WRP Southeastern Arizona/New Mexico Project

GIS Suitability Analysis Report

This report provides information on the GIS analysis conducted to identify lands within the Southeastern Arizona/New Mexico area that are important to the military mission and for habitat conservation.

APRIL 2014

Prepared for the WRP Natural Resources Committee

ManTech International Corporation ®

DUFFY CONSULTING

This Page Intentionally Left Blank

April 2014

Executive Summary

This report details the Geographic Information System (GIS) analysis used to identify areas beneficial to conservation and military testing and training within parts of Southeastern Arizona and Southwestern New Mexico. This analysis, with the input of WRP's Natural Resource Committee's Southeastern Arizona-New Mexico Project Team, identified three focus areas important to Department of Defense testing and training and habitat conservation:

- The intersection of Cochise, Pima, and Santa Cruz Counties
- Northwestern Cochise County
- Southeastern Cochise County

This report provides important information about each focus area and the GIS analysis of them.

This Page Intentionally Left Blank

Table of Contents

List of Figures

WRP Natural Resources Committee's Southeastern Arizona/New Mexico Project

The Western Regional Partnership (WRP) identified the Southeastern Arizona/New Mexico Region as one of two important regions to collaborate on broad-based regional planning. This area was identified for its significant wildlife, military testing and training, renewable energy development and other infrastructure.

Project Goals:

- Identify areas important to both **ecological and military values**, through GIS Analysis with partner input.
- Examine appropriate locations for conservation easements and other projects to enhance habitat, reduce loss potential and improve connectivity and support the military mission.

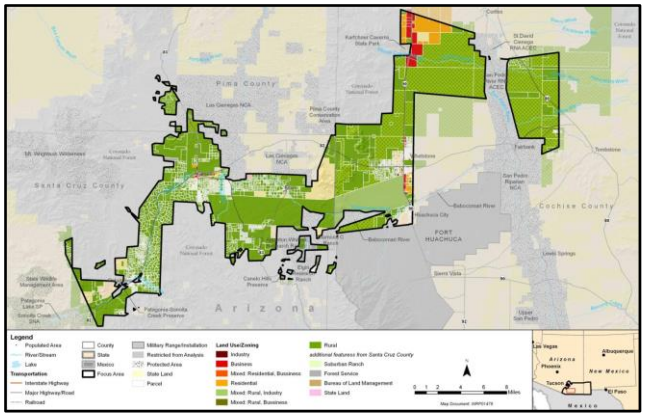
Relevance of the Southeastern Arizona/New Mexico Region to the Project Goals:

- The San Pedro River runs through the Chihuahuan and Sonoran Deserts in southeastern Arizona, providing essential habitat to hundreds of species. It also contains a rich archeology with sites going back 13,000 years.
- U.S. Army Fort Huachuca, a critical military asset, operates in the project region. It is home to many units, including the U.S. Army Intelligence Center of Excellence, the U.S. Army's school for training military intelligence personnel. It is also home to the largest Unmanned Aircraft System (UAS) training center in the world and operates the Army's Electronic Proving Ground.

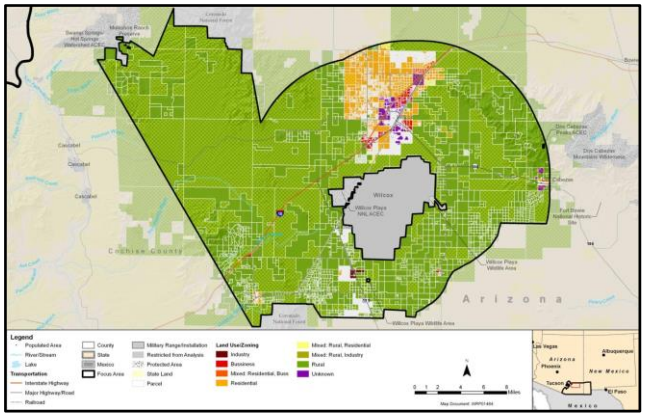
WRP Analysis and Outreach Efforts:

- At the project kick-off meeting in June 2012, agencies and stakeholders provided information on their efforts related to the project goals and known challenges.
- The WRP Southeastern Arizona/New Mexico (SoAZ/NM) project team held numerous conference calls to review GIS suitability analysis and provide recommendations to efficiently address priorities in the area:
    - Studied an area (consisting of 13,100 square miles) initially identified as possibly suitable for projects.
    - Developed project criteria for GIS analysis of recommended specific focus areas:
        - Lands important to the military mission (including analysis with special use airspace and military training routes).
        - Natural resource considerations (including proximity to protected areas, habitat quality, missing linkages and water quality).
        - Land use/zoning, parcel ownership.
    - Collected GIS data and information on related studies.
    - Invited additional stakeholders to participate.
- Held April 2013 planning meeting to receive briefing on the mission at Fort Huachuca and refined focus area to 1,335 square miles.
- Conducted GIS Analysis of the focus areas by applying the specified criteria.

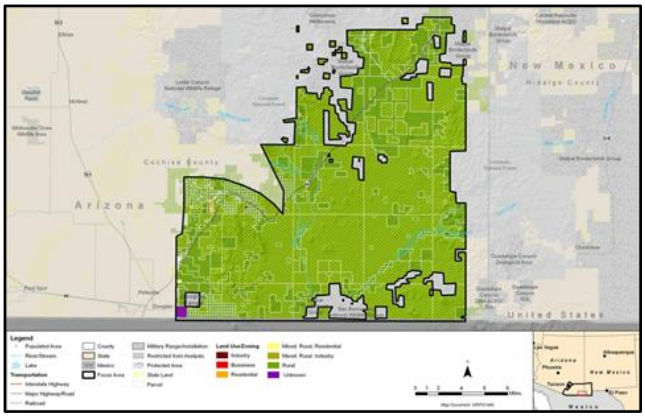
Three focus areas identified:	**Total Area**
Focus Area 1: Intersection of Cochise, Pima and Santa Cruz Counties	277 mi^2
Focus Area 2: Southeastern Arizona, Northwestern Cochise County	619 mi^2
Focus Area 3: Southeastern Arizona, Southeast Cochise County	439 mi^2



Focus Area 1



Focus Area 2

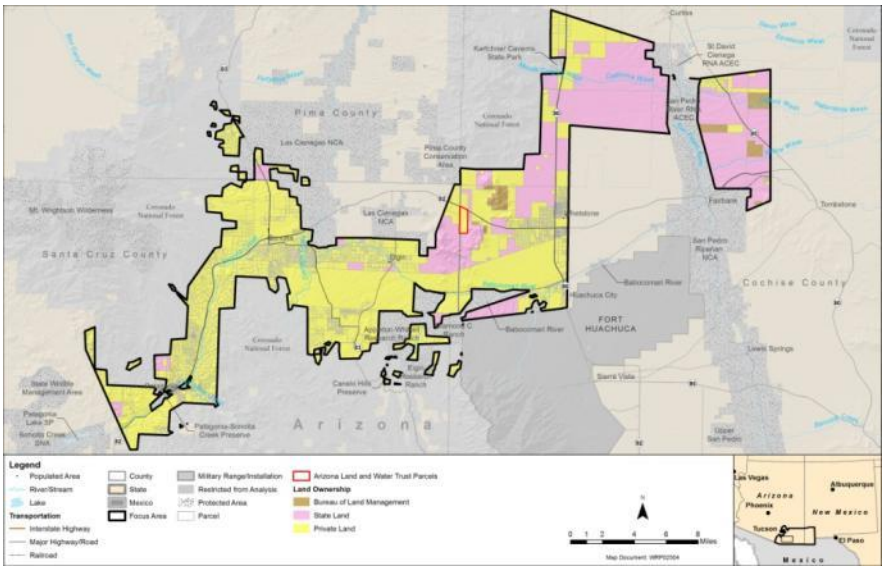


Focus Area 3

Significant efforts have been undertaken to support both ecological and military values in the region including:

- Prior to 2012, the Arizona Land and Water Trust (the Trust) acquired:
  - A 105-acre conservation easement on the High Haven Ranch (Hwy 83), an area included in the Fort Huachuca Buffalo Soldier Electronic Testing Range.
  - Approximately 1,600 acres of conservation easements protecting the ranching operation of the Diamond C Ranch and deterring encroachment to the west of the Fort.
- In 2012, an $8 million dollar Army-Readiness Environmental Protection Initiative (REPI) investment, together with a substantial TNC investment, was used to protect nearly 6,000 acres of watershed in the San Pedro Riparian National Conservation Area, assisting Fort Huachuca with mission protection and achieving its goal of being "net zero" in water use by protecting and conserving amounts equal to its attributable pumping.

