management strategies not identified under current management. Water diversions (e.g., St. David Diversion Dam), flow regulations (e.g., Fort Huachuca, City of Sierra Vista, and developers' retention/detention basins), and groundwater pumping in the Sierra Vista subwatershed were not considered in the last RMP and are probably the biggest threat to the majority of special status species in the SPRNCA. Augmented flows (e.g., Murray, Horsethief, and Moson Springs) could be an impact to special status species but more data is necessary to make this determination. Direct impacts from decreased amount or locations of water include less available aquatic habitat for special status species (such as native fishes, amphibians, and reptiles), and less available surface water for use by terrestrial special status species (such as movement corridors for jaguar). Effects may be felt as baseflow in the San Pedro River continues to diminish and eventually causes impacts indirectly to riparian vegetation and then to associated special status species (such as southwestern willow flycatcher and yellow-billed cuckoo).

Current management has supported the reintroduction of federally listed desert pupfish, Gila topminnow, and Huachuca water umbel. These reintroductions have been conducted at several springs in the SPRNCA in recent years and is planned to occur at additional springs. Reintroduction has been more effective at some sites than others, but overall has been largely successful in the SPRNCA.

Management Opportunities

Management opportunities for BLM to support desired conditions for special status species include:

1. Manage for conservation and/or recovery of special status species and initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species pursuant to BLM Manual 6840;
2. Identify desired habitat conditions and population objectives for special status species and identify priority species that require immediate intensive management, clearly defining overarching goals (what we want to accomplish overall), objectives (how we get there), and decisions (specific actions we will take to accomplish our objectives);
3. Utilize ecosystem based management and include goals, objectives, and decisions for habitat cores (protected areas); graduated peripheries (variegated levels of restricted areas); and movement corridors as necessary to sustain species richness and genetic connection within species;
4. Consider standard stipulations for maintenance and implementation level activities to avoid potential conflicts with ESA and BLM Manual 6840;
5. Identify and enact conservation measures, design features, mitigation measures, and/or area use restrictions needed to achieve desired population and habitat conditions for special status species. For example, establish buffer zones around special status species locations or habitat for vegetation management and ground disturbing activities (e.g., recreation, vegetation treatments);
6. In general, manage for native plant communities for which special status species are adapted;
7. Establish planning and conduct restoration with native willows to mitigate potential damage to southwestern willow flycatcher habitat by tamarisk beetles;
8. Designate trails away from fragile river banks or other special status species habitats and restore unauthorized trails to a natural condition;
9. Improve trail location, design, maintenance, and signage to prevent erosion from trails near fragile river banks or other special status species habitats
10. Monitor and quickly restore unauthorized trails, especially in special status species habitats;
11. Remove and restore redundant trails and roads, especially in special status species habitats;
12. Consider for future management any new information on existing special status species and listings of new species may warrant future consideration of priority habitat or designated critical habitat;
13. Monitor for and quickly remove unauthorized livestock following BLM regulations;
14. Identify and construct modifications or new fencing location or design to prevent unauthorized livestock;
15. Review and adjust livestock grazing management on existing allotments as needed to support special status species habitats and achieve PFC (e.g., Babocomari River and San Pedro River);

16. Where feasible, implement recovery plans (including reintroductions) for federally listed species and initiate reintroduction efforts for other special status species;
17. Develop vegetation treatments to improve special status species habitat;
18. Prioritize for implementing recovery and conservation projects, especially those in recovery plans;
19. Create a robust monitoring plan for special status species with detailed reports, readily available to interested publics and management;
20. Work with the AZGFD to determine the balance between native aquatic species management and sportfish management. Where ever possible renovate habitat;
21. Prevent accelerated erosion (head cut) in Government Draw from moving upstream by stabilizing the headcut (near the aqueduct) that threatens the riparian area with becoming nonfunctional. The stabilization may also act as a fish barrier to protect habitat upstream from nonnative fish migration from the river;
22. Address (stabilize) accelerated erosion in Curry Draw that supplies excess sediment from parking lot reach;
23. Evaluate seeps, springs and the remaining perennial portions of the Babocomari River for suitable habitat for Huachuca water umbel;
24. Coordinate with the USFWS on the transplant of water umbel to habitats with characteristics required to support Huachuca water umbel;
25. Renovate (fish and crayfish removal) Phoebe pond and work with the USFWS and AZGFD to reintroduce Gila topminnow, desert pupfish and Gila chub;
26. Renovate (fish and crayfish removal) Government draw and work with the USFWS and AZGFD to reintroduce speckled dace, longfin dace, Gila topminnow, desert pupfish and Gila chub;
27. Address erosion problems in Government Draw, especially above the rail road bridge where the best fish habitat is present;
28. Develop artesian water sources at Kolbe and or Dunlavy into wetland surrounded ponds for the recovery efforts of special status species aquatic species, ducks, shorebirds and birds requiring marsh habitat (e.g., rails);
29. Coordinate with the USFWS and AZGFD on the reintroduction of desert pupfish, Gila topminnow, Gila chub, Chiricahua and Lowland leopard frogs, northern Mexican gartersnakes, and Huachuca water umbel in restored or developed wetlands;
30. Coordinate with the USFWS and AZGFD on the potential to renovate portions of the San Pedro River in conjunction with Mexico and private land owners; and
31. Coordinate with the USFWS and AZGFD on the potential to reintroduction the aquatic species appropriate for the San Pedro River such as razorback sucker, Colorado pikeminnow, roundtail chub, Gila chub, spikedace, loach minnow, Sonora sucker and flannelmouth sucker.

4.1.11 Fire Management

Adequacy of Current Fire Management Direction

The Arizona Statewide *LUPA for Fire, Fuels, and Air Quality Management* 2004 and the *Gila District Fire Management Plan* 2013 allow for natural caused wildfires to be managed for resource benefit in some areas of the SPRNCA. However, the close proximity of WUI, nonfire adapted vegetation types (riparian), current conditions of vegetation communities coupled with jurisdictional boundaries and related fire management protocols by neighboring agencies would make managing fires for resource benefit within the SPRNCA difficult to implement. Projects funded by the Gila District Fuels Program will continue to focus on hazardous fuels reduction in and around WUI areas and restoring and maintaining vegetation communities within the SPRNCA.

As more recreation occurs within the SPRNCA, BLM Gila District Fire, Fuels and Prevention/Mitigation Programs in coordination with Resource Managers and Law Enforcement will need to increase fire prevention, mitigation, and education efforts to prevent human-caused fires.

Management Opportunities

Management of wildfires should support the goals and objectives for vegetation, wildlife and other resources values. The top priority should always be public and firefighter safety.

Vegetation treatments (mechanical, chemical, biological) and prescribed fire treatments could be important tools to utilize for restoring and maintaining vegetative communities.

Vegetation treatments could be used to:

1. Reduce hazardous fuels around private land, cultural resource values, administrative sites, high visitor use areas, Threatened and Endangered species habitat, and other resources values that have the potential to be negatively impacted by wildfire events;
2. Maintain grass-dominated ecosystems by treating mesquite and other invasive woody species encroachment into perennial grassland dominated sites;
3. Protect cottonwood-willow galleries by controlling non-native species (tamarisk, giant reed);
4. Focus on the Firewise Communities Program that addresses fire safety for human habitation on private property near the SPRNCA; and
5. Ensure that hazardous fuels treatments and implementation projects conform to and support land use plan objectives, (see BLM Manual 9211 1.6 C16); Ensure that travel and transportation planning is an interdisciplinary, collaborative process across all programs (BLM Manual 1626.04C5, 1626.06A1, and 1626.08A).

4.1.12 Cultural and Heritage Resources

Management Adequacy

Many cultural resource sites within the SPRNCA were recorded over 30 years ago. The site information, including locational information is no longer valid and in some cases the information is not adequate. Some sites no longer can be located and could be assumed to not exist. There is a need for these sites to be inventoried using provisions set forth under Section 110 of the NHPA with the goal being to update and derive a usable cultural resource site database within the SPRNCA.

Surface disturbing activities resulting from authorized actions, such as range improvements and recreation site developments, may potentially threaten cultural resources. Most archaeological sites are protected by using avoidance if possible. Most newly recorded cultural resource sites within the current SPRNCA area are located when a survey is required (Section 106) prior to a project occurring in a specific area. Mandatory compliance with Section 106 of the NHPA requires that all ground disturbing projects be surveyed using intensive ground surveys to look for the presence of cultural resources

Cultural resource sites have a range on a spectrum of vulnerability to human and natural impacts. The factors that drive this are numerous. Damages to cultural resource sites are visible throughout the SPRNCA and the damages are detected throughout the whole SPRNCA. There is not one particular geographic area where damages are more present. Prior to Agencies being held accountable for Cultural Resource Federal Law compliance (e.g., Section 106), many areas within the SPRNCA were impacted and numerous cultural resource sites were destroyed.

Current management issues for cultural resources in the SPRNCA:

1. Many sites were first recorded over twenty years ago, often with no NRHP evaluation or with inadequate documentation compared to today's standards. Factors to consider are that some of these sites no longer exist due to project development activities, such as bulldozing, and human factors, such as looting, that have destroyed these sites.
2. The previous management plan misallocated and failed to allocate many cultural resource sites. Some sites were never allocated and others no longer belong in allocated use categories due to factors that do not meet current conditions.

Management Opportunities

Present management direction is effective in conserving and protecting cultural resource values. Management opportunities for BLM to support desired conditions for cultural resources include:

- Establish a priority for inventory of BLM administered lands in all high probability areas as required under Section 110 of the NHPA;
- Use and or re-assign relevant cultural resource use categories to enhance and protect cultural resources;
- Prioritize NRHP nomination of unique and/or significant historic properties;
- Consider developing consistent cultural resource management information signage throughout the SPRNCA;
- Consider enhancing interpretive signage throughout the SPRNCA;

- Continue to consult and strengthen relations with Native American tribes who claim cultural affilitiation to or traditional use of the SPRNCA;
- Combine BLM driven research objectives (cultural resource management) with data recovery strategies for "at risk" cultural resource sites;
- Establish clear criteria for what constitutes an "at risk" cultural resource site;
- Continue outreach efforts with partners, tribes and scientific educational, institutions;
- Contract for an ethnohistoric overview of the entire SPRNCA project area using Class I survey information to define high, medium and low probability areas for the occurrence of cultural resource sites;
- Develop Cultural Resource Management Plans for highly visited public use sites, NHL's and other NRHP sites within the SPRNCA;
- Develop Cultural Resource Management Plans for selected high probability areas ex. statistical modelling; and
- Establish a priority for large scale locational site verification information on all past recorded sites (ex. sites recorded in the 1930's, 40's, 50's and 60's) to document current site conditions as well as site existence.

4.1.13 Paleontology

Adequacy of Current Management

The *Safford RMP* (BLM 1992 and 1994) directs management of paleontological resources to preserve their scientific and interpretative values. The *Riparian Management Plan* (BLM 1989) also directs paleontological resources to be managed for scientific and public use values.

The current management adequately emphasizes that significant paleontological resources should be protected. The current management has adequate objectives to manage paleontological resources for scientific research, educational purposes, and public outreach.

The current management does not emphasize the need for a baseline inventory of the paleontological resources in the SPRNCA to go along with the PFYC.

Management Opportunities

There is an opportunity to set up a fossil monitoring plan and to provide monitoring and mitigation for any fossil discoveries during ground disturbing activities in areas with high potential for fossils (PFYC 4 and 5).

There is an opportunity to develop off-site interpretation, such as for the Lehner site, at other paleontological sites. BLM could develop resource protection Best Management Practices to protect this unique resource during project development, reduce impacts from recreational use, and identify process for extraction and curation of the uncovered objects.

4.1.14 Visual Resources

Adequacy of Current Management

Current management practices have led to a reduction of impacts on the visual resources in the SPRNCA. Surface-disturbing activities have been mitigated so as to maintain the objectives of

the VRM Class that the BLM parcel is managed under. The result is land uses that remain subordinate against the surrounding natural elements of form, line, color, and texture. However, recognizing that one of the BLM's management mandates for the SPRNCA is the protection and enhancement of scenic quality, some areas of current VRM are not considered adequate to protect visual resources. Managing for VRM Class III objectives allows for a moderate level of change to the landscape. Allowing a moderate level of change could result in deterioration of the scenic quality of the SPRNCA.

Management Opportunities

As a result of the new VRI, the previous evaluation that determined portions of the San Pedro River were suitable for inclusion in the National Wild and Scenic River System under the Recreational Classification, and the determination that there are four units of the SPRNCA that contain lands with wilderness characteristics, there is an opportunity to reevaluate the current VRM classifications in the RMP to ensure the scenic quality is protected in balance with resource uses.

4.1.15 Wilderness Characteristics

Adequacy of Current Management

In the *Riparian Management Plan* (BLM 1989), the potential for wilderness in the SPRNCA was inventoried, but not recommended. At that time, it was determined that the SPRNCA contained two units of roadlessness greater than 5,000 acres, yet according to evaluators did not meet the three criteria required for further consideration for managing for wilderness values.

In compliance with BLM policy, the maintenance of a current inventory and ground-truthing of lands with wilderness characteristics was updated for the SPRNCA in 2013- 2014. The inventory of the SPRNCA for lands with wilderness characteristics identified four units of greater than 5,000 acres which possess naturalness, solitude, opportunities for primitive recreation, and unique values as defined in BLM Manual 6310. These four units are: AZ-G022-009, Cereus Unit, 5,398 acres; AZ-G022-014, Oxbow Unit, 8,473 acres; AZ-G022-015, Coati Wash Unit, 5,912 acres; and AZ-G022-021, Kestrel Unit, 5,915 acres. Other units may still meet the BLM criteria for Lands with Wilderness Characteristics when considered in context with adjacent units.

These changes from the 1989 findings and the current inventory are likely a result of the specific limitation of human disturbances and the allowance of natural processes to predominate in the SPRNCA in the intervening years between inventories.

These four units comprise over 25,690 acres of lands with wilderness characteristics. There are four other units that possess the wilderness characteristics of naturalness, opportunities for solitude and primitive recreation, and contain unique and/or special features, but are not greater than 5,000 acres in size. Legislative direction and BLM policy, states that lands with wilderness characteristics have at least 5,000 acres of land, *or are individually of sufficient size to make practicable their preservation and use in an unimpaired condition*.

Management goals, objectives, and actions would need to be developed to manage lands within the SPRNCA with wilderness characteristics if they are so designated.

Management Opportunities

There is an opportunity to manage four units of the SPRNCA, over half of the total acreage, as Lands with Wilderness Characteristics. This would allow BLM to allow for predominantly untrammeled, natural environments for the physical, biologic and social components of wilderness. The physical and biologic components would be managed so that natural processes are unimpeded by human activities or use. Management would emphasize high levels of solitude, few party encounters, and high opportunities for self-reliance.

4.2 Resource Uses

4.2.1 Lands and Realty

Adequacy of Current Management

Land actions constitute resource allocations, and, as such, are made through a variety of means. They generally fall into five broad categories: use authorizations (primarily ROW and land use permits for temporary facilities such as apiaries that are issued for three year periods [2920 permits]), disposal actions, acquisitions, exchanges, and withdrawals. Each proposal or application for a lands action is considered on a case-by-case basis and is either authorized or rejected under existing *Safford RMP* direction. The primary objective for the SPRNCA lands and realty program is to manage the acquisition, withdrawal, and use of public lands to meet the needs of internal and external customers and to preserve important resource values as designated in the Act. Current management does not provide guidance for new technologies and land uses that were not anticipated.

Under current management, land exchanges and other land tenure adjustment actions such as acquisition of conservation easements will be considered by the TFO and will conform with the relevant RMP, the acquisition of in holdings in the SPRNCA will be reviewed on a case-by-case basis. Current management does not include development of an acquisition strategy for the SPRNCA which would identify and prioritize criteria for acquisitions.

Under current management, ROWs and permits must be in conformance with all federal, state, and local laws and will be issued on a case-by-case basis.

According to IM AZ-2008-07 published October 25, 2007, the BLM TFO will defer approval of land use authorizations unless the requests demonstrate that the intended uses of those lands will not require groundwater from the Upper San Pedro Groundwater Basin.

Management Opportunities

1. Continue issuance of ROWs and permits on a case by case basis;
2. Develop an acquisition strategy for the SPRNCA;
3. Continue to explore acquisition of the railroad fee easement to support management opportunities;
4. Identify ROW avoidance and exclusion areas; and
5. Consider small scale (less than 20 MW) commercial energy development including small scale commercial renewable energy projects on a case by case basis.