- In 2013, the Trust received funding from the Arizona Military Installation Fund for a conservation easement/deed restriction of 908 acres within WRP SoAZ/NM Project priority Focus Area 1. This project significantly contributes to maintaining Fort Huachuca's mission. By protecting priority lands and reducing development under the R2303 Military Airspace, this project maintains full use of this airspace and improves the Fort's capacity to support its air operations. By safeguarding these large parcels, this project also protects endangered species habitat and improves watershed characteristics. Reduced development and encroachment lessens competition for water and limits the need for new groundwater pumping and extraction.



Recent Arizona Military Installation Fund (MIF) conservation easement/deed restriction of 908 acres within WRP SoAZ/NM Project Priority Focus Area 1

Future Steps:

- Work as collaborative partners to protect important habitat and corridors.
- Final recommendations and report will be presented to the WRP Principals at their 2014 meeting.

Section 1: Southern Arizona-New Mexico Suitability Analysis Summary

Section 1.1 Project Overview

The Western Regional Partnership (WRP) identified Southeastern Arizona/New Mexico as one of two important regions for collaborative, broad-based regional planning. WRP recognized the region's significant wildlife, military testing and training, renewable energy development, and other infrastructure. The WRP Natural Resource Committee led this project with contractor support (ManTech (MT) conducted GIS analysis, and Duffy Consulting assisted with collaboration and outreach), the goals of which were to identify opportunities to enhance habitat, reduce potential habitat loss, improve ecoregional connectivity, and further ecological and military readiness goals.

The project applied suitability analysis to comprehensively examine appropriate locations for conservation through easements and other means. The analysis method used is a repeatable model, first used by WRP in its analysis of the Mojave Desert Ecoregion. More information on that project can be found in the *Geographic Information Systems (GIS) Suitability Analysis Report for the WRP Mojave Project* (WRP 2013).

At the project kick-off meeting in June 2012, WRP Partners discussed their efforts and challenges across the region. Small groups collaborated to identify regional issues, potential partners and available resources. Each group also outlined a general geographic area to define the project study area (Figure 1.1-1), resulting in the identification of four large areas. To focus the project, the Committee members chose the overlapping portion of these four areas as the project study area (Figure 1.1-2).

At this kick-off meeting, meeting participants further refined project goals and criteria. For each phase, the group recommended the important criteria to consider and examine (Figure 1.1-3). The initial phases were to be broad-based regional analysis of the entire study area; later phases would refine the area to those most important to natural resources and the military mission. Meeting participants also toured Fort Huachuca to better understand its particular DoD mission.

This report details the initial phases of the study, which used Geographic Information System (GIS) data and tools (Levels 5 through 3). WRP Natural Resource Committee's Southeastern Arizona/New Mexico Project Team (SoAZ/NM Team) input was incorporated throughout the GIS analysis conducted by MT.