Develop criteria for terms and conditions that may apply to new land use authorizations, including best management practices to minimize environmental impacts to the resource values outlined in PL 100-696.

4.2.2 Range and Grazing Management

Adequacy of current management

The *BLM Arizona Standards and Guidelines* initiate a 10-year monitoring and evaluation cycle to assess the condition of desired plant communities, determine if management changes are needed to achieve resource objectives, and adjust management prescriptions as necessary. BLM has conducted this monitoring and evaluation cycle concurrently with permit/lease renewals. This information, as well as other data, is also used to make adjustments in grazing permits and leases. These evaluations indicate that current management is adequate in most areas to maintain healthy, productive plant communities.

Management Opportunities

Management opportunities for the RMP could include changing management direction to focus on identifying Desired Plant Community objectives, prioritizing areas that require intensive management, and identifying management actions needed to achieve desired conditions. Specific activities include:

1. Complete/ update the management plans for Three Brothers, Lucky Hills, Babocomari and Brunckow Hill.
2. Implement rotational grazing practices in allotments and add the needed structures to make this possible;
3. Continue to develop grazing systems and modify existing AMPs as necessary to best manage livestock use for the improvement of riparian areas and reduce nonpoint source water pollution to the SPRNCA;
4. Create a fencing maintenance plan for the SPRNCA that should be revisited at a minimum of once a year for low pressure spots and more often in high pressure areas. This will help ensure unauthorized grazing doesn't continue for long periods of time;
5. Proactively manage for droughts and keep open communication with lessees to prevent high utilization levels;
6. Provide for sustained level of livestock grazing consistent with other resource objectives;
7. Remove unauthorized livestock and manage authorized use to meet land health standards; and
8. Use collaborative groups to help with monitoring.

4.2.3 Recreation

Adequacy of Current Management – Recreation

The Record of Decision from the *Riparian Management Plan* (BLM 1989) chose to provide for moderate recreation use of the SPRNCA to the extent possible without impacting other sensitive resources, making both dispersed and developed recreation available. In addition the BLM was directed to intensively interpret all of the resources of the SPRNCA. Objectives for recreation management in the *Riparian Management Plan* included designating the SPRNCA as a SRMA and adopting the Limits of Acceptable Change planning system. The *Riparian Management Plan* clearly emphasized developing recreational facilities, and a travel and transportation system.

In the intervening years, recreational access, allocations, and facilities development has been a priority of BLM outdoor recreation planning. Much, if not most, of the recreation objectives articulated in the preferred alternative of the *Riparian Management Plan*, have been implemented "to the extent possible without impacting other sensitive resources, making both dispersed and developed recreation available."

Collaboration continues with local, regional, national, and international partners, managing and planning for the recreational and interpretive opportunities in the SPRNCA. The BLM and nonprofit organizations such as the FSPR, Huachuca Audubon Society, and The Nature Conservancy, expend considerable effort, working together to balance sensitive natural and cultural resource values with the congressional mandate that the SPRNCA conserve, protect and enhance recreational and educational opportunities.

Management Opportunities

Recreation in the SPRNCA can be managed as an SRMA or as lands with no recreation management area designation. The SRMA management tool provides opportunities to make a long-term commitment that protects or enhances a set of activities, outcomes and recreation settings. Management of recreation outside an SRMA provides opportunities to manage areas without a recreation focus. These different tools provide a wide variety of management options.

As indicated above in the recreation section, visitors desire a variety of outcomes, recreation settings, and activities throughout the SPRNCA. Continuing to manage the SPRNCA as an SRMA would provide the option of protecting these desired opportunities and their associated natural and cultural values. Different objectives could be developed for different RMZs to selectively manage for one or more recreational activities.

Managing for recreation outside an SRMA provides management opportunities to protect different recreation activities. Though no commitment would be made to protecting outcomes, this management strategy would provide a level of security to user groups concerned with loss of opportunities resulting from encroachment of noncompatible uses or management decisions to close areas to certain types of activities.

Due to recreation being listed as one of the specific values of the SPRNCA in the enabling legislation, managing the SPRNCA as lands with no recreation management designation is generally not an option. The exception could be to manage certain lands within the SPRNCA for their wilderness characteristics, for specific ACEC values, and/or ESA listed species critical habitat. Management values of the wilderness characteristics units would be for naturalness, opportunities for solitude, and primitive and unconfined recreation.

There are units of isolated public land that border, or are within a few miles of, the SPRNCA, which could offer opportunities to manage recreation in a way that complements recreation management not necessarily available within the SPRNCA.

Addressing recreation capacity issues is another management opportunity. Defining use levels through implementation of Adaptive Management in the planning process could reduce the potential for conflict and congestion now and for the future. Defining an SRP classification process and setting allowable use restrictions for SRPs through Adaptive Management and a

recreational activity plan to address use restrictions and permits, could help encourage applications by outfitters and other potential permit applicants.

Finally, there are always opportunities to engage community partnerships to secure long-term commitments for managing recreation as well as other resource values in the SPRNCA. However, recreation is managed, whether as an SRMA, or for lands with wilderness characteristics, or undesignated recreation management, or some combination of techniques, partnerships will be necessary to manage, monitor, and market the recreation opportunities. Potential partnerships include continued liaison with the FSPR, with other service providers (both public and private), tourism organizations, and volunteers. Partnership opportunities have been identified as part of the RMP outreach during the scoping phase.

4.2.4 Transportation and Access

Adequacy of Current Management

Prior to the designation of the SPRNCA, the travel and transportation system was designed to respond to the needs of ROW, grazing allotments, mineral development (gravel and flag stone quarries) and agricultural operations. At that time, OHV use and public recreation was not anticipated.

Within the SPRNCA, the congressional legislation directs the BLM to allow for the use of motorized vehicles in the SPRNCA only on roads specifically designated for administrative or emergency purposes, and that all motorized travel be limited to designated routes. Additionally, the *Riparian Management Plan* states there would be no areas designated as Open for off-road motorized travel. Because a comprehensive route inventory had not been completed and route designations had not been made throughout the SPRNCA, current management is not adequate to meet the requirements of the SPRNCA legislation or anticipated changing uses on the landscape.

Management Opportunities

Travel and transportation decisions required during the planning process are made at two different levels. First, the BLM is required to complete an inventory of the travel and transportation roads, trails, routes and other linear features. This was completed during Fiscal Year 2014. The identification, documentation, and evaluation of these approximately 150 miles of linear features, is a major component of a thorough SPRNCA TTM Plan.

The second level of decisions that BLM is required to make is to designate all BLM-administered public lands as open, closed or limited for motorized travel. The SPRNCA legislation language directed BLM to not manage any lands within the SPRNCA as open, restricting the planning decision to either areas closed or limited to motorized travel. This language restricts BLM's decision to areas "limited to designated routes," removing the option of "limited to existing routes."

Along with the required decisions, the BLM has the opportunity to address other travel and transportation management issues in the planning process. These include:

1. Create a truly comprehensive travel plan, in which travel and transportation planning and management is an interdisciplinary approach where all resource and resource uses are supported by the travel decisions;
2. Developspecific objectives for all resource programs prior to consideration of travel and transportation decisions will ensure the travel system supports each resource program's objectives;
3. Designate routes for nonmotorized uses, including bicycles, foot travel, horses, etc.;
4. Restrict use in areas or on specific routes seasonally;
5. Designate routes for administrative or emergency use only. (e.g., agency use or authorized use through permits);
6. Assign maintenance levels to all routes designated as open and classified as a road, primitive road or a trail;
7. Define criteria for new trail development; and
8. Geographically separate trail users or intensity of use.

The adoption of the TTM Plan will fulfill the requirements of the legislation establishing the SPRNCA.

4.3 Special Designations

4.3.1 Special Management Areas

Adequacy of Current Management

Given the restrictive language in PL 100-696 that established the SPRNCA, it is unclear whether the continued management of these areas within the SPRNCA as ACECs is warranted. PL 100-696 withdrew the SPRNCA from entry for mineral extraction, as well as from entry, appropriation or disposal. The act also only allows uses within the SPRNCA that further the purposes for which the SPRNCA was established. As a result, most surface disturbing activities are already precluded within the SPRNCA.

Management Opportunities

Additional areas warranting designation as ACECs based on relevance and importance criteria may be identified during the planning process for the SPRNCA. These designations will only be used where general management provides inadequate protection for the SPRNCA's important site-specific resources. The designation of ACECs could be used as a management tool to protect important resources in areas where recreation usage is anticipated to increase over the life of the RMP. This is especially true of exceptional locations of resources for which the SPRNCA was designated (i.e., geological, cultural, paleontological, natural/biological, and scenic resources).

One drawback of the designation of ACECs is that they may lead to increased visitation, which can in turn lead to resource degradation as a result of the "loving it to death" paradigm. Opportunities for combined ACECs that protect multiple resources should be identified during the planning process. This approach could allow for restrictive management for sensitive resources without highlighting to the public the specific resources that the ACEC was created to protect.

4.3.2 Wild and Scenic Rivers

Adequacy of Current Management

According to the Record of Decision for the Arizona Statewide Wild and Scenic Rivers Legislative EIS signed by the Assistant Secretary of the Interior in May 1996, two river segments totaling 44.0 miles were recommended suitable for designation by Congress. These river segments were classified as "Recreational."

Preliminary findings of a new Wild and Scenic River inventory performed in 2015 and 2016 indicate that significant portions of the San Pedro River could be re-classified as "Wild" and/or "Scenic" as defined by legislation and guidance provided in BLM Manual 6400. Current environmental conditions which point to these trends are likely a result of the specific limitation of human disturbances and the allowance of natural processes to predominate in the SPRNCA in the intervening years between the 1993 San Pedro River, Arizona, Potential Wild and Scenic River Suitability Assessment and the present time.

Management Opportunities

Current law and policy requires that the TFO, as part of the planning process, conduct an analysis and identify river segments that may be eligible and suitable for inclusion in the National Wild and Scenic River System.

The National Wild and Scenic River Act of 1968 and subsequent BLM policy guides the decision space for actions and activities proposed in specific suitable and eligible segments of a river, (e.g., Wild, Scenic, Recreational). Therefore, specific opportunities for managing a Wild and Scenic San Pedro River depend on which of these classifications are recommended in the suitability report.

If the Director accepts the recommendations in the San Pedro River's suitability report, the BLM will be responsible to manage for those Outstandingly Remarkable Values, until such a time that Congress includes the San Pedro River in the Wild and Scenic River System, or releases the river from further consideration.

4.4 Support

Adequacy of Current Management

Interpretation and Environmental Education

Interpretation and environmental eductation is conducted for most resources managed by the BLM. Current management for those resource areas prescribes the development of both interpretive facilities and educational facilities.

Scientific Research

The Riparian Management Plan (BLM 1989) has the objective of providing facilities for a variety of research in the EIS area (the SPRNCA). The plan has the specific planned action of developing an adequate research facility at either Fairbank or the Highway 90 area for research. Research facilities were provided for a number of years at Boquillas Ranch, but are no longer provided due to needed hazard remediation. The management direction for scientific research in the Riparian Management Plan (BLM 1989) is outdated and only addresses research facilities.

Management Opportunities

Interpretation and Environmental Education

There is an opportunity in the upcoming RMP to develop goals and objectives for interpretation and environmental education.

There is also the opportunity to identify sites in the SPRNCA that would be suitable for environmental education. Some of the environmental education programs that could be developed in the SPRNCA include Hands on the Land and River Pathways. There is an opportunity to partner with organizations such as the FSPR that already have numerous environmental education programs and the Gray Hawk Nature Center.

The new RMP could identify existing sites where interpretation could be updated and new sites for interpretation.

Scientific Research

There is the opportunity to develop goals and objectives for scientific research in the SPRNCA.

The new RMP could discuss how research requests will be handled in the SPRNCA and outline minimum criteria that must be met before requests will be considered. There is the opportunity to identify a facility that is currently suitable to develop as a research facility. Explore adaptive reuse of an existing facility in the SPRNCA, e.g. Boquillas Ranch Manager's house.

4.5 Socioeconomics

Adequacy of Current Management

There are no existing management guidelines in the *Riparian Management Plan* (BLM 1989) or the *Safford RMP* (BLM 1992 and 1994) that directly address social and economic conditions.

Management Opportunities

From a social and economic perspective, the new RMP provides an opportunity for BLM to contribute to a diverse array of stable economic opportunities in an environmentally sound manner.

The SPRNCA RMP does not directly address economic resources in terms of desired economic conditions; however, permitted (authorized), and casual land and mineral resource uses do affect local economic conditions.

Potential economic opportunities and conditions are not identified in the *Riparian Management Plan* or the *Safford RMP* or amendments. However, potential economic effects of management alternatives will be evaluated in the new RMP. Management decisions and related resource uses and activities in the planning area have the potential to affect the local economy. For example, management decisions that dictate the amounts and types of recreation use, livestock grazing, fire and hazardous fuels management, and public revenues could affect local social and economic conditions.

In addition, current planning decisions do not always adequately address traditional use areas important to Native American Tribes. Consultation with Tribes to identify traditional places of importance occurs only when a project specific undertaking is proposed.

5 Consistency/Coordination with Other Plans

According to the BLM RMP guidance found in 43 CFR 1610, BLM RMPs and amendments must be consistent, to the extent practical, with officially approved or adopted resource-related plans of state and local governments, other federal agencies, and tribal governments so long as the guidance and RMPs are also consistent. BLM RMPs must also be consistent with the purposes, policies, and programs of the FLPMA and other federal laws and regulations applicable to public lands, including federal and state pollution control laws (see 43 CFR 1610.3-2 [a]). If these other entities do not have officially approved or adopted resource-related plans, then BLM RMPs must, to the extent practical, be consistent with their officially approved and adopted resource-related policies and programs. This consistency will be accomplished so long as BLM RMPs incorporate the policies, programs, and provisions of public land laws and regulations and federal and state pollution control laws (see 43 CFR 1610.3-2 (b)).

Before BLM approves proposed RMP decisions, the Governor(s) has 60 days to identify inconsistencies between the proposed plan and state plans and programs and to provide written comments to the BLM State Director. The BLM and the state may mutually agree on a shorter review period satisfactory to both. If the Governor does not respond within this period, it is assumed that the proposed RMP decisions are consistent. If the Governor recommends changes in the proposed plan or amendment that were not raised during the public participation process, the State Director shall provide the public with an opportunity to comment on the recommendations (see 43 CFR 1610.3-2 [e]). This public comment opportunity will be offered for 30 days and may coincide with the 30-day comment period for the Notice of Significant Change. If the State Director does not accept the Governor's recommendations, the Governor has 30 days to appeal in writing to the BLM Director (see 43 CFR 1610.3-2[e]).

In accordance with the FLPMA, the BLM has an independent responsibility to coordinate with other units of government (43 U.S.C. 1712(c)(9)) in the development and revision of land use plans. As stated, the BLM will, to the extent practicable, seek to maximize consistency with the plans and policies of other government entities consistent with other federal law, whether or not a cooperating agency relationship has been established.

The CEQ regulations implementing NEPA establish the Cooperating Agency relationship and provide the opportunity for eligible entities to participate in the EIS process as cooperating agencies. In 2005, the BLM added provisions to its planning regulations to include Cooperating Agencies as partners in land use planning. The cooperating agency relationship helps the BLM meet the "coordination" and "consistency" requirements of FLPMA.

County and town, state agency, and other federal agency plans for neighboring areas or cross jurisdictional purposes are further discussed in the following sections. The plans discussed in the following sections should be consulted as applicable during the development of the RMP.

5.1 City and County Plans

This section contains a summary of policies from three local government entities – Cochise County, the City of Sierra Vista and the Hereford Natural Resource Conservation District (NRCD) – that have had extensive engagement in the SPRNCA land use planning process. While some portions of each entity's plans are characterized, this should not be considered a comprehensive review of the policies relevant to the BLM's management of the SPRNCA.

However, a cooperating agency relationship provides an excellent opportunity to meet the BLM's responsibilities under the FLPMA and establish a formal working relationship with local government entities. In the case of the SPRNCA land use planning effort, multiple local jurisdictions were invited to be cooperating agencies and two (Cochise County and the city of Sierra Vista) accepted this invitation.

In the case of this planning effort, consistency with local government policy must be pursued to the extent that these policies are compatible with the FLPMA, other federal law and the direction contain in PL 100-696, the NCA's enabling legislation.

The state of Arizona provides guidance on the relationship between federal and local government policy. Arizona Revised Statutes § 11-269.09 mandates that "[i]f a county has laws, regulations, plans or policies that are less restrictive than a federal or state regulation, rule, plan or policy, the county shall demand by any lawful means that the federal government coordinate with the county before the federal government implements, enforces, expands or extends the federal regulation, rule, plan or policy within the county's jurisdictional boundaries."

5.1.1 Cochise County, Arizona

- *Cochise County Comprehensive Master Plan (1984 as amended 2011)*

Approximately one quarter of surface acres in Cochise County are administered by federal agencies including the BLM, USFS and the NPS. As a result, the Cochise County Comprehensive Master Plan, first developed in 1984 and amended in 2011, contains specific direction on management of federal lands. The county's stated goal is to preserve or improve the county's economic development, unique cultural characteristics, ecological function and community quality of life. The County has strongly encouraged federal agencies to coordinate with the county under ARS 11-269.09, and relevant agency policies. Within the Comprehensive Master Plan, there are numerous policies that are pertinent to management of the SPRNCA, including but not limited to:

- **Public and stakeholder engagement:** Throughout the county's planning documents, the need for full disclosure and public engagement are emphasized. This requirement is complimentary to BLM's RMP process and the iterative nature of public and stakeholder involvement required by land use planning policy.
- **Groundwater and riparian habitat protection*:*** Water policy is a consistent theme in the county's comprehensive plan. It encourages the careful management of groundwater and surface water to maintain stability for social and economic conditions within the county. Additionally, the plan also recognizes the importance of policy to ensure the viability of riparian areas. The importance of cross-jurisdiction cooperation, recharge and

reuse efforts is stressed throughout the plan. Federal lands are to be managed in a way to limit impacts to the groundwater aquifer.

- **No net loss policy:** The Comprehensive Plan calls for a "no net loss" of private land within county boundaries, a policy that has implications for potential land acquisition or future additions to the SPRNCA. PL 100-696 also contains legislative direction specific to land acquisition.
- **Value of the SPRNCA:** Through the comprehensive plan, Cochise County recognizes both the historic and current value of the SPRNCA as a national riparian wildlife habitat, migratory bird corridor, recreational and agricultural resource, and critical habitat for an endangered species.
- **Special designations:** The comprehensive plan urges caution in the application of special, protective designations on federal land such as ACEC, critical habitat or similar designations. This direction would also presumably apply to BLM administrative determinations such as protection of Lands with Wilderness Characteristics or findings of Wild and Scenic River suitability. The need for scientific data, utility of the designation, consistency with enabling legislation or law and the uniqueness of the area in question are emphasized by the county. This policy would apply to several RMP-level decisions to be made by the BLM.
- **Livestock grazing:** Preservation of a viable agricultural economic base is one of the goals of Cochise County, as stated in several sections of the county plan. Ranching, farming and other agricultural pursuits are seen as key to the county's cultural and social identity. As a result, the county encourages that current allocations for livestock grazing are maintained or increased.
- **Tourism and Recreation management:** The availability of high quality recreation opportunities is identified by the county as important for local residents and visitors alike. County policy on recreation encourages robust user education, availability of opportunities to a broad segment of the population and preservation of public access. Public land management should also be considered in light of the county's initiatives to promote tourism-related development.

5.1.2 City of Sierra Vista, Arizona

- *Vista 2030: Sierra Vista General Plan (*ratified 2014)

The city of Sierra Vista's comprehensive plan, the *Vista 2030 General Plan,* was ratified by city voters on November 4, 2014. According to the city, the Plan is "…a collection of goals and strategies that provide overall direction for how Sierra Vista should manage growth and development." The city first developed a general plan in 1965, which has been revised four times (1985, 1995, and 2002).

General plans are a state requirement (Arizona Revised Statutes, Section 9-461.05-9 D 4) for municipalities in order to provide policies for land use, transportation, environmental production and the provision of public services. Since the Plan is specific to the incorporated boundaries of the city, much of the content is not specific to federal public lands such as the SPRNCA. However, as the largest city in the region, the vision for management and growth of Sierra Vista is highly relevant for stewardship of the SPRNCA.

Broadly, the Plan calls for an intentional approach to growth that minimizes noncontiguous development and provides for open space and habitat protection. Connectivity between and protection of major conservation areas surrounding Sierra Vista is emphasized on the city's General Plan. Connections between the Huachuca Mountains and the San Pedro River are referenced as a "primary focus" (pg 38). Additionally, the city's zoning calls for lower levels of residential density to the east, based on proximity to the river. Open space protection within incorporated boundaries is also provided for in the Plan.

The city recognizes that municipal growth within city limits and throughout Cochise County has the potential to effect water resources and the SPRNCA, and describes the current groundwater deficit in the Sierra Vista Subwatershed of the river. Numerous steps are identified by the city to reduce or eliminate this deficit, including implementation of recharge projects and partnership with federal agencies such as the BLM. The city identifies a reduction in water usage by residents of more than 5 percent, despite an 8 percent increase in population between 2000 to 2012.

The General Plan also describes the city's approach to water conservation. It identifies numerous objectives and Best Management Practices to reduce impacts to water quality such as the protection of tributaries of the San Pedro River, increase of permeable surfaces, low-impact stormwater management, and limits on pumping from the groundwater aquifer.

The promotion of tourism is one area of potential economic growth for Sierra Vista. The General Plan identifies eco-tourism and visitation to regional destinations such as the SPRNCA as future areas of economic diversity. Policies that improve the SPRNCA as both an asset for local residents and a destination for out-of-town visitors is consistent with the city's Plan.

5.1.3 Hereford NRCD

- *Hereford NRCD 2013-2018 Long Range Plan*
- *Hereford NRCD 2015 Conservation Strategy*

The Hereford NRCD is a local division of state government established in August 1944. The boundaries of the NRCD are irregular, but include much of the SPRNCA.

The vision of the NRCD is to "…conserve natural resources by promoting and demonstrating policies and practices that are economically feasible and environmentally responsible." The NRCD's current guiding documents, the *2013-2018 Long Range Plan (LRP)* and the closely-related *2015 Conservation Strategy*, provides specific direction for the organization and other government entities at the local, state and federal level in the interest of pursuing this vision. Coordination with federal agencies such as the BLM is emphasized as a key strategy for the District to achieve its goals.

Generally, both documents emphasize the balance between conservation and economic development by promoting voluntary conservation efforts. It contains detailed objectives that support the NRCD's vision and conservation goals, many of which are relevant to the management of public lands within the SPRNCA. While some objectives are applicable to day-to-day operations rather than land use planning, such as the sharing of monitoring data with the

NRCD, control of invasive species or education activities, many are applicable to the SPRNCA RMP.

The NRCD encourages the use of livestock grazing as a tool for resource management, including on federal lands such as the SPRNCA. According to the LRP, the NRCD seeks to broaden the use of livestock grazing within the boundaries of the NCA using best management practices, many of which are listed.

Other economic considerations are also prominent in the NRCD's objectives. They include encouragement of "full access" to mineral resources and public access to recreational opportunities, among other policies.

Efforts to improve range conditions such as erosion control, vegetation management and post-fire restoration are encouraged. The Conservation Strategy specifically encourages the increase of vegetation of cover combined with an expansion of brush control methods to promote ecological function. The SPRNCA is specifically mentioned as a suitable location for these techniques.

The NRCD encourages integrated long term water planning and management between the relevant agencies and organizations. Programmatic decisions that mitigate surface water impacts and promote efficient use are strategies mentioned by NRCD documents.

Wildfire prevention is part of the NRCD's overall strategy for resource management. The District supports controlled burns to prevent "catastrophic" fires that may threaten property, infrastructure and natural resources.

While many objectives are relevant for public land management, the following objectives from the LRP pertain to multiple use management, wildlife conservation and livestock grazing are selected verbatim:

- **LRP Objective 2:** Embrace the multiple use philosophy of the Federal Land Management Act of 1976
- **LRP Objective 4(a):** Enter into coordination with the federal and state agencies and the county in the management of lands and/or resources located within the District to ensure agency plans are either consistent with the District plans or contain an explanation for the nonconsistence areas.
- **LRP Objective 5(a):** Artificial introductions or reintroductions of threatened, endangered, and protected species, or species of special concern or species proposed for listing is opposed by the District.
- **LRP Objective 6(j):** Encourage grazing, brush control and fire management to improve the resource conditions of the SPRNCA and on properties of all ownerships.
- **LRP Objective 6(k).** Have continued managed grazing on the 6521 acres of former State Trust land within the SPRNCA in accordance with the state exchange agreements. This area includes state lands acquired by BLM with the development of the SPRNCA.

5.2 State Agency Plans

5.2.1 AZGFD

- *Statewide Wildlife Action Plan 2012–2022*

Arizona's State Wildlife Action Plan (SWAP) provides a comprehensive vision for managing Arizona's fish, wildlife, and wildlife habitats for a 10-year period. The plan identifies strategies and actions to coordinate efforts among all of the entities that participate in conserving Arizona's wildlife. The plan focuses on wildlife and habitats that are at the greatest risk and in the most need of conservation.

The SWAP identifies Species of Greatest Conservation Need (SGCN) based on vulnerability of populations, of which there are eight criteria (AZGFD 2012a). The SWAP also describes habitat types and the conditions of those habitats across the state of Arizona. It identifies stressors for the SGCN and actions that can be taken to address the stressors. Section 2.3.8 Fish and Wildlife Habitat, and Section 2.3.9 Migratory Birds both incorporate applicable aspects of the SWAP into the description of current conditions, trends, and forecast for SPRNCA fish and wildlife and migratory birds.

5.3 Other Federal Agency Plans

5.3.1 Department of Defense

- *Fort Huachuca's 2014 Biological Opinion*

Fort Huachuca's Biological Opinion is the 2014 culmination of formal consultation with the USFWS regarding the potential effects of Fort Huachuca's operations on threatened and endangered species, as well as on existing or proposed critical habitat, on the Fort and in the San Pedro and Babocomari Rivers. The consultation looks at the Fort's 10-year plan for land use, training activities, construction activities, administration and support actions, recreation, fire management, and other activities. Effects to the endangered Huachuca water umbel, jaguar, lesser long-nosed bat, ocelot, Sonora tiger salamander, and the threatened Chiricahua leopard frog and Mexican spotted owl and applicable critical habitat designations are addressed in the Biological Opinion. The conclusion of the Biological Opinion is that the Fort's ongoing operations are not likely to jeopardize the continued survival or recovery of any threatened, endangered or proposed species or result in adverse modification of existing or proposed critical habitat.

- *Fort Huachuca's 2010 Integrated Natural Resources Management Plan*

Fort Huachuca's Integrated Natural Resources Management Plan is Fort Huachuca's plan of action for the management of natural resources on all Fort lands, ranges, and leased lands. The goal of the plan is to support the military mission of electronics testing and training soldiers in intelligence and communication as well as conserving natural resources. Another goal is to move the Fort from compliance-based management to a mission-oriented approach based on ecosystem management. The Integrated Natural Resources Management Plan also guides Fort Huachuca's

role in natural resource conservation at the regional level and emphasizes the need to coordinate outside of the Fort's boundaries.

5.3.2 US Fish and Wildlife Service, Arizona, New Mexico, Oklahoma, Texas – Region 2

A description of the applicable Habitat Conservation Plans, Candidate Conservation Agreements, and Recovery Plans is provided in Section 2.3.8 Fish and Wildlife Habitat, Section 2.3.9 Migratory Birds, and Section 2.3.10 Special Status Species.

5.4 Nation to Nation Consultation

On December 12, 2012, the BLM invited the following tribes to become a Cooperating Agency for the RMP revision process:

- Ak Chin Indian Community;
- Gila River Indian Community;
- Pueblo of Zuni;
- Salt River Pima Maricopa Indian Community;
- San Carlos Apache Indian Community;
- Hopi Tribe;
- Tohono O'Odham; and
- White Mountain Apache.

Of these tribes only the Hopi Tribe replied, however, they did not accept the invitation to be a Cooperating Agency. Follow up letters were sent to the Ak Chin, Gila River Indian Community, Salt River Pima Maricopa Indian Community, and the Tohono O'Odham in June 2013 with no response.

Presentations were made to tribal councils and representatives on April 29:

- Ak Chin Indian Community;
- Gila River Indian Community;
- Salt River Pima Maricopa Indian Community; and
- Tohono O'Odham.

6 Specific Mandates and Authority

The BLM planning process is authorized through the FLPMA of 1976 and the NEPA of 1969. In addition to these acts, several other acts, Regulations, Instruction Memorandums, Information Bulletins, Manuals, and Handbooks provide direction and authority to the BLM. The following are some of the additional documents and laws that direct the management of public lands and resources in the SPRNCA.

6.1 Laws, Regulations, and Orders

- 2009 Guidance for the Implementation of the Federal Wildland Fire Management Policy
- American Indian Religious Freedom Act (49 USC 47125 et sequens)
- Appropriations Act of 1952, McCarran Amendment
- Archaeological Resources Protection Act of 1979, as amended (16 USC 470)
- Classification of Multiple Use Act of September 1964, in accordance with 43 CFR 2400
- Clean Air Act of 1955 (42 USC §§ 7401-7671q.)
- Clean Water Act of 1987, as amended (33 USC 1251)
- Endangered Species Act of 1973, as amended (16 USC 1531 et sequens)
- EO 11288 (water quality management and pollution abatement plans)
- EO 11644 (Use of Off-Road Vehicles on the Public Lands)
- EO 11738 (Enforce the Clean Air Act and the Clean Water Act in the procurement of Goods, Materials, and Services)
- EO 11987 (Exotic Flora and Fauna)
- EO 13007 (Indian Sacred Sites)
- EO 13084 (Consultation and Coordination with Indian Tribal Governments)
- EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)
- EO 13443 (Facilitation of Hunting Heritage and Wildlife Conservation)
- EO 1311(64 FR 6183) (Invasive Species Control)
- Federal Cave Resources Protection Act of 1988 (16 USC 4301 et sequens)
- Federal Land Policy Management Act of 1976 (43 USC 1701 et sequens)
- Federal Noxious Weed Act of 1974, as amended (7 USC 2814)
- Federal Water Pollution Control Act (commonly known as the Clean Water Act), as amended (33 USC 1251-1387)
- Federal Wildland Fire Management Policy (1995)
- Fish and Wildlife Coordination Act (16 USC 661 et sequens)
- Healthy Forests Restoration Act of 2003269
- Historic Sites Act of 1935 (16 USC 461)
- Migratory Bird Conservation Act of 1929, as amended (16 USC 715)
- Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712)
- Mining and Mineral Policy Act of 1970 (30 USC 181 et sequens)
- National Ambient Air Quality Standards (40 CFR 50.4-50.12)
- NEPA of 1969 (42 USC 4321 et sequens)
- National Historic Preservation Act, as amended (16 USC 470)

- Native American Graves Protection and Repatriation Act, as amended (25 USC 3001 et sequens)
- Noise Control Act of 1972 (42 USC 4901 et sequens)
- Noxious Weed Control Act of 2004 (PL 108-412)
- Public Rangelands Improvement Act of 1978 (43 USC 869 et sequens)
- Recreation and Public Purposes Act of 1926, as amended (43 USC 869 et sequens)
- Review and Update of the 1995 Federal Wildland Fire Management Policy (2001)
- The R&PP Amendment Act of 1988
- The Sikes Act of 1974, as amended (16 USC 670 et sequens)
- Soil and Water Resources Conservation Act of 1977 (16 USC 2001)
- Surface Mining Control and Reclamation Act of 1977 (30 USC 1201 et sequens)
- Taylor Grazing Act of 1934 (43 USC 315)
- The Common Varieties of Mineral Materials Act of 1947
- The Mineral Leasing Act of 1920
- The Mineral Leasing Act for Acquired Lands of 1947
- The Multiple Use Mining Act of 1955
- The Organic Administration Act of 189
- The Surface Mining Control and Reclamation Act of 1977
- The United States Mining Laws of 1872
- Title CFR 43 (Public Lands, Interior), Parts 2100, 2200, 2300, 2700, 2800, 2900, 3100, 3200, 3400, 3500, 3600, and 3800
- Water Resources Development Act of 1974
- Wild and Scenic Rivers Act, as amended (16 USC 1271 et sequens)
- Wilderness Act, as amended (16 USC 1131 et sequens)