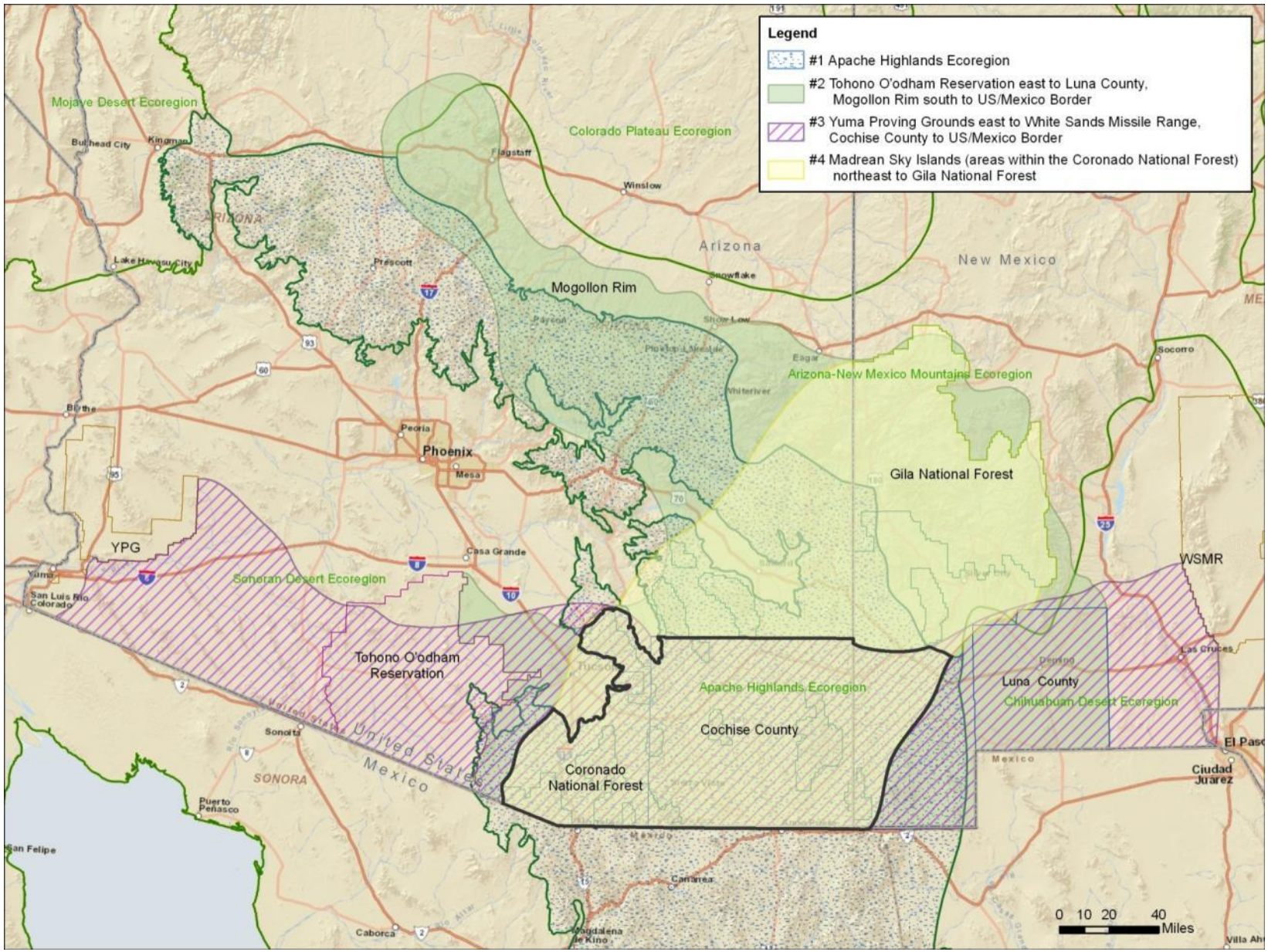


Figure 1.1-1 Proposed Study Areas

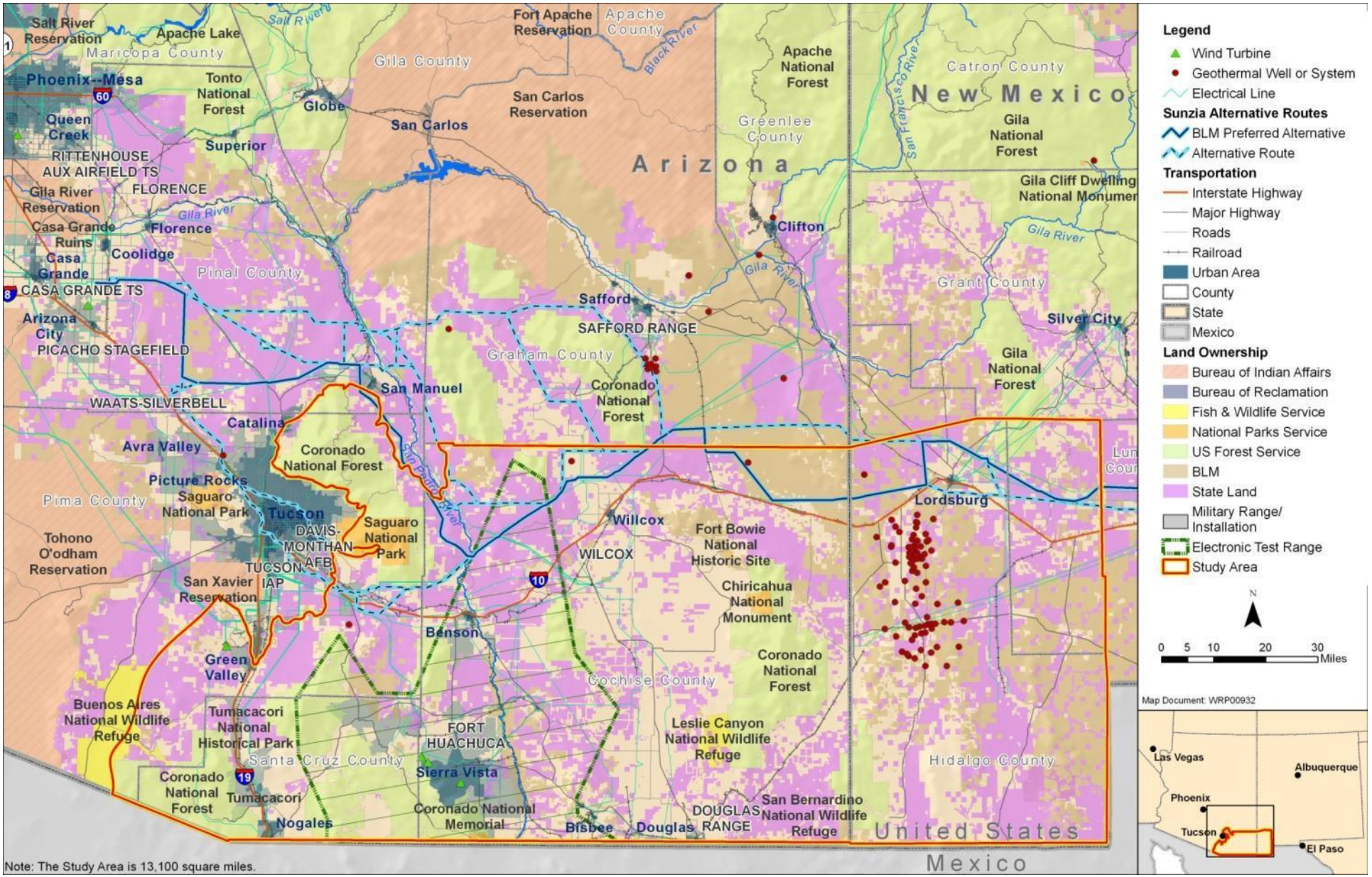


Figure 1.1-2 Southern Arizona-New Mexico Project Study Area

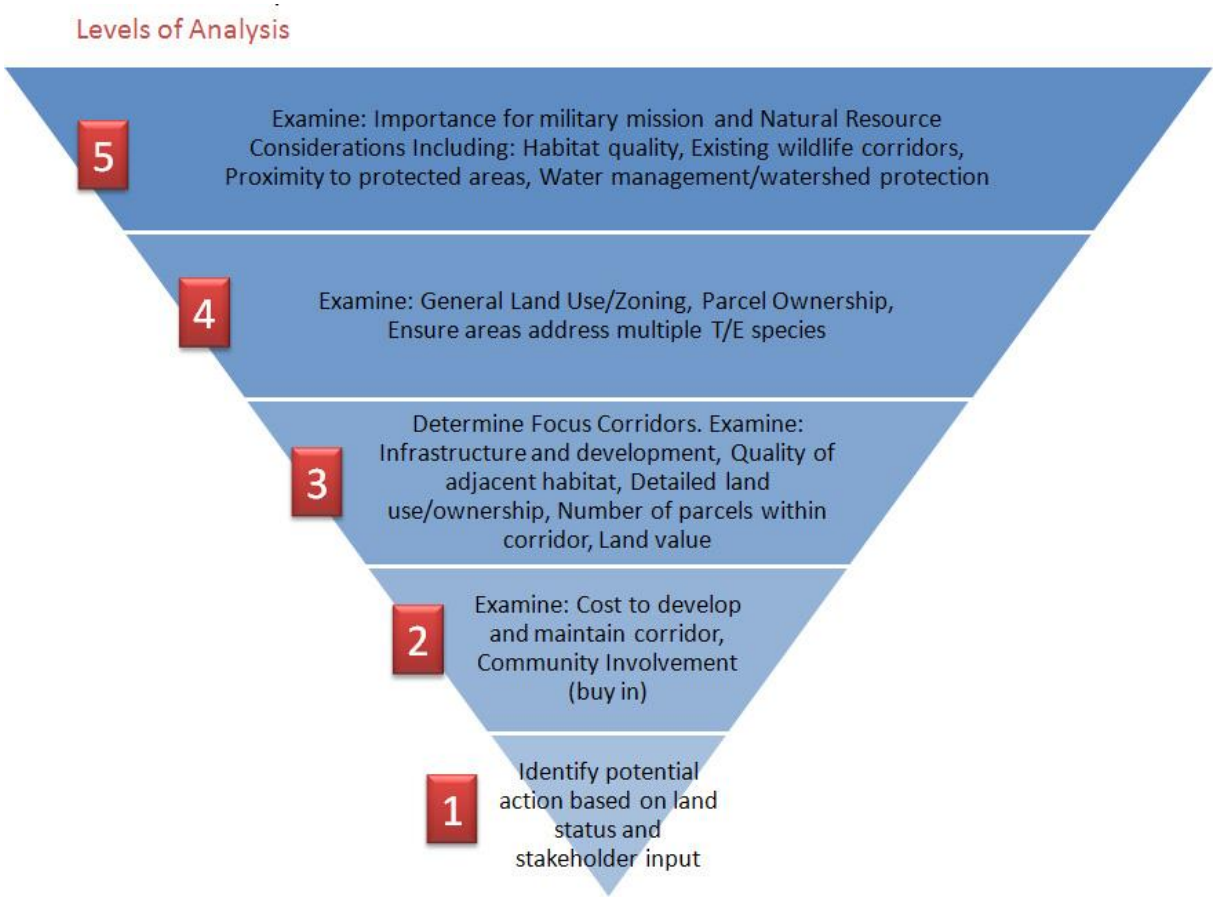


Figure 1.1-3 Project Levels of Analysis

Section 1.2 Level 5 Analysis: Department of Defense and Natural Resource Considerations

Introduction

Level 5 analysis focused on identifying lands used by the Department of Defense (DoD) for testing and training that are near ecologically sensitive areas, (including those inhabited by threatened and endangered species, or containing wildlife corridors, healthy watersheds and quality habitat). MT applied the selected criteria by employing suitable GIS datasets through the model analysis to identify suitable land.

Restriction Analysis

Restriction analysis (Figure 1.2-1) removed land that could not be influenced within the scope of this project such as land owned by the Federal government (i.e. military installations and ranges, national forest, parks, and refuges) or already protected (i.e. lands with conservation easements, and state, county, and locally owned preserves). The SoAZ/NM Team included all areas owned by the Bureau of Land Management (BLM) as some of these lands include areas potentially suitable for project collaboration. In addition, areas that were already protected for conservation were eliminated from further consideration.