6.2 Memorandums, Bulletins, Manuals, Handbooks, and Notes

- BLM-H-1601-1 (Land Use Planning)
- BLM Handbook H 1734-1 (Interagency Ecological Site Handbook for Rangelands)
- BLM Handbook H 1740-2 (Integrated Vegetation Handbook)
- BLM Handbook H 1741-5 (Prescribed Fire Handbook)
- BLM Manual MS-1745 (Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants)
- BLM-H-1790-1 (NEPA Handbook)
- BLM-H-2100-1 (Acquisitions)
- BLM-H-2200 (Land Exchanges)
- BLM-H-3720-1 (Abandoned Mine Land Program Policy)
- BLM Manual MS-4180 (Land Health)
- BLM Handbook H 4180-1 (Rangeland Health Standards)
- BLM Manual 6220 National Monuments, National Conservation Areas, and Similar Designations.
- BLM Manual 6310, Conducting Wilderness Characteristics Inventory on BLM Lands
- BLM Manual 6320 Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process

- BLM-H-8410-1 (VRI)
- BLM H-9211-1, Fire Management Activity Planning
- Interagency Prescribed Fire Planning and Implementation Procedures Guide (July 2008)
- BLM-M-1613 (ACEC)
- BLM-M-4180 (Rangeland Health Standards)
- BLM Manual MS-6500 (Fish and Wildlife Conservation Manual)
- BLM Manual MS-6830 (Wildlife Damage Management)
- BLM-M-6840 (Special Status Species Management)
- BLM-M-7150 (Provides guidance in the conduct of maintenance of water utilization and development, water quality, water yield and timing, and water rights)
- BLM-M-7300 (Air Resource Management Manual)
- BLM-M-8100 (Cultural Resource Management)
- BLM-M-8270 (Paleontological Resource Management)
- BLM-M-8340 (OHV Management)
- BLM Manual 9211, Fire Planning
- IB 98-116 (Clean Water Action)
- IB 2002-101 (Cultural Resource Information)
- IM 78-410 (Protection of Wetlands and Riparian Areas)
- IM 78-523 (Compliance with BLM Interim Floodplain Management Procedures)
- IM 87-261 (Implementation of the Riparian Area Management Policy)
- IM 99-085 (Federal Multi-Agency Source Water Agreement)
- IM 2004-005 (Clarification of OHV Designations and Travel Management in the BLM Land Use Planning Process)
- IMAZ-2005-023 (Wildlife Water Development/Maintenance Coordination with Arizona Game and Fish Department)
- IMAZ-2007-001 (Implementing BLM Manual Section 1745 (Introductions and Transplants) Delegation of Authority for Approvals)
- IM 2008-014 (Clarification of Guidance and Integration of Comprehensive TTM Planning into the Land Use Planning)
- IMAZ-2007-001 (Implementing BLM Manual Section 1745 (Introductions and Transplants) Delegation of Authority for Approvals)
- IMAZ-2012-020 (Implementation of Endangered Species Act Section 7 Consultation Related to Wildland Fire Activities)
- IMAZ-2012-031 (Desert Tortoise Mitigation Policy)
- WO-IM-2012-039 (Identification and Uniform Mapping of Wildlife Corridors and Crucial Habitat Pursuant to an MOU with the Western Governors' Association)
- IM-2013-119 (Review of the BLM Strategic Plan for Migratory Bird Conservation)
- Interagency Standards for Fire and Fire Aviation Operations (The Red Book) (Updated yearly)
- Interagency Prescribed Fire Planning and Implementation Procedures Guide (July 2008)
- Technical Notes 346: Erosion condition classification system
- Technical Notes 369: Considerations in rangeland watershed monitoring
- Arizona BLM Interdisciplinary Resource Management Handbook
- Arizona Standards for Rangeland Health and Guidelines for Grazing Administration

- BLM NLCS Science Strategy
- Adaptive management: the US Department of the Interior technical guide
- *DOI-BLM Burned Area Emergency Stabilization and Rehabilitation Handbook*, H-1742-1.
- *BLM AZ Programmatic Emergency Stabilization and Rehabilitation Plan*, BLM-AZ-EA-934-2006-0001.
- BLM 8270 *Manual Paleontological Resource Management*
- BLM Handbook (H-8270-1) *General Procedural Guidance for Paleontological Resource Management*.

6.3 Applicable Arizona State Laws and Regulations

- Arizona Water Quality Standards (18 Arizona Administrative Code, Chapter 11, Article 1)
- Arizona Fish and Wildlife Management (Arizona Revised Statute 17-102, Arizona Revised Statute 17-301 D.2)

6.4 Memoranda and Agreements

- WO-IB-2010-110 (MOU Between the BLM and the US FWS to Promote the Conservation of Migratory Birds)
- Agreement Number AZ-930-0703 (Master MOU Between the BLM Arizona State Office and the state of Arizona, Arizona Game and Fish Commission for Statewide Coordination and Cooperation).

6.5 Applicable Planning Documents

- The NAWMP
- Arizona's SWAP
- Arizona's Comprehensive Wildlife Conservation Strategy: 2005–2015

6.5.1 Land Use Plans and Amendments

- Arizona Statewide LUPA for Fire, Fuels, and Air Quality Management
- Approved RMP Amendments/Record of Decision for Designation of Energy Corridors on BLM-Administered Lands in the 11 Western States (January 2009)
- Final Vegetation Treatments using Herbicides on BLM Lands in 17 Western States Programmatic EIS (June 2007)
- Wind Energy Development Programmatic EIS and Associated LUPAs (December 2005)
- RMP Amendments for Geothermal Leasing in the Western United States (December 2008)
- Solar Energy Development Programmatic EIS to develop and implement agency-specific programs that would facilitate environmentally responsible utility scale solar energy development in six western states (Scheduled for release in Fall 2010)
- Arizona Statewide Wild and Scenic Rivers Legislative EIS

6.5.2 Activity Level Plans

- Gila District Fire Management Plan

6.5.3 Endangered Species Recovery Plans

- Chiricahua leopard frog Recovery Plan (2007)
- Draft Revised Gila/Yaqui Topminnow Recovery Plan (1998)
- Loach minnow Recovery Plan (1991)
- Spikedace Recovery Plan (1991)
- (Northern) Aplomado falcon Recovery Plan (1990)
- Southwestern willow flycatcher Recovery Plan (2002)
- Lesser-long nosed bat Recovery Plan (1997)
- Ocelot Recovery Plan (2010) Draft
- Recovery Outline for the Jaguar (2012)
- Mexican wolf Recovery Plan (1982)

6.5.4 Habitat Plans

- San Pedro Riparian NCA Habitat Management Plan (1993)

6.5.5 Other Policy and Guiding Direction

- Preparing a CWPP-A Handbook for Wildland-Urban Interface Communities, 2004;
- Best Management Practices for Creating a CWPP, GTR-NRS-89, 2012;
- Southwest CWPP Guide, Southwest Strategy;
- The Federal Land Assistance, Management and Enhancement Act of 2009;
- Biological Opinion on the Replacement of the State Route 90 Bridge over the San Pedro River in Cochise County, Arizona;
- Biological Opinion on the Hereford Bridge Collapse Emergency Consultation;
- Biological Opinion on Reintroduction of Beaver into the San Pedro Riparian NCA;
- Biological Opinion on Aquatic Species Conservation on the San Pedro Riparian NCA and Las Cienegas NCA;
- Biological Opinion on the Gila District Grazing Program.

7 Summary of Scoping Report

7.1 Scoping

Following publication of the Notice of Intent, the BLM conducted three strategic planning meetings. The purpose of the meetings was to present information about the RMP process, discuss public involvement plans, solicit recommendations to encourage public involvement, and share lessons learned from other public involvement experiences. Table 7.1-1 lists the date, location, and attendance at these meetings.

Table 7.1-1. Strategic Planning Locations and Attendance

Date	Location	Attendance
May 15, 2013	Sierra Vista	43
June 18, 2013	Benson	29
June 20, 2013	Tucson	18
Total		90

Participants in the strategic planning meetings voiced interest in holding educational forms on relevant topics to inform public comments in the scoping period. As a result, five forums were held in Sierra Vista from July 20 to August 24. Each forum consisted of 20-minute presentations by three to four subject-matter experts, followed by a 10-minute question-and-answer period. After the presentations, the participants were invited to meet with the presenters and BLM resource specialists. Table 7.1-2 lists the date, topic, and attendance at each forum.

Table 7.1-2. Education and Scoping Forums

Date	Topic	Attendance
July 20, 2013	Water and riparian	35
July 27, 2013	Watershed and range	48
August 10, 2013	Wildlife and threatened and endangered species	33
August 17, 2013	Cultural resources and recreation	44
August 24, 2013	Socioeconomics	22
Total		**182**

The BLM hosted four public scoping meetings in August and September to provide information to the public and agencies (Table 7.1-3). The meeting attendees were invited to submit comments and share issues and concerns related to the RMP. A total of 46 participants attended the scoping meetings.

Table 7.1-3. Public Scoping Meeting Locations and Attendance

Date	Location	Attendance
August 13, 2013	Benson	11
August 15, 2013	Tucson	9
August 21, 2013	Sierra Vista	22
September 12, 2013	Bisbee	4
Total		**46**

The public scoping meetings consisted of a hybrid meeting format: presentation, question-and answer period, and open house. Each scoping meeting started with introductions and a 20-minute presentation by BLM staff. The presentation described the scoping process, provided information on submitting scoping comments, and summarized the range of planning decisions to be considered in the RMP/EIS. Following the presentation, participants were given the opportunity to ask questions. The last hour of each scoping meeting was an open-house format in which participants could talk one-on-one with BLM resource specialists.

To highlight specific concerns and for simplicity in identifying specific issues, comments have been grouped by category, consolidated, and edited. The comments were summarized by grouping comments of similar content into a singular statement that the RMP/EIS writers can address. Table 7.1-4 lists the number of external comments received during the formal scoping period.

Table 7.1-4. Number of External Comments by Comment Category

Comment Category	Number of Comments	Percent
Planning area boundary	19	4
Recreation, travel management, scientific research, public health and safety, and firearms	129	26
Special designations (ACECs, wilderness, wild and scenic rivers), visual resources, and wilderness characteristics	18	4
Land health (uplands and watershed function), soil resources, vegetation, fire management, adaptive management/climate change, and riparian areas, floodplains, wetlands, and aquatic habitats	93	19
Fish and wildlife habitat and special status species	41	8
Water resources	52	10
Lands and realty, livestock grazing, and energy and mineral resources	92	18
International border	11	2
Cultural resources, paleontological resources, and Native American concerns	38	8
Socioeconomics	6	1
Total	499	

8 List of Preparers

The following staff participated in the preparation of the AMS:

- David McIntyre – Project Manager
- Amy Markstein – Assistant Project Manager
- Karen Simms – Management Representative
- Ben Lomeli – Water Resources
- David Murray – Water Resources
- Amy Sobiech – Cultural Resources
- Phillip Gensler – Paleontological Resources
- Jim Mahoney – Outdoor Recreation Planner
- Francisco Mendoza – Outdoor Recreation Planner
- Eric Baker – Range Conservation Specialist
- Leslie Uhr – GIS Specialist
- Sharisse Fisher – GIS Specialist
- Evan Darrah – GIS Specialist
- Marcia Radke – Wildlife Biologist
- Jeff Simms – Fisheries Biologist
- Dan Quintana – Fire Management
- Linda Dunlavey – Lands and Realty
- Dan Moore – Geology

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10 Appendices

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APPENDIX A
ARIZONA STANDARDS AND GUIDES

ARIZONA STANDARDS
FOR
RANGELAND HEALTH
AND
GUIDELINES
FOR
GRAZING ADMINISTRATION

U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

ARIZONA

Recommended for Approval:

Sylvia Baca
Interim Director
of the Interior

APR 24 1997

Date

Approved:

Bruce Babbitt
Secretary

APR 28 1997

Date

ARIZONA STANDARDS FOR RANGELAND HEALTH AND GUIDELINES FOR GRAZING ADMINISTRATION

INTRODUCTION

The Department of the Interior's final rule for Grazing Administration, issued on February 22, 1995, and effective August 21, 1995, requires that Bureau of Land Management (BLM) State Directors develop State or regional standards and guidelines for grazing administration in consultation with BLM Resource Advisory Councils (RAC), other agencies and the public. The final rule provides that fallback standards and guidelines be implemented, if State standards and guidelines are not developed by February 12, 1997. Arizona Standards and Guidelines and the final rule apply to grazing administration on public lands as indicated by the following quotation from the Federal Register, Volume 60, Number 35, page 9955.

> "The fundamentals of rangeland health, guiding principles for standards and the fallback standards address ecological components that are affected by all uses of public rangelands, not just livestock grazing. However, the scope of this final rule, and therefore the fundamentals of rangeland health of §4180.1, and the standards and guidelines to be made effective under §4180.2, are limited to grazing administration."

Although the process of developing standards and guidelines applies to grazing administration, present rangeland health is the result of the interaction of many factors in addition to grazing by livestock. Other contributing factors may include, but are not limited to, past land uses, land use restrictions, recreation, wildlife, rights-of-way, wild horses and burros, mining, fire, weather, and insects and disease.

With the commitment of BLM to ecosystem and interdisciplinary resource management, the standards for rangeland health as developed in this current process will be incorporated into management goals and objectives. The standards and guidelines for rangeland health for grazing administration, however, are not the only considerations in resolving resource issues.

The following quotations from the Federal Register, Vol. 60, No. 35, page 9956, February 22, 1995, describe the purpose of standards and guidelines and their implementation:

> "The guiding principles for standards and guidelines require that State or regional standards and guidelines address the basic components of healthy rangelands. The Department believes that by implementing grazing-related actions that are consistent with the fundamentals of §4180.1 and the guiding principles of §4180.2, the long-term health of public rangelands can be ensured.
>
> "Standards and guidelines will be implemented through terms and conditions of grazing permits, leases, and other authorizations, grazing-related portions of activity plans (including Allotment Management Plans), and through range improvement-related activities.
>
> "The Department anticipates that in most cases the standards and guidelines themselves will not be terms and conditions of various authorizations but that the terms and conditions will reflect the standards and guidelines.

> "The Department intends that assessments and corrective actions will be undertaken

in priority order as determined by BLM.

"The Department will use a variety of data including monitoring records, assessments, and knowledge of the locale to assist in making the "significant progress" determination. It is anticipated that in many cases it will take numerous grazing seasons to determine direction and magnitude of trend. However, actions will be taken to establish significant progress toward conformance as soon as sufficient data are available to make informed changes in grazing practices."

FUNDAMENTALS AND DEFINITION OF RANGELAND HEALTH

The Grazing Administration Regulations, at §4180.1 (43 Code of Federal Regulation [CFR] 4180.1), Federal Register Vol. 60, No. 35, pg. 9970, direct that the authorized officer ensures that the following conditions of rangeland health exist:

(a) Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity, and timing and duration of flow.

(b) Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.

(c) Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs.

(d) Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed, Category 1 and 2 Federal candidate and other special status species.

These fundamentals focus on sustaining productivity of a rangeland rather than its uses. Emphasizing the physical and biological functioning of ecosystems to determine rangeland health is consistent with the definition of rangeland health as proposed by the Committee on Rangeland Classification, Board of Agriculture, National Research Council (Rangeland Health, 1994, pg. 4 and 5). This Committee defined Rangeland Health ". . .as the degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained." This committee emphasized ". . .the degree of integrity of the soil and ecological processes that are most important in sustaining the capacity of rangelands to satisfy values and produce commodities." The Committee also recommended that "The determination of whether a rangeland is healthy, at risk, or unhealthy should be based on the evaluation of three criteria: degree of soil stability and watershed function, integrity of nutrient cycles and energy flow, and presence of functioning mechanisms" (Rangeland Health, 1994, pg. 97-98).

Standards describe conditions necessary to encourage proper functioning of ecological processes on specific ecological sites. An ecological site is the logical and practical ecosystem

unit upon which to base an interpretation of rangeland health. Ecological site is defined as:

". . . a kind of land with specific physical characteristics which differs from other kinds of land in its

ability to produce distinctive kinds and amounts of vegetation and in its response to management" (Journal of Range Management, 48:279, 1995). Ecological sites result from the interaction of climate, soils, and landform (slope, topographic position). The importance of this concept is that the "health" of different kinds of rangeland must be judged by standards specific to the potential of the ecological site. Acceptable erosion rates, water quality, productivity of plants and animals, and other features are different on each ecological site.

Since there is wide variation of ecological sites in Arizona, standards and guidelines covering these sites must be general. To make standards and guidelines too specific would reduce the ability of BLM and interested publics to select specific objectives, monitoring strategies, and grazing permit terms and conditions appropriate to specific land forms.

Ecological sites have the potential to support several different plant communities. Existing communities are the result of the combination of historical and recent uses and natural events. Management actions may be used to modify plant communities on a site. The desired plant community for a site is defined as follows: "Of the several plant communities that may occupy a site, the one that has been identified through a management plan to best meet the plan's objectives for the site. It must protect the site as a minimum." (Journal of Range Management, 48:279, 1995.)

Fundamentals (a) and (b) define physical and biological components of rangeland health and are consistent with the definition of rangeland health as defined by the Committee on Rangeland Classification, Board on Agriculture, National Research Council, as discussed in the paragraph above. These fundamentals provide the basis for sustainable rangelands.

Fundamentals (c) and (d) emphasize compliance with existing laws and regulation and, therefore, define social and political components of rangeland health. Compliance with Fundamentals (c) and (d) is accomplished by managing to attain a specific plant community and associated wildlife species present on ecological sites. These desired plant communities are determined in the BLM planning process, or, where the desired plant community is not identified, a community may be selected that will meet the conditions of Fundamentals (a) and (b) and also adhere to laws and regulations. Arizona Standard 3 is written to comply with Fundamentals (c) and (d) and provide a logical combination of Standards and Guidelines for planning and management purposes.

STANDARD AND GUIDELINE DEFINITIONS

Standards are goals for the desired condition of the biological and physical components and characteristics of rangelands. Standards:

(1) are measurable and attainable; and
(2) comply with various Federal and State statutes, policies, and directives applicable to BLM Rangelands.

Guidelines are management approaches, methods, and practices that are intended to achieve a standard. Guidelines:

(1) typically identify and prescribe methods of influencing or controlling specific public land uses;

(2) are developed and applied consistent with the desired condition and within site capability; and
(3) may be adjusted over time.

IMPLEMENTING STANDARDS AND GUIDELINES

The authorized officer will review existing permitted livestock use, allotment management plans, or other activity plans which identify terms and conditions for management on public land. Existing management practices, and levels of use on grazing allotments will be reviewed and evaluated on a priority basis to determine if they meet, or are making significant progress toward meeting, the standards and are in conformance with the guidelines. The review will be interdisciplinary and conducted under existing rules which provide for cooperation, coordination, and consultation with affected individuals, federal, state, and local agencies, tribal governments, private landowners, and interested publics.

This review will use a variety of data, including monitoring records, assessments, and knowledge of the locale to assist in making the significant progress determination. Significance will be determined on a case by case basis, considering site potential, site condition, weather and financial commitment. It is anticipated there will be cases where numerous years will be needed to determine direction and magnitude of trend.

Upon completion of review, the authorized officer shall take appropriate action as soon as practicable but no later than the start of the next grazing year upon determining that the existing grazing management practices or level of use on public land are significant factors contributing to failure to achieve the standards and conform with the guidelines that are made effective under 43 CFR 4180.2. Appropriate action means implementing actions that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with guidelines.

Livestock grazing will continue where significant progress toward meeting standards is being made. Additional activities and practices would not be needed on such allotments. Where new activities or practices are required to assure significant progress toward meeting standards, livestock grazing use can continue contingent upon determinations from monitoring data that the implemented actions are effective in making significant progress toward meeting the standards. In some cases, additional action may be needed as determined by monitoring data over time.

New plans will incorporate an interdisciplinary team approach (Arizona BLM Interdisciplinary Resource Management Handbook, April 1995). The terms and conditions for permitted grazing in these areas will be developed to comply with the goals and objectives of these plans which will be consistent with the standards and guidelines.

ARIZONA STANDARDS AND GUIDELINES

Arizona Standards and Guidelines (S&G) for grazing administration have been developed through a collaborative process involving the Bureau of Land Management State S&G Team and the Arizona Resource Advisory Council. Together, through meetings, conference calls, correspondence, and Open Houses with the public, the BLM State Team and RAC prepared Standards and Guidelines to address the minimum requirements outlined in the grazing regulations. The Standards and Guidelines, criteria for meeting Standards, and indicators are an integrated document that conforms to the fundamentals of rangeland health and the requirements of the regulations when taken as a whole.

Upland sites, riparian-wetland areas, and desired resource conditions are each addressed by a standard and associated guidelines.

Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Criteria for meeting Standard 1:

Soil conditions support proper functioning of hydrologic, energy, and nutrient cycles. Many factors interact to maintain stable soils and healthy soil conditions, including appropriate amounts of vegetative cover, litter, and soil porosity and organic matter. Under proper functioning conditions, rates of soil loss and infiltration are consistent with the potential of the site.

Ground cover in the form of plants, litter or rock is present in pattern, kind, and amount sufficient to prevent accelerated erosion for the ecological site; or ground cover is increasing as determined by monitoring over an established period of time.

Signs of accelerated erosion are minimal or diminishing for the ecological site as determined by monitoring over an established period of time.

As indicated by such factors as:

- Ground Cover
  - litter
  - live vegetation, amount and type (e.g., grass, shrubs, trees, etc.)
  - rock

- Signs of erosion
  - flow pattern
  - gullies
  - rills
  - plant pedestaling

Exceptions and exemptions (where applicable):

- none

Guidelines:

1-1. Management activities will maintain or promote ground cover that will provide for infiltration, permeability, soil moisture storage, and soil stability appropriate for the ecological sites within management units. The ground cover should maintain soil organisms and plants and animals to support the hydrologic and nutrient cycles, and energy flow. Ground cover and signs of erosion are surrogate measures for hydrologic and nutrient cycles and energy flow.

1-2. When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments may be designed and implemented to attain improvement.

Standard 2: Riparian-Wetland Sites

Riparian-wetland areas are in properly functioning condition.

Criteria for meeting Standard 2:

Stream channel morphology and functions are appropriate for proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate stream energy associated with high water flows.

Riparian-wetland functioning condition assessments are based on examination of hydrologic, vegetative, soil and erosion-deposition factors. BLM has developed a standard checklist to address these factors and make functional assessments. Riparian-wetland areas are functioning properly as indicated by the results of the application of the appropriate checklist.

The checklist for riparian areas is in Technical Reference 1737-9 "Process for Assessing Proper Functioning Condition." The checklist for wetlands is in Technical Reference 1737-11 "Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas." These checklists are reprinted on the pages following the Guidelines for Standard 3.

As indicated by such factors as:

- Gradient
- Width/depth ratio
- Channel roughness and sinuosity of stream channel
- Bank stabilization
- Reduced erosion
- Captured sediment
- Ground-water recharge
- Dissipation of energy by vegetation

Exceptions and exemptions (where applicable):

- Dirt tanks, wells, and other water facilities constructed or placed at a location for the purpose of providing water for livestock and/or wildlife and which have not been

determined through local planning efforts to provide for riparian or wetland habitat are exempt.

- Water impoundments permitted for construction, mining, or other similar activities are exempt.

Guidelines:

2-1. Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability, thus promoting stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform.

2-2. New facilities are located away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function. Existing facilities are used in a way that does not conflict with riparian-wetland functions or are relocated or modified when incompatible with riparian-wetland functions.

2-3. The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect ecological functions and processes.

Standard 3: Desired Resource Conditions

Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

Desired plant community objectives will be developed to assure that soil conditions and ecosystem function described in Standards 1 and 2 are met. They detail a site-specific plant community, which when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened, and sensitive species. Thus, desired plant community objectives will be used as an indicator of ecosystem function and rangeland health.

As indicated by such factors as:

- Composition

- Structure
- Distribution

Exceptions and exemptions (where applicable):

- Ecological sites or stream reaches on which a change in existing vegetation is physically,

biologically, or economically impractical.

Guidelines:

3-1. The use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species are appropriate for use where native species (a) are not available, (b) are not economically feasible, (c) cannot achieve ecological objectives as well as non-native species, and/or (d) cannot compete with already established non-native species.

3-2. Conservation of Federal threatened or endangered, proposed, candidate, and other special status species is promoted by the maintenance or restoration of their habitats.

3-3. Management practices maintain, restore, or enhance water quality in conformance with State or Federal standards.

3-4. Intensity, season and frequency of use, and distribution of grazing use should provide for growth and reproduction of those plant species needed to reach desired plant community objectives.

3-5. Grazing on designated ephemeral (annual and perennial) rangeland may be authorized if the following conditions are met:

- ephemeral vegetation is present in draws, washes, and under shrubs and has grown to useable levels at the time grazing begins;
- sufficient surface and subsurface soil moisture exists for continued plant growth;
- serviceable waters are capable of providing for proper grazing distribution;
- sufficient annual vegetation will remain on site to satisfy other resource concerns, (i.e., watershed, wildlife, wild horses and burros); and
- monitoring is conducted during grazing to determine if objectives are being met.

3-6. Management practices will target those populations of noxious weeds which can be controlled or eliminated by approved methods.

3-7. Management practices to achieve desired plant communities will consider protection and conservation of known cultural resources, including historical sites, and prehistoric sites and plants of significance to Native American peoples.

LOTIC and LENTIC CHECKLISTS

General Instructions

1) The concept "Relative to Capability" applies wherever it may be inferred.

2) This checklist constitutes the Minimum National Standards required to determine Proper Functioning Condition of lotic or lentic riparian-wetland areas.

3) As a minimum, an ID Team will use this checklist to determine the degree of function of a lotic or lentic riparian-wetland area.

4) Mark one box for each element. Elements are numbered for the purpose of cataloging comments. The numbers do not declare importance.

5) For any item marked "No," the severity of the condition must be explained in the "Remarks" section and must be a subject for discussion with the ID Team in determining riparian-wetland functionality. Using the "Remarks" section to explain items marked "Yes" is encouraged but not required.

6) Based on the ID Team's discussion, "functional rating" will be resolved and the checklist's summary section will be completed.

7) Establish photo points where possible to document the site.

Lotic Standard Checklist

Name of Riparian-Wetland Area:_____

Date:_____ Area/Segment ID:_____ Miles:_____

ID Team Observers:_____

Yes	No	N/A	HYDROLOGIC
			1) Floodplain inundated in "relatively frequent" events (1-3 years)
			2) Active/stable beaver dams
			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
			4) Riparian zone is widening or has achieved potential extent
			5) Upland watershed not contributing to riparian degradation

Yes	No	N/A	VEGETATIVE
			6) Diverse age-class distribution (recruitment for maintenance/recovery)
			7) Diverse composition of vegetation (for maintenance/recovery)
			8) Species present indicate maintenance or riparian soil moisture characteristics
			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events
			10) Riparian plants exhibit high vigor
			11) Adequate vegetative cover present to protect banks and dissipate energy during high flows
			12) Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

Yes	No	N/A	EROSION DEPOSITION
			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody debris) adequate to dissipate energy
			14) Point bars are revegetating
			15) Lateral stream movement is associated with natural sinuosity
			16) System is vertically stable
			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1995)

Appendix 1-11

REMARKS (Lotic Checklist)

SUMMARY DETERMINATION

Functional Rating:

Proper Functioning Condition _____
Functional--At Risk _____
Nonfunctional _____
Unknown _____

Trend for Functional--At Risk:

Upward _____
Downward _____
Not Apparent _____

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes _____
No _____

If yes, what are those factors?

____Flow regulations ____Mining activities ____Upstream channel conditions
____Channelization ____Road encroachment ____Oil field water discharge
____Augmented flows ____Other (Specify)_____

Lentic Standard Checklist

Name of Riparian-Wetland Area:_____

Date:_____ Area/Segment ID:_____ Acres:_____

ID Team Observers:_____

Yes	No	N/A	HYDROLOGIC
			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events (1-3 years)
			2) Fluctuation of water levels is not excessive
			3) Riparian-wetland zone is enlarging or has achieved potential extent
			4) Upland watershed not contributing to riparian-wetland degradation
			5) Water quality is sufficient to support riparian-wetland plants
			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e., hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
			7) Structure accommodates safe passage of flows (e.g., no headcut effecting dam or spillway)

Yes	No	N/A	VEGETATION
			8) Diverse age-class distribution (recruitment for maintenance/recovery)
			9) Diverse composition of vegetation (for maintenance/recovery)
			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics
			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g., storm events, snowmelt)
			12) Riparian-wetland plants exhibit high vigor
			13) Adequate vegetative cover present to protect shorelines/soil surface and dissipate energy during high wind and wave events or overland flows
			14) Frost or abnormal hydrologic heaving is not present
			15) Favorable microsite condition (i.e., woody debris, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	SOILS-EROSION DEPOSITION
			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
			17) Saturation of soils (i.e., ponding, flooding frequency and duration) is sufficient to compose and maintain hydric soils
			18) Underlying geologic structure/soil material/permafrost is capable of restricting water percolation
			19) Riparian wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
			20) Islands and shoreline characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate wind and wave event energies

(Revised 1995)

REMARKS (Lentic Checklist)

SUMMARY DETERMINATION

Functional Rating:

Proper Functioning Condition _____
Functional--At Risk _____
Nonfunctional _____
Unknown _____

Trend for Functional--At Risk:

Upward _____
Downward _____
Not Apparent _____

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes _____
No _____

If yes, what are those factors?

____Dewatering ____Mining activities ____Watershed condition
____Dredging activities ____Road encroachment ____Land ownership
____Other (specify)_____

GLOSSARY

ACCELERATED EROSION: Soil loss above natural levels resulting directly from human activities. Due to the slow rate of soil formation, accelerated erosion can lead to a permanent reduction in plant productivity.

ACTIVITY PLAN: A detailed and specific plan for managing a single resource program or plan element undertaken as needed to implement the more general resource management plan decisions. An activity plan is prepared for specific areas to reach specific resource management objectives within stated timeframes.

ALLOTMENT: An area of land where one or more individuals graze their livestock. An allotment generally consists of Federal rangelands, but may include intermingled parcels of private, State, or Federal lands. BLM and the Forest Service stipulate the number of livestock and season of use for each allotment.

ALLOTMENT MANAGEMENT PLAN (AMP): A livestock grazing management plan dealing with a specific unit of rangeland and based on multiple use resource management objectives. The AMP considers livestock grazing in relation to other uses of rangelands and in relation to renewable resources-watershed, vegetation, and wildlife. An AMP establishes the seasons of use, the number of livestock to be permitted on rangelands, and the rangeland improvements needed.

AQUATIC COMPONENTS (HABITATS): Habitats confined to streams, rivers, springs, lakes, ponds, reservoirs, and other water bodies.

AUTHORIZED OFFICER: Any person authorized by the Secretary of the Interior to administer BLM's rangeland management program.

CHANNEL MORPHOLOGY: Relating to the form and structure of channels.

COMPOSITION: The proportions of various plant species in relation to the total on a given area. It may be expressed in terms of cover, density, weight, etc.

DESIRED PLANT COMMUNITY (DPC): The plant community that has been determined through a land use or management plan to best meet the plan's objectives for a site. A real, documented plant community that embodies the resource attributes needed for the present or potential use of an area, the desired plant community is consistent with the site's capability to produce the required resource attributes through natural succession, management intervention, or a combination of both.

ECOLOGICAL SITE: A distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community.

EPHEMERAL: A rangeland that does not consistently produce enough forage to sustain a livestock operation but may briefly produce unusual volumes of forage that may be utilized by livestock.

GOAL: The desired state or condition that a resource management policy or program is designed to achieve. Broader and less specific than objectives, goals are usually not

measurable and may not have specific dates by which they must be reached. Objectives are developed by first understanding one's goals.

GRADIENT: Rate of regular or graded ascent or descent.

GRAZING PERMIT/LEASE: Official written permission to graze a specific number, kind, and class of livestock for a specified time period on a defined rangeland.

GULLIES: A furrow, channel or miniature valley cut by concentrated runoff, usually with steep sides through which water commonly flows during and immediately after rains or snow melt.

HYDROLOGIC CYCLE: The circuit of water movement from the atmosphere to the earth and its return to the atmosphere through various stages or processes, such as precipitation, interception, runoff, infiltration, percolation, storage, evaporation and transpiration.

INFILTRATION: The downward entry of water into the soil or other material.

INTERDISCIPLINARY TEAM: A team of varied land use and resource specialists formed to provide a coordinated, integrated information base for overall land use planning and management.

INTERESTED PUBLIC: An individual, group or organization that has submitted a written request to the authorized officer to be provided an opportunity to be involved in the decision-making process for the management of livestock grazing on specific grazing allotments or has submitted written comments to the authorized officer regarding the management of livestock grazing on a specific allotment.