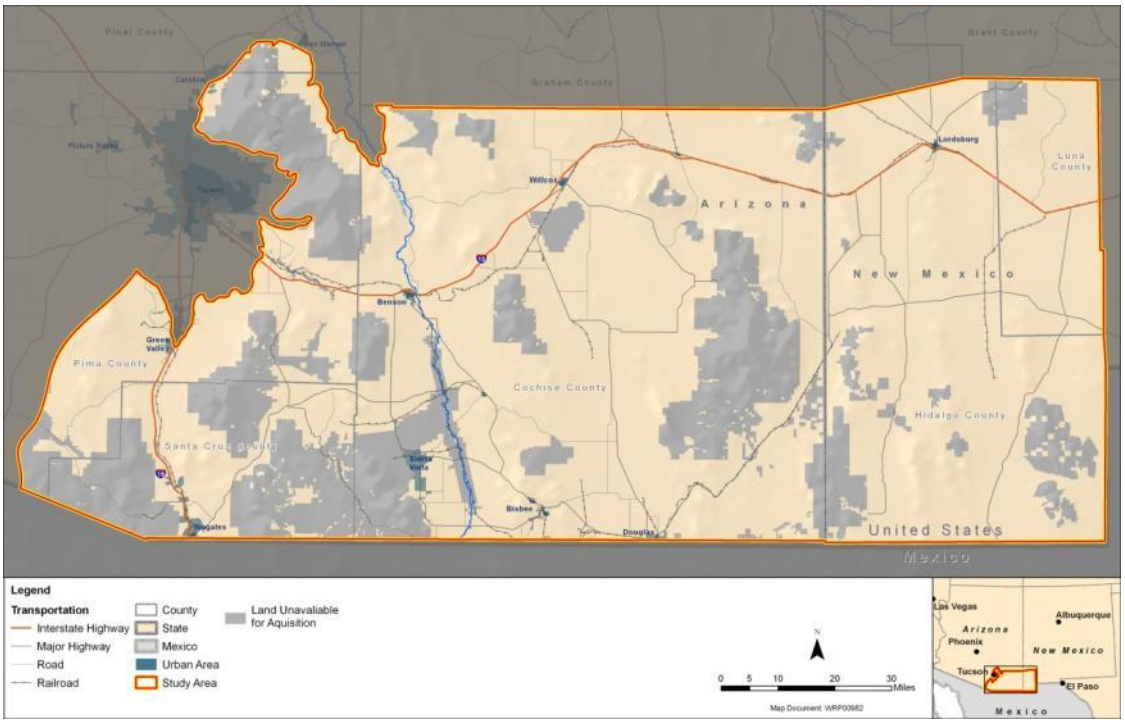


Figure 1.2-1 Land Unavailable for Acquisition

Level 5 Suitability Methods, Datasets and Results

The SoAZ/NM Team chose criteria to represent DoD and conservation interests. For the Level 5 analysis, several geographic datasets, which represented the criteria, were examined and selected for use in a model to determine project suitability. Each dataset was given a ranking between 1 to 5 to distinguish suitability, with 5 being excellent suitability and 1 being no suitability. A combination of datasets was used to represent each group's measure of suitability. Finally, a weighted analysis, of half DoD input and half conservation input, determined an area's final Level 5 suitability ranking.

In determining the suitability for military purposes, the model analyzed several factors. DoD considers it important to preserve land within or below military testing and training areas, i.e. special use airspace (SUA) areas, military training route (MTR) corridors, and the Buffalo Soldier Electronic Test Range (Figure 1.2-2). Low level SUA and MTRs with a floor less than 1,000 feet above ground level (AGL) are considered especially important and were given a ranking of 5, while all other airspace areas were given a ranking of 4. The electronic test range area was ranked high (5) in the model, as the entire range area's susceptibility to electromagnetic radiation interference threatens the testing and training potential of the range. Lands near military installations and ranges were also considered important, so a 25-mile buffer was created around all installations for use in the model. Areas closest to the installations and ranges were ranked 5 and rank was decreased at 5 mile intervals across the study area. A weighted analysis of these datasets was conducted and resulted in a final result of Level 5, military considerations measure of suitability (Figure 1.2-3).

For natural resource suitability, the model analyzed numerous datasets and was revised several times to accommodate newly acquired data, reassessment of dataset completeness, and SoAZ/NM Team's priorities and concerns. Because the project study area includes parts of two states, the datasets used to represent the criteria did not always cover both states. However, comparable datasets were used as much as possible across the study area to achieve consistent results. Threatened and endangered species designated critical habitat and important bird areas were considered important areas to protect and results were ranked 5 and 4 in the model (Figure 1.2-4). These areas were buffered at 5 mile increments and areas closer to the habitat areas were ranked higher.