LANDFORM: A discernible natural landscape that exists as a result of geological activity such as a plateau, plain, basin, or mountain.

LENTIC: Standing water riparian-wetland areas such as lakes, ponds, seeps, bogs, and meadows.

LITTER: The uppermost layer of organic debris on the soil surface, essentially the freshly fallen or slightly decomposed vegetative material.

LOTIC: Running water riparian-wetland areas such as rivers, streams and springs.

MANAGEMENT ACTIONS/PRACTICES: Actions or practices that improve or maintain basic soil and vegetation resources. Rangeland practices typically consist of watershed treatments (planting, seeding, burning, rest, vegetation manipulation, grazing management) in an attempt to establish desired vegetation species or communities.

NONFUNCTIONAL: Riparian-wetland areas are considered to be in nonfunctioning condition when they don't provide adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, or other normal characteristics of riparian areas. The absence of certain physical attributes such as a flood plain where one should be are indicators of nonfunctioning conditions.

NOXIOUS WEED: A weed arbitrarily defined by law as being especially undesirable, troublesome, and difficult to control.

NUTRIENT CYCLE: The process of use, release and reuse of elements by plants and animals through uptake by incorporation into and decomposition of organisms. Elements involved in

nutrient cycling remain in the vicinity of the earth's surface.

OBJECTIVES: The planned results to be achieved within a stated time period. Objectives are subordinate to goals, more narrow in scope, and shorter in range. Objectives must specify time periods for completion, and products or achievements that are measurable.

PERMEABILITY: The ease with which gases, liquids (water), or plant roots penetrate or pass through a bulk mass of soil or a layer of soil. Since different soil horizons vary in permeability, the particular horizon under question should be designated.

PERMITTED LIVESTOCK USE: The forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease and is expressed in animal unit months (AUMs).

PLANT PEDESTALING: A condition where the soil has eroded from around individual plants or other objects such as small rocks, leaving them on small pedestals of soil. Sometimes the result of frost heaving.

PROPERLY FUNCTIONING:
Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is influenced by geomorphic features, soil, water, and vegetation.

Uplands function properly when the existing vegetation and ground cover maintain soil conditions capable of sustaining natural biotic communities. The functioning condition of uplands is influenced by geographic features, soil, water, and vegetation.

RESOURCE ADVISORY COUNCIL (RAC): A citizen-based group of 10 to 15 members chartered under the Federal Advisory Committee Act and appointed by the Secretary of the Interior to forward advice on public land planning and management issues to the BLM. Council membership reflects a balance of various interests concerned with the management of the public lands and users of the public lands.

RILL EROSION: Removal of soil by running water forming shallow channels that can be smoothed out by normal cultivation.

RIPARIAN AREA: An area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lake shores and streambanks are typical areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent on free water in the soil.

SEASON OF USE: The time during which livestock grazing is permitted on a given range area, as specified in the grazing permit.

SEEPS: Wet areas, normally not flowing, arising from an underground water source.

SINUOSITY: The ratio of stream length between two points divided by the valley length between the same two points.

SOIL MOISTURE STORAGE: The water content stored in a soil.

SPECIAL STATUS SPECIES: Plant or animal species listed as threatened, endangered, candidate, or sensitive by Federal or State governments.

STRUCTURAL DIVERSITY: The diversity of the composition, abundance, spacing, and other attributes of plants in a community.

TERMS AND CONDITIONS: Stipulations contained in livestock grazing permits and leases as determined by the authorized officer to be appropriate to achieve management and resource condition objectives for the public lands and other lands administered by BLM and to achieve standards for rangeland health and ensure conformance with guidelines for grazing administration.

TREND: The direction of change over time, either toward or away from desired management objectives.

WIDTH/DEPTH RATIO: Bankfull stream width divided by average depth.

UPLANDS: Land at a higher elevation than the alluvial plain or low stream terrace; all lands outside the riparian-wetland and aquatic zones.

WETLANDS: An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support and which, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, shallows, swamps, lake shores, bogs, muskegs, wet meadows, estuaries and riparian areas.

MAMMALS OF THE
SAN PEDRO RIPARIAN NATIONAL CONSERVATION AREA

The following is a compilation of mammals that occurred historically or may be expected to occur on SPRNCA (see Duncan 1989, Reid 2006). Common and scientific names are in accordance with the 2000 Society for the Study of Amphibians and Reptiles, American Society of Ichthyologists and Herpetologists, and Herpetologist's League list, 2001 errata, and 2003 update.

Duncan, D.K. 1989. Mammal inventory of the San Pedro Riparian National Conservation Area, Cochise County, Arizona: final report. BLM, San Pedro Project Office, Sierra Vista, AZ.

Reid, F.A. 2006. A Field Guide to Mammals of North America. Houghton Mifflin Company, New York, NY. 579 pp.

SPECIES

Order Didelphimorpha (American opossum)

Family Didelphidae (opossum)
Virginia opossum (*Didelphis virginiana*)
Mexican opossum (*Didelphis virginiana californica*)

Order Rodentia (rodents)

Family Castoridae (beaver)
American beaver (*Castor canadensis*)

Family Sciuridae (squirrels, chipmunks, prairie dogs)
+black-tailed prairie dog (*Cynomys ludovicianus*)
spotted ground squirrel (*Spermophilus spilosoma*)
round-tailed ground squirrel (*Spermophilus tereticaudus*)
rock squirrel (*Spermophilus variegatus*)
Harris's antelope squirrel (*Ammospermophilus harrisii*)
cliff chipmunk (*Tamias dorsalis*) in Smithsonian, not in Duncan

Family Geomyidae (pocket gophers)
Botta's pocket gopher (*Thomomys bottae*)

Family Heteromyidae (pocket mice, kangaroo rats, kangaroo mice)
hispid pocket mouse (*Chaetodipus hispidus*)
Bailey's pocket mouse (*Chaetodipus baileyi*)
rock pocket mouse (*Chaetodipus intermedius*)
desert pocket mouse (*Chaetodipus penicillatus*)
silky pocket mouse (*Perognathus flavus*)
Merriam's kangaroo rat (*Dipodomys merriami*)
Ord's kangaroo rat (*Dipodomys ordii*)
+banner-tailed kangaroo rat (*Dipodomys spectabilis*)

APPENDIX B
STATE AND TRANSITION MODEL

State and Transition Model Purpose
A State and Transition Model is a diagram that depicts our current understanding of the dynamics of an ecological site. They identify the different plant associations or "states" that may exist on a given ecological site and how other site characteristics, such as hydrology and soil stability, might change with them. State and Transition Models describe the environmental conditions, disturbances and management actions that cause vegetation to change from one group of plant species to a different set of species, and the management actions needed to restore plant communities to a desired composition. They help the BLM identify where the land is currently (its present state) and what potential alternative states it could inhabit, and provide ideas about how to move to a more desirable state and avoid unwanted transitions.

State and Transition Model Development
State and Transition Models are developed using four kinds of information:

- Inventory data of soil properties and vegetation;
- Historical reconstructions using long-term monitoring data, historical records, or photography;
- Recent monitoring data, including responses to climate variability and management interventions; and
- Process-based research and studies that test for the mechanisms causing or constraining ecosystem responses.

Ecological Site Descriptions and their associated State and Transition Models are developed using expert knowledge, available inventory and monitoring data, previous range site descriptions,"soil survey"information and research to help confirm model assumptions for State and Transition Models. State and Transition Models look like and include the following:

- Stable groupings of plant species or "states" (boxes) and the pathways of change (transition) between states (arrows);
- The arrows between the large boxes, or states, signify that a threshold has been crossed. This means that new ecological processes characterize the site, and it will take active management to shift back to the previous state;
- Vegetation states (larger boxes) may contain several communities which are called plant "community phases" (or plant associations); and
- Plant community phases (smaller boxes) can easily transition from one to another in short time frames.

The narrative section of the State and Transition Model model gives a written description of each of these states that explains what plants we would find in each state, how useful each state is for achieving specific management objectives, and other site characteristics.

States, Transitions, and Disturbances
A state includes one or more biological (including soil) communities that occur on a particular ecological site and that are functionally similar with respect to the three attributes (soil/site stability, hydrologic function, and biotic integrity). States are generally distinguished by

relatively large differences in plant functional groups, dynamic soil properties, and ecosystem processes, and consequently in vegetation structure, biodiversity, and management requirements. They are also distinguished by their responses to disturbance. A number of different plant communities may be included in a state, and the communities are often connected by community pathways (Figure B-1).

Shifts between states (solid arrows in Figure B-1) are referred to as "transitions." Unlike community pathways (dashed arrows in Figure B-1), these "threshold" transitions are not reversible by simply altering the intensity or direction of factors that produced the change. Instead, they may create a physically-altered state, such as an eroded state that has lost part of its A soil horizon. Alternatively, they may require new inputs such as revegetation or shrub removal. Practices such as these, enabling a return to a pre-existing state (USDA 1997), are often expensive to apply. Transitions among states in an ecological site are often caused by a combination of feedback mechanisms that alter soil and plant community dynamics (e.g., Schlesinger et al. 1990). For example, as shrubs replace grasses, runoff and erosion increase from shrub interspaces further reducing soil resource availability for grasses.

The reference state is the state where the functional capacities represented by soil/site stability, hydrologic function, and biotic integrity are performing at a near optimum level under the natural disturbance regime. This state usually includes more than one community, one of which is known as the "historic climax plant community" and is depicted as one of the communities in the Reference State in Figure B-1. Alternatively, some rangeland management or ecology literature (Heady and Child 1994, Society for Range Management 1999, Vallentine 1990), recognize one of the communities as the "potential natural plant community." While this technical reference uses the reference state (but not any particular community within the state) as the reference for the rangeland health evaluation, we recognize that managers may choose to manage for communities in another state. In other words, the reference state usually, but not always, includes the manager's desired plant community. However, if sustainability is an objective, the desired plant community will nearly always be found in the reference state (Borman and Pyke 1994).

Some type of disturbance is a natural and necessary part of all ecosystems. Healthy ecosystems are generally both resistant to external disturbances and resilient (able to recover) if external disturbances occur (Pimm 1984). Healthy ecosystems generally allow various communities to fluctuate over time within a state. Transitions rarely occur in response to the natural disturbance regime. However, resistance and resilience alone are insufficient criteria for healthy ecosystems; degraded systems are often highly resistant to change.

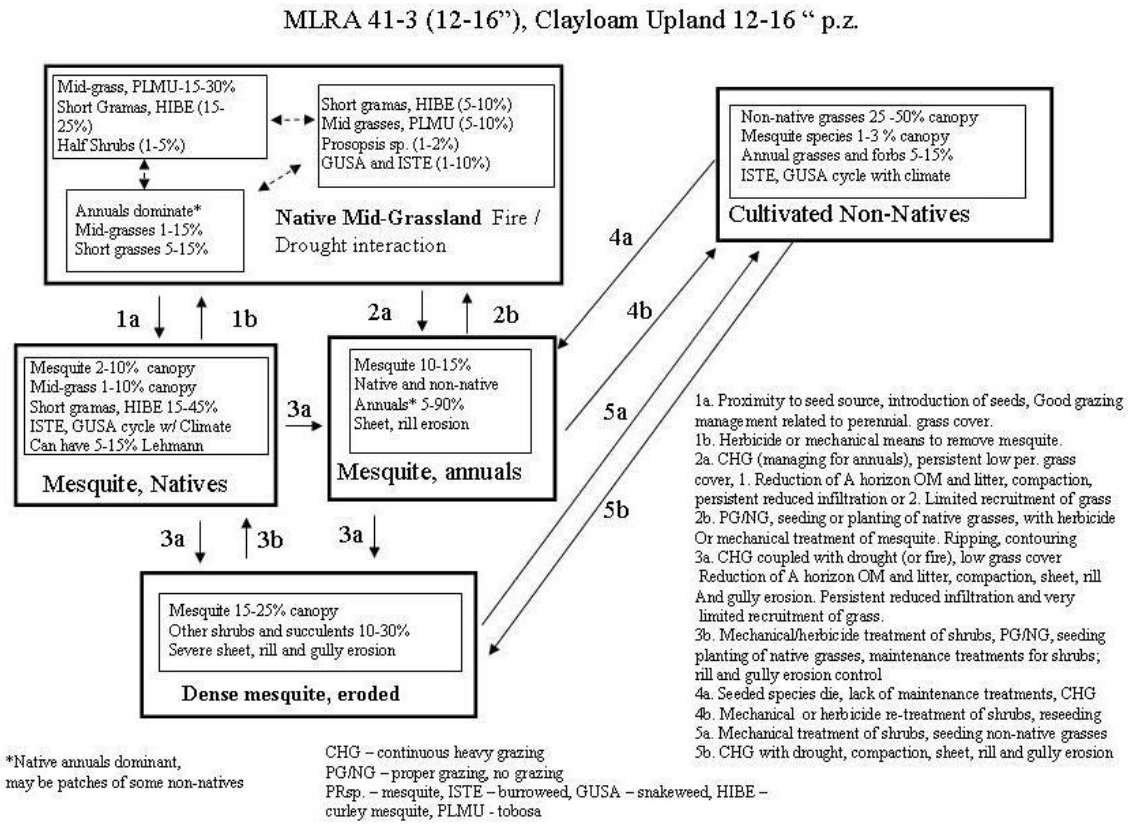

Figure B-1. State and Transition Model

APPENDIX C
MAMMALS, AMPHIBIANS AND REPTILES, AND BIRDS WITHIN THE SPRNCA

Mammals

MAMMALS OF THE
SAN PEDRO RIPARIAN NATIONAL CONSERVATION AREA

The following is a compilation of mammals that occurred historically or may be expected to occur on SPRNCA (see Duncan 1989, Reid 2006). Common and scientific names are in accordance with the 2000 Society for the Study of Amphibians and Reptiles, American Society of Ichthyologists and Herpetologists, and Herpetologist's League list, 2001 errata, and 2003 update.

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Family Didelphidae (opossum)
Virginia opossum (*Didelphis virginiana*)
Mexican opossum (*Didelphis virginiana californica*)

Order Rodentia (rodents)

Family Castoridae (beaver)
American beaver (*Castor canadensis*)

Family Sciuridae (squirrels, chipmunks, prairie dogs)
+black-tailed prairie dog (*Cynomys ludoviciamus*)
spotted ground squirrel (*Spermophilus spilosoma*)
round-tailed ground squirrel (*Spermophilus tereticaudus*)
rock squirrel (*Spermophilus variegatus*)
Harris's antelope squirrel (*Ammospermophilus harrisii*)
cliff chipmunk (*Tamias dorsalis*) in Smithsonian, not in Duncan

Family Geomyidae (pocket gophers)
Botta's pocket gopher (*Thomomys bottae*)

Family Heteromyidae (pocket mice, kangaroo rats, kangaroo mice)
hispid pocket mouse (*Chaetodipus hispidus*)
Bailey's pocket mouse (*Chaetodipus baileyi*)
rock pocket mouse (*Chaetodipus intermedius*)
desert pocket mouse (*Chaetodipus penicillatus*)
silky pocket mouse (*Perognathus flavus*)
Merriam's kangaroo rat (*Dipodomys merriami*)
Ord's kangaroo rat (*Dipodomys ordii*)
+banner-tailed kangaroo rat (*Dipodomys spectabilis*)

Family Muridae (rats, mice)
brush mouse (*Peromyscus boylii*)
cactus mouse (*Peromyscus eremicus*)
white-footed mouse (*Peromyscus leucopus*)
American deer mouse (*Peromyscus maniculatus*)
northern grasshopper mouse (*Onychomys leucogaster*)
southern grasshopper mouse (*Onychomys torridus*)
fulvous harvest mouse (*Reithrodontomys fulvescens*)
western harvest mouse (*Reithrodontomys megalotis*)
plains harvest mouse (*Reithrodontomys montanus*)
northern pygmy mouse (*Baiomys taylori*)
western white-throated woodrat (*Neotoma albigula*)
Arizona cotton rat (*Sigmodon arizonae*)
tawny-bellied cotton rat (*Sigmodon fulviventer*)
yellow-nosed cotton rat (*Sigmodon ochrognathus*)
common muskrat (*Ondatra zibethicus*)
=house mouse (*Mus musculus*)
=roof rat (*Rattus rattus*)
=Norway rat (*Rattus norvegicus*)

Family Erethizontidae (New World porqupines)
North American porqupine (*Erethizon dorsatum*)

Order Lagomorpha (rabbits and hares)
Family Leporidae (rabbits and hares)
desert cottontail (*Sylvilagus audubonii*)
=European rabbit (*Oryctolagus cuniculus*)
antelope jackrabbit (*Lepus alleni*)
black-tailed jackrabbit (*Lepus californicus*)

Order Soricimorpha (shrews)
Family Soricidae (shrews)
Crawford's gray shrew (*Notiosorex crawfordi*)
Cockrum's shrew (*Notiosorex cockrumi*)

Order Chiroptera (bats)
Family Phyllostomidae (leaf-nosed bats)
+California leaf-nosed bat (*Macrotus californicus*)
+Mexican long-tongued bat (*Choeronycteris mexicana*)
+lesser long-nosed bat (*Leptonycteris yerbabuena*)

Family Vespertilionidae (vesper bats)
California myotis (*Myotis californicus*)
western small-footed myotis (*Myotis ciliolabrum*)
Yuma myotis (*Myotis yumanensis*)
+Arizona myotis (*Myotis occultus*)

+cave myotis (*Myotis velifer*)
long-legged myotis (*Myotis volans*)
southwestern myotis (*Myotis auriculus*)
fringed myotis (*Myotis thysanodes*)
silver-haired bat (*Lasionycteris noctivagans*)
western pipistrelle (*Pipistrellus hesperus*)
big brown bat (*Eptesicus fuscus*)
western yellow bat (*Lasiurus xanthinus*)
western red bat (*Lasiurus blossevillii*)
hoary bat (*Lasiurus cinereus*)
+spotted bat (*Euderma maculatum*)
+Townsend's big-eared bat (*Corynorhinus townsendii*)
pallid bat (*Antrozous pallidus*)
+Allen's big-eared bat (*Idionycteris phyllotis*)

Family Molossidae (free-tailed bats)
Brazilian free-tailed bat (*Tadarida brasiliensis*)
pocketed free-tailed bat (*Nyctinomops femorosaccus*)
big free-tailed bat (*Nyctinomops macrotis*)
+western mastiff bat (*Eumops perotis*)

Order Carnivora (carnivores)
Family Felidae (cats)
cougar (*Puma concolor*)
+ocelot (*Leopardus pardalis*)
+jaguarundi (*Herpailurus yagouarundi*)
bobcat (*Lynx rufus*)
+jaguar (*Panthera onca*)
=domestic cat (*Felis catus*)

Family Canidae (dogs)
coyote (*Canis latrans*)
+Mexican gray wolf (*Canis lupus baileyi*)
kit fox (*Vulpes macrotis*)
common gray fox (*Urocyon cinereoargenteus*)
=domestic dog (*Canis familiaris*)

Family Ursidae (bears)
black bear (*Ursus americanus*)
brown bear (*Ursus arctos*)

Family Procyonidae (ringtail, raccoon, and coati)
ringtail (*Bassariscus astutus*)
northern raccoon (*Procyon lotor*)
white-nosed coati (*Nasua narica*)

Family Mephitidae (skunks)
western spotted skunk (*Spilogale gracilis*)
striped skunk (*Mephitis mephitis*)
hooded skunk (*Mephitis macroura*)
white-backed hog-nosed skunk (*Conepatus leuconotus*)

Family Mustelidae (weasels, badgers, and otters)
long-tailed weasel (*Mustela frenata*)
American badger (*Taxidea taxus*)
river otter (*Lutra canadensis*)
=European ferret (*Mustela putorius*)

Order Artiodactyla (even-toed ungulates)
Family Suidae (Old World swine)
=feral hog (*Sus scrofa*)

Family Tayassuidae (peccaries)
collared peccary (*Pecari tajacu*)

Family Cervidae (deer)
mule deer (*Odocoileus hemionus*)
Coues' white-tailed deer (*Odocoileus virginianus couesi*)

Family Antilocapridae (pronghorn)
pronghorn (*Antilocapra americana*)

Family Bovidae (cattle, sheep, and goats)
=goat
=sheep
=cattle

Family Equidae (horses)
=horse

+Special status species
=introduced

Amphibians and Reptiles

AMPHIBIANS AND REPTILES OF THE
SAN PEDRO RIPARIAN NATIONAL CONSERVATION AREA

The San Pedro Riparian National Conservation Area (SPRNCA) was established through an act of Congress in 1988 in a manner that "conserves, protects, and enhances" resources. Well-known for the high number and diversity of birds which utilize the area, SPRNCA is less known for its myriad of reptile and amphibian species (herptiles) which are also found here. Various habitat types, including aquatic, riparian, ephemeral washes, sacaton grasslands, Chihuahuan desert-scrub, semidesert grasslands, and rocky outcrops provide an assortment of habitat types that support a diversity of herptile species. The following is a compilation of 12 species of amphibians and 59 species of reptiles that occur or may be expected to occur on SPRNCA. Please provide the BLM wildlife biologist with a detailed description, location, and photo of any species listed as rare, extirpated, or hypothetical.

Common and scientific names are in accordance with the 2000 Society for the Study of Amphibians and Reptiles, American Society of Ichthyologists and Herpetologists, and Herpetologist's League list, 2001 errata, and 2003 update.

Corman, T. 1988. Proposed San Pedro Riparian National Conservation Area Reptiles and Amphibians Preliminary Inventory Results. San Pedro Technical Report #3. USDI, Bureau of Land Management, San Pedro Project Office, Sierra Vista, AZ

Rosen, P.C. 2005. Lowland riparian herpetofaunas: the San Pedro River in southeastern Arizona. USDA Forest Service Proceedings RMRS-P-36:106-111.

SPECIES	ABUNDANCE	HABITAT
Caudata - Salamanders		
=tiger salamander (*Ambystoma tigrinum*)	H	AR
Anura – Frogs and Toads		
Couch's spadefoot (*Scaphiopus couchii*)	C	ACDGMRS
Mexican spadefoot (*Spea multiplicata*)	U	ACGMSg
green toad (*Bufo debilis*)	R	CGMSg
red-spotted toad (*Bufo punctatus*)	U	CMRRoS
Woodhouse's toad (*Bufo woodhousii*)	C	ACDGMRSg
great plains toad (*Bufo cognatus*)	U	ACGMSg
Sonoran desert toad (*Bufo alvarius*)	R	AGMSg
canyon treefrog (*Hyla arenicolor*)	R	ARRo
lowland leopard frog (*Rana yavapaiensis*)	E	AR
+Chiricahua leopard frog (*Rana chiricahuensis*)	E	AR
=American bullfrog (*Rana catesbeiana*)	C	AR
Testudines – Turtles		
ornate box turtle (*Terrepene ornata*)	U	CGMRSg
=pond slider (*Trachemys scripta*)	U	AR
Sonoran mud turtle (*Kinosternon sonoriense*)	U	AR

=spiny softshell (*Apalone spinifera*)	C	AR
desert tortoise (*Gopherus agassizii*)	H	CG
Squamata – Lizards		
eastern collared lizard (*Crotaphytus collaris*)	R	CRo
long-nosed leopard lizard (*Gambelia wislizenii*)	R	CG
zebra-tailed lizard (*Callisaurus draconoides*)	U	S
greater earless lizard (*Cophosaurus texanus*)	U	CMRoS
common lesser earless lizard (*Holbrookia maculata*)	U	CGS
ornate tree lizard (*Urosaurus ornatus*)	C	CDMRRo
common side-blotched lizard (*Uta stansburiana*)	H	CGRoS
southwestern fence lizard (*Sceloporus cowlesi*)	C	CDGMRRo
desert spiny lizard (*Sceloporus magister*)	R	CMRo
Clark's spiny lizard (*Sceloporus clarkii*)	C	MR
+Texas horned lizard (*Phrynosoma cornutum*)	U	CDGM
regal horned lizard (*Phrynosoma solare*)	U	CRoS
greater short-horned lizard (*Phrynosoma hernandesi*)	R	CM
canyon spotted whiptail (*Aspidoscelis burti*)	R	MRo
little striped whiptail (*Aspidoscelis inornata*)	H	GSg
Sonoran spotted whiptail (*Aspidoscelis sonorae*)	R	R
tiger whiptail (*Aspidoscelis tigris*)	U	CM
desert grassland whiptail (*Aspidoscelis uniparens*)	C	CGMRRoSg
Great Plains skink (*Eumeces obsoletus*)	H	GPRRo
Madrean alligator lizard (*Elgaria kingii*)	R	PR
western banded gecko (*Coleonyx variegatus*)	R	CRo
=Mediterranean gecko (*Hemidactylus turcicus*)	H	D
*Gila monster (*Heloderma suspectum*)	U	CMRo
Squamata – Snakes		
plains threadsnake (*Leptotyphlops dulcis*)	R	CGRo
western threadsnake (*Leptotyphlops humilis*)	H	CRRoS
*Sonoran coralsnake (*Micruroides euryxanthus*)	R	GMRo
groundsnake (*Sonora semiannulata*)	H	CDGMRRoS
Smith's black-headed snake (*Tantilla hobartsmithi*)	R	CGMPRRoSg
plains black-headed snake (*Tantilla nigriceps*)	R	CG
Yaqui black-headed snake (*Tantilla yaquia*)	H	MR
ring-necked snake (*Diadophis punctatus*)	U	GPR
nightsnake (*Hypsiglena torquata*)	R	CGMPRo
lyresnake (*Trimorphodon biscutatus*)	R	CRRo
gophersnake (*Pituophis catenifer*)	C	CDGMRRoSg
glossy snake (*Arizona elegans*)	U	CGSRo
saddled leaf-nosed snake (*Phyllorhynchus browni*)	H	CRoS
western hog-nosed snake (*Heterodon nasicus*)	U	GMSSg
Chihuahuan hook-nosed snake (*Gyalopion canum*)	R	GCRo
mountain patch-nosed snake (*Salvadora grahamiae*)	H	GCRo
western patch-nosed snake (*Salvadora hexalepis*)	U	GCM

green ratsnake (*Senticolis triaspis*)	H	CRRo
Sonoran whipsnake (*Masticophis bilineatus*)	U	CRRoSg
coachwhip (*Masticophis flagellum*)	C	CDGMRRoSg
long-nosed snake (*Rhinocheilus lecontei*)	U	CGM
common kingsnake (*Lampropeltis getula*)	U	CGMPR
Sonoran mountain kingsnake (*Lampropeltis pyromelana*)	H	PRRo
black-necked gartersnake (*Thamnophis cyrtopsis*)	H	CGMR
+Mexican gartersnake (*Thamnophis eques*)	E	AR
checkered gartersnake (*Thamnophis marcianus*)	C	ACGMR
*western diamondback rattlesnake (*Crotalus atrox*)	C	CDMRRoSg
*Mohave rattlesnake (*Crotalus scutulatus*)	U	CGM
*black-tailed rattlesnake (*Crotalus molossus*)	H	RRo
*massasauga (*Sistrurus catenatus*)	E	GS

Crocodilia – Crocodilians

=#alligator (*Alligator mississippiensis*)	R	AR

*Venomous to humans
+Special status species
=Introduced
#Breeding not documented, but two individuals have been removed from the Upper San Pedro River watershed.

Abundance:

C	Common. Normally seen in appropriate habitat under suitable weather conditions.
U	Uncommon. Occurs locally or in small numbers.
R	Rare. Very local, in very small numbers, or secretive habit makes observation unlikely.
H	Hypothetical. Within range, but no occurrence records have been documented.
E	Extirpated. Documented historically, but no recent records.

Habitat:

A	Aquatic
C	Chihuahuan desert-scrub
D	Developed areas (buildings, fences)
G	Semidesert Grassland
M	Mesquite
P	Plant debris (under logs, bark, litter, dead plants such as yucca and agave)
R	Riparian
Ro	Rocky
S	Sandy
Sg	Sacaton grassland

Birds

Birds of the San Pedro Riparian National Conservation Area

The San Pedro Riparian National Conservation Area (NCA) includes over 56,000 acres in Cochise County, Arizona. Extending approximately 40 miles northward from the Mexican border to a few miles south of St. David, the NCA represents the most extensive, healthy riparian ecosystem remaining in the desert Southwest. The Bureau of Land Management (BLM) manages the area to protect and enhance the existing riparian habitat and wildlife communities, as well as provide for recreational use, cultural interpretation, and educational opportunities.

The NCA is home to over 100 species of breeding birds and provides invaluable habitat for another 250 species of migrant and wintering birds. Located between the Huachuca and Mule mountains, and adjacent to Mexico, the NCA attracts a myriad of bird species from a wide variety of vegetative life-zones.

The NCA's importance was officially recognized in 1997 when the American Bird Conservancy named it as the first Globally Important Bird Area in North America. In 2013, Audubon also listed the NCA as a Globally Important Bird Area. The Nature Conservancy includes the San Pedro as one of its *Last Great Places*.

Concerns have increased over population declines of migrant bird species which breed in North American and winter south of the United States (Neotropical Migratory Birds). The BLM recognized this problem and has prepared management plans to monitor and enhance populations of bird species which utilize BLM public lands throughout North America.

This checklist, which documents over 370 bird species, has been compiled from historical avian records within the Upper San Pedro River Valley and from biological inventories within the NCA. This checklist will be periodically updated, so notification of interesting sightings would be greatly appreciated. Please report them to:

Bureau of Land Management
San Pedro Riparian National Conservation Area
1763 Paseo San Luis
Sierra Vista, AZ 85635
520-439-6400

ABUNDANCE

C	Common
U	Uncommon
R	Rare
Ca	Casual
I	Irregular

RESIDENCY

P	Permanent
S	Summer Resident
W	Winter Resident
T	Transient or migrant
*	Accidental or historical record and not expected again
#	Neotropical Migratory Bird Species

SWANS, GEESE and DUCKS	
__ Black-bellied Whistling Duck	U S #
__ Tundra Swan	R T
__ Greater White-fronted Goose	R W
__ Snow Goose	R W
__ Ross' Goose	R W
__ Canada Goose	R W
__ Wood Duck	R W
__ Gadwall	U W #
__ American Wigeon	U W #
__ Mallard	C P #
__ Blue-winged Teal	U T R W #
__ Cinnamon Teal	U W T #
__ Northern Shoveler	C W
__ Northern Pintail	U W #
__ Garganey	T *
__ Green-winged Teal	U W #
__ Canvasback	U T R W #
__ Redhead	U T R W #
__ Ring-necked Duck	U T U W #
__ Greater Scaup	Ca T
__ Lesser Scaup	U W
__ Surf Scoter	R T
__ Common Goldeneye	R W
__ Bufflehead	U W #
__ Hooded Merganser	R T
__ Common Merganser	U T
__ Red-breasted Merganser	R T
__ Ruddy Duck	U W #

QUAIL and ALLIES	
__ Scaled Quail	C P
__ Gambel's Quail	C P
__ Montezuma Quail	Ca T
__ Wild Turkey	R T

LOONS and GREBES	
__ Pacific Loon	T *
__ Common Loon	Ca T
__ Least Grebe	T *
__ Pied-billed Grebe	U W T #
__ Eared Grebe	U W #
__ Western Grebe	R T #
__ Clark's Grebe	R T #

FRIGATEBIRDS	
__ Magnificent Frigatebird	T *

PELICANS and CORMORANTS	
__ Olivaceous Cormorant	R T
__ Double-crested Cormorant	U S T #
__ American White Pelican	Ca T #
__ Brown Pelican	Ca T

BITTERNS and HERONS	
__ American Bittern	R T #
__ Least Bittern	T R #
__ Great Blue Heron	C P
__ Great Egret	R T #
__ Snowy Egret	U T #
__ Little Blue Heron	Ca T
__ Tricolored Heron	Ca T
__ Cattle Egret	U T #
__ Green Heron	R P #
__ Black-crowned Night-Heron	R P #

IBISES and ALLIES	
__ White-faced Ibis	U T #
__ Wood Stork	Ca T

RAPTORS	
__ Turkey Vulture	C S #
__ Osprey	R T #
__ White-tailed Kite	R T
__ Mississippi Kite	R T #
__ Bald Eagle	R W
__ Northern Harrier	C W #
__ Sharp-shinned Hawk	U W #
__ Cooper's Hawk	C P #
__ Northern Goshawk	R T
__ Common Black-Hawk	U T #
__ Great Black Hawk	T *
__ Harris's Hawk	U P
__ Gray Hawk	C S #
__ Broad-winged Hawk	Ca T #
__ Swainson's Hawk	C S #
__ Zone-tailed Hawk	U T #
__ Red-tailed Hawk	C P
__ Ferruginous Hawk	U W
__ Rough-legged Hawk	R W
__ Golden Eagle	U T

RAILS and ALLIES	
__ Black Rail	T *
__ Virginia Rail	U W #
__ Sora	U W #
__ Purple Gallinule	Ca T #
__ Common Moorhen	U P
__ American Coot	U P
__ Sandhill Crane	R T

SHOREBIRDS	
__ Black-bellied Plover	Ca T #
__ Snowy Plover	Ca T #
__ Semipalmated Plover	U T #
__ Killdeer	C P
__ Black-necked Stilt	U T #
__ American Avocet	U T #
__ Spotted Sandpiper	U T #
__ Solitary Sandpiper	U T #
__ Greater Yellowlegs	U T #
__ Willet	U T #
__ Lesser Yellowlegs	U T #
__ Whimbrel	R T #
__ Long-billed Curlew	U T #
__ Marbled Godwit	U T #
__ Ruddy Turnstone	Ca T #
__ Sanderling	U T #
__ Semipalmated Sandpiper	R T #
__ Western Sandpiper	U T #
__ Least Sandpiper	C T U W #
__ Baird's Sandpiper	U T #
__ Pectoral Sandpiper	U T #
__ Dunlin	Ca T #
__ Stilt Sandpiper	U T #
__ Short-billed Dowitcher	R T #
__ Long-billed Dowitcher	U T #
__ Common Snipe	C W #
__ Wilson's Phalarope	C T #
__ Red-necked Phalarope	U T #
__ Red Phalarope	Ca T #

GULLS and TERNS	
__ Black-legged Kittiwake	Ca T
__ Sabine's Gull	Ca T
__ Bonaparte's Gull	R T #
__ Franklin's Gull	R T #
__ Heermann's Gull	R T
__ Ring-billed Gull	U T #
__ California Gull	R T
__ Herring Gull	R T #
__ Least Tern	T *
__ Black Tern	C T #
__ Common Tern	R T #
__ Forster's Tern	U T #
__ Long-tailed Jaeger	T *

PIGEONS and DOVES	
__ Rock Dove	C P
__ Eurasian Collared-Dove	UP
__ Band-tailed Pigeon	Ca T
__ White-winged Dove	C S R W #
__ Mourning Dove	C P #
__ Inca Dove	U P
__ Common Ground-Dove	U P
__ Ruddy Ground-Dove	Ca T

CUCKOOS and ALLIES	
__ Yellow-billed Cuckoo	U S #
__ Greater Roadrunner	C P
__ Groove-billed Ani	Ca T

OWLS	
__ Barn Owl	U P
__ Flammulated Owl	T * #
__ Western Screech-Owl	C P
__ Great Horned Owl	C P
__ Elf Owl	U S T #
__ Burrowing Owl	R P #
__ Long-eared Owl	U T
__ Short-eared Owl	R T #

GOATSUCKERS or NIGHTJARS	
__ Lesser Nighthawk	C S #
__ Common Nighthawk	U S #
__ Common Poorwill	C S #
__ Mexican Whip-poor-will	R T #

SWIFTS	
__ Black Swift	T * #
__ Chimney Swift	Ca T #
__ Vaux's Swift	U T #
__ White-throated Swift	U P #

HUMMINGBIRDS	
__ Magnificent Hummingbird	Ca T #
__ Plain-capped Starthroat	T *
__ Blue-throated Hummingbird	Ca T #
__ Lucifer Hummingbird	Ca T #
__ Black-chinned Hummingbird	C S #
__ Anna's Hummingbird	U P
__ Costa's Hummingbird	R T #
__ Broad-tailed Hummingbird	U T #
__ Rufous Hummingbird	C T #
__ Allen's Hummingbird	R T #
__ Calliope Hummingbird	U T #
__ Broad-billed Hummingbird	U T #
__ Violet-crowned Hummingbird	Ca T #

TROGONS and KINGFISHERS	
__ Elegant Trogon	Ca T #
__ Belted Kingfisher	C W #
__ Green Kingfisher	U P

WOODPECKERS	
__ Lewis' Woodpecker	I W
__ Acorn Woodpecker	R T
__ Gila Woodpecker	C P
__ Williamson's Sapsucker	R W #
__ Yellow-bellied Sapsucker	R T #
__ Red-naped Sapsucker	C T U W #
__ Red-breasted Sapsucker	Ca T
__ Ladder-backed Woodpecker	C P
__ Hairy Woodpecker	R T
__ Strickland's Woodpecker	Ca T
__ Northern Flicker	C P
__ Gilded Flicker	UP

CARACARAS and FALCONS	
__ Crested Caracara	R T
__ American Kestrel	C P #
__ Merlin	U W #
__ Aplomado Falcon	T *
__ Peregrine Falcon	R T #
__ Prairie Falcon	U W

FLYCATCHERS	
__ Northern Beardless-Tyrannulet	U S #
__ Olive-sided Flycatcher	U T #
__ Greater Pewee	R T #
__ Western Wood-Pewee	C S #
__ Willow Flycatcher	U T #
__ Least Flycatcher	R T #
__ Hammond's Flycatcher	U W #
__ Gray Flycatcher	C W #
__ Dusky Flycatcher	U W #
__ Pacific-Slope Flycatcher	C T #
__ Buff-breasted Flycatcher	T * #
__ Black Phoebe	CP
__ Eastern Phoebe	R T W #
__ Say's Phoebe	C P #
__ Vermilion Flycatcher	C S U W #
__ Dusky-capped Flycatcher	U S #
__ Ash-throated Flycatcher	C S #
__ Brown-crested Flycatcher	C S #
__ Sulphur-bellied Flycatcher	Ca T #
__ Tropical Kingbird	Ca T #
__ Cassin's Kingbird	C S #

BECARDS	
__ Rose-throated Becard	Ca T #

SHRIKES	
__ Loggerhead Shrike	C P #
__ Northern Shrike	Ca T

VIREOS	
__ White-eyed Vireo	Ca T #
__ Bell's Vireo	C S #
__ Gray Vireo	U T #
__ Yellow-throated Vireo	T * #
__ Plumbeous Vireo	C T #
__ Hutton's Vireo	U T #
__ Warbling Vireo	C T #
__ Philadelphia Vireo	Ca T #
__ Yellow-green Vireo	T *

JAYS, CROWS and RAVENS	
__ Pinyon Jay	I W
__ Steller's Jay	I J
__ Blue Jay	T *
__ Western Scrub-Jay	I W
__ Mexican Jay	Ca T
__ Clark's Nutcracker	I W
__ American Crow	R T
__ Chihuahuan Raven	C P
__ American Crow	R T

LARKS	
__ Horned Lark	C P #

SWALLOWS	
__ Purple Martin	U T #
__ Tree Swallow	C T #
__ Violet-green Swallow	C T #
__ Northern Rough-winged Swallow	C S #
__ Bank Swallow	U T #
__ Cliff Swallow	C S #
__ Barn Swallow	C S #

TITMICE, VERDIN, and BUSHTITS	
__ Bridled Titmouse	U W
__ Verdin	C P
__ Bushtit	C P

NUTHATCHES and CREEPERS	
__ Red-breasted Nuthatch	R T
__ White-breasted Nuthatch	C P
__ Pygmy Nuthatch	Ca T
__ Brown Creeper	U W

WRENS	
__ Rock Wren	C P
__ Canyon Wren	U P
__ House Wren	U W #
__ Winter Wren	R W
__ Marsh Wren	U W #
__ Bewick's Wren	C P
__ Cactus Wren	C P

GNATCATCHERS and KINGLETS

__ Blue-gray Gnatcatcher	U T #
__ Black-tailed Gnatcatcher	U T
__ Golden-crowned Kinglet	RW
__ Ruby-crowned Kinglet	C W #

THRUSHES

__ Eastern Bluebird	I W
__ Western Bluebird	U W #
__ Mountain Bluebird	U W #
__ Townsend's Solitaire	R W #
__ Veery	Ca T #
__ Swainson's Thrush	R W #
__ Hermit Thrush	U W #
__ Rufous-backed Robin	R T
__ American Robin	I W
__ Varied Thrush	Ca T

MOCKINGBIRDS and THRASHERS

__ Gray Catbird	R T #
__ Northern Mockingbird	C P
__ Sage Thrasher	U W #
__ Brown Thrasher	R T #
__ Bendire's Thrasher	U P #
__ Curve-billed Thrasher	C P
__ Crissal Thrasher	C P

STARLINGS

__ European Starling	C P

PIPITS and WAXWINGS

__ American Pipit	U W #
__ Sprague's Pipit	Ca W #
__ Cedar Waxwing	U T #
__ Bohemian Waxwing	T *

SILKY FLYCATCHERS

__ Phainopepla	U P *

LONGSPURS

__ Chestnut-collared Longspur	U W #
__ McCown's Longspur	U W #

WOOD WARBLERS

__ Ovenbird	Ca T #
__ Worm-eating Warbler	Ca T #
__ Louisiana Waterthrush	R T #
__ Northern Waterthrush	U T #
__ Golden-winged Warbler	Ca T #
__ Black and white Warbler	R T #
__ Prothonotary Warbler	Ca T #
__ Orange-crowned Warbler	C T #
__ Lucy's Warbler	C S #
__ Nashville Warbler	C T #
__ Virginia's Warbler	U T #
__ MacGilivray's Warbler	C T #
__ Mourning Warbler	T * #
__ Kentucky Warbler	Ca T #
__ Hooded Warbler	R T #
__ American Redstart	R T #
__ Cape May Warbler	Ca T #
__ Northern Parula	R T #
__ Yellow Warbler	C S #
__ Magnolia Warbler	Ca T #
__ Chestnut-sided Warbler	R T #
__ Palm Warbler	Ca T #
__ Pine Warbler	
__ Yellow-rumped Warbler	U W #
__ Grace's Warbler	R T #
__ Black-throated Gray Warbler	C T #
__ Townsend's Warbler	U T #
__ Hermit Warbler	U T #
__ Black-throated Green Warbler	Ca T #
__ Wilson's Warbler	C T #
__ Red-faced Warbler	R T #
__ Painted Redstart	U T #
__ Yellow-breasted Chat	C S #

NEW WORLD SPARROWS and ALLIES

__ Rufous-crowned Sparrow	U P
__ Green-tailed Towhee	C W #
__ Spotted Towhee	I W
__ Canyon Towhee	C P
__ Abert's Towhee	C P
__ Rufous-winged Sparrow	R T
__ Botteri's Sparrow	C S #
__ Cassin's Sparrow	C S #
__ Chipping Sparrow	C W #
__ Clay-colored Sparrow	R T #
__ Brewer's Sparrow	C W #
__ Black-chinned Sparrow	R T #
__ Vesper Sparrow	C W #
LARK SPARROW	
__ Black-throated Sparrow	C P
__ Sage Sparrow	U W #
__ Lark Bunting	C T U W #
__ Savannah Sparrow	C W #
__ Grasshopper Sparrow	U W #
__ Baird's Sparrow	R W #
__ Fox Sparrow	R W
__ Song Sparrow	C P
__ Lincoln's Sparrow	C W #
__ Swamp Sparrow	R W
__ White-throated Sparrow	R W
__ Harris's Sparrow	R W
__ White-crowned Sparrow	C W #
__ Golden-crowned Sparrow	R W
__ Dark-eyed Junco	I W
__ Yellow-eyed Junco	Ca T

TANAGERS

__ Hepatic Tanager	R T #
__ Summer Tanager	C S #
__ Scarlet Tanager	Ca T #
__ Western Tanager	C T #

CARDINALS, GROSBEAKS and ALLIES	
__ Northern Cardinal	C P
__ Pyrrhuloxia	C P
__ Yellow Grosbeak	T *
__ Rose-breasted Grosbeak	R T #
__ Black-headed Grosbeak	C T #
__ Blue Grosbeak	C S #
__ Lazuli Bunting	C T I S #
__ Indigo Bunting	U S #
__ Varied Bunting	U S #
__ Painted Bunting	R T #
__ Dickcissel	R T #
BLACKBIRDS and ALLIES	
__ Bobolink	R T #
__ Red-winged Blackbird	C P #
__ Eastern Meadowlark	C P
__ Western Meadowlark	C W
__ Yellow-headed Blackbird	C W #
__ Rusty Blackbird	R T #
__ Brewer's Blackbird	C W #
__ Common Grackle	T *
__ Great-tailed Grackle	C P
__ Bronzed Cowbird	U S R W #
__ Brown-headed Cowbird	C P #
__ Orchard Oriole	R T #
__ Hooded Oriole	C S #
__ Bullock's Oriole	C S #
__ Baltimore Oriole	T * #
__ Scott's Oriole	U S #
FINCHES and ALLIES	
__ Purple Finch	R W
__ Cassin's Finch	R W #
__ House Finch	C P
__ Red Crossbill	R T
__ Pine Siskin	C W #
__ Lesser Goldfinch	C P
__ Lawrence's Goldfinch	I W
__ American Goldfinch	UW
OLD WORLD FINCHES	
__ House Sparrow	C P

Last Updated: July 3, 2013

PLEASE CALL THE BLM TO REPORT SIGHTINGS OF UNLISTED SPECIES: 520-439-6400.

NOTES

APPENDIX D: LIST OF NOXIOUS WEEDS

USDA United States Department of Agriculture
Natural Resources Conservation Service

NRCS | PLANTS Database

Introduced, Invasive, and Noxious Plants

Arizona State-listed Noxious Weeds

80 records returned

Noxious weeds that are synonyms retain their noxious status, and are indented beneath the current PLANTS accepted name.

Plant Services Division. 2005. *Prohibited, regulated and restricted noxious weeds* (http://www.azda.gov/PSD/quarantine5.htm, 1 May 2006). Arizona Department of Agriculture.

Symbol	Scientific Name	Noxious Common Name	State Noxious Status†	Native Status*
ACBR5	*Achnatherum brachychaetum* (Godr.) Barkworth			L48 (I)
STBR3	*Stipa brachychaeta* Godr.	puna grass	PNW	
ACRE3	*Acroptilon repens* (L.) DC.	Russian knapweed	PNW, RNW	L48 (I), CAN (I)
AECY	*Aegilops cylindrica* Host	jointed goatgrass	PNW, RNW	L48 (I)
ALMA12	*Alhagi maurorum* Medik.			L48 (I)
ALPS3	*Alhagi pseudalhagi* (M. Bieb.) Desv. ex B. Keller & Schaparenko	camelthorn	RNW	
ALPH	*Alternanthera philoxeroides* (Mart.) Griseb.	alligatorweed	PNW	L48 (I), PR (I)
CACH42	*Cardaria chalepensis* (L.) Hand.-Maz.			L48 (I), CAN (I)
CACH10	*Cardaria chalepensis* (L.) Hand.-Maz., orth. var.	lens podded hoary cress	PNW	
CADR	*Cardaria draba* (L.) Desv.	globe-podded hoary cress, globe-podded hoary cress, whitetop	PNW, RNW	L48 (I), CAN (I)
CAPU6	*Cardaria pubescens* (C.A. Mey.) Jarmolenko	hairy whitetop	PNW	L48 (I), CAN (I)
CAAC	*Carduus acanthoides* L.	plumeless thistle	PNW	L48 (I), CAN (I)
CEEC	*Cenchrus echinatus* L.	southern sandbur	PNW, RGNW	L48 (N), HI (I), PR (N), VI (N)
CESP4	*Cenchrus spinifex* Cav.			L48 (N), PR (N), VI (N)
CEIN4	*Cenchrus incertus* M.A. Curtis	field sandbur	RGNW	
CECA2	*Centaurea calcitrapa* L.	purple starthistle	PNW	L48 (I), CAN (I)
CEDI3	*Centaurea diffusa* Lam.	diffuse knapweed	PNW, RNW	L48 (I), CAN (I)
CEIB	*Centaurea iberica* Trevir. ex Spreng.	iberian starthistle	PNW	L48 (I)
CESO3	*Centaurea solstitialis* L.	yellow starthistle, yellow starthistle, St. Barnaby's thistle	PNW, RNW	L48 (I), CAN (I)
CESTM	*Centaurea stoebe* L. ssp. *micranthos* (Gugler) Hayek			L48 (I), HI (I), CAN (I)
CEMA4	*Centaurea maculosa* auct. non Lam.	spotted knapweed	RNW	
CESU	*Centaurea sulphurea* Willd.	Sicilian starthistle	PNW	L48 (I)