The SoAZ/NM Team included and ranked areas high within proximity to currently protected lands since it may be easier to extend a buffer out from existing conservation lands. Protected areas were compiled for this analysis and buffered at 5 mile increments, ranking adjacent areas higher in the model (Figure 1.2-5).

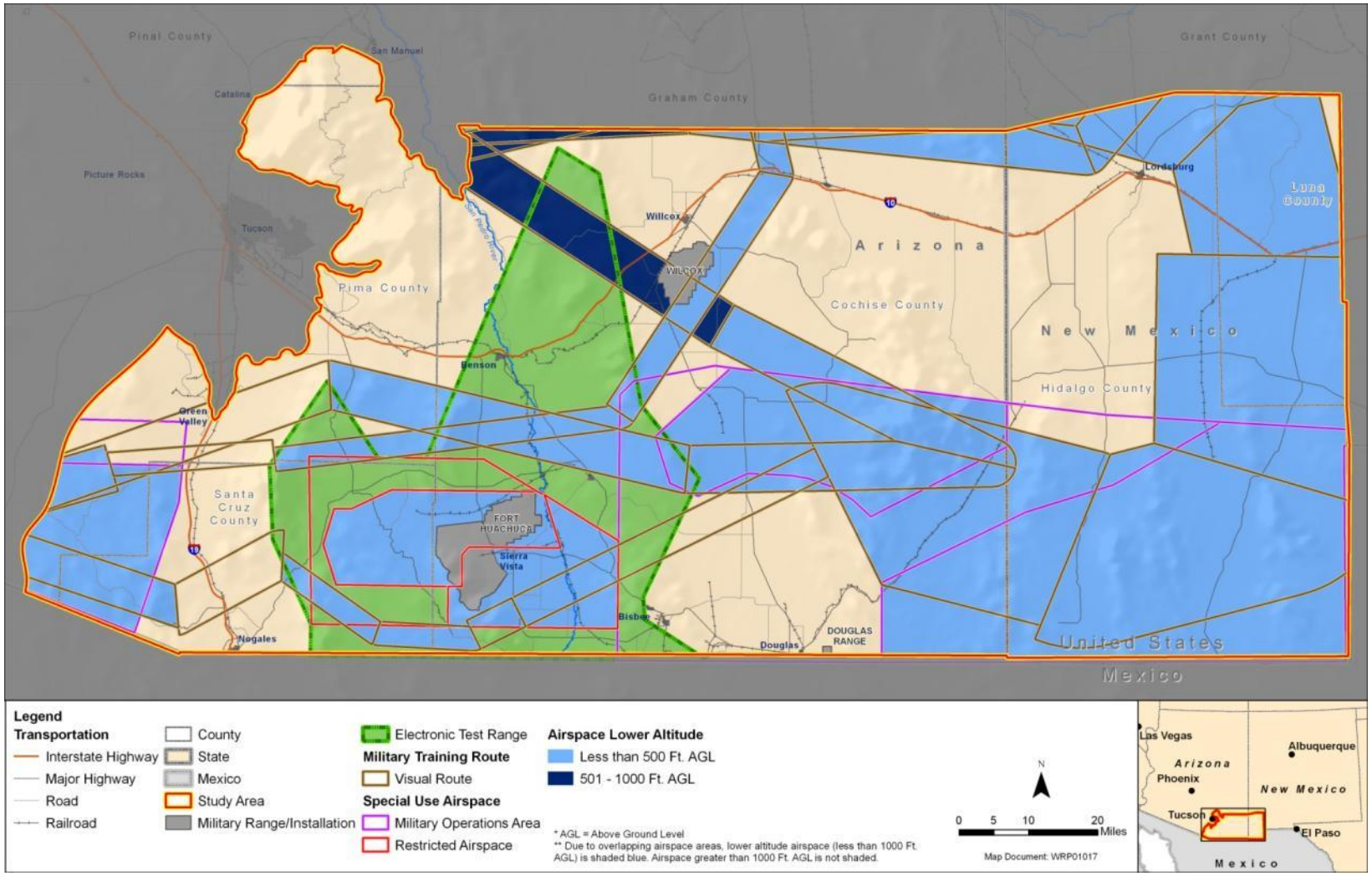


Figure 1.2-2 DoD Considerations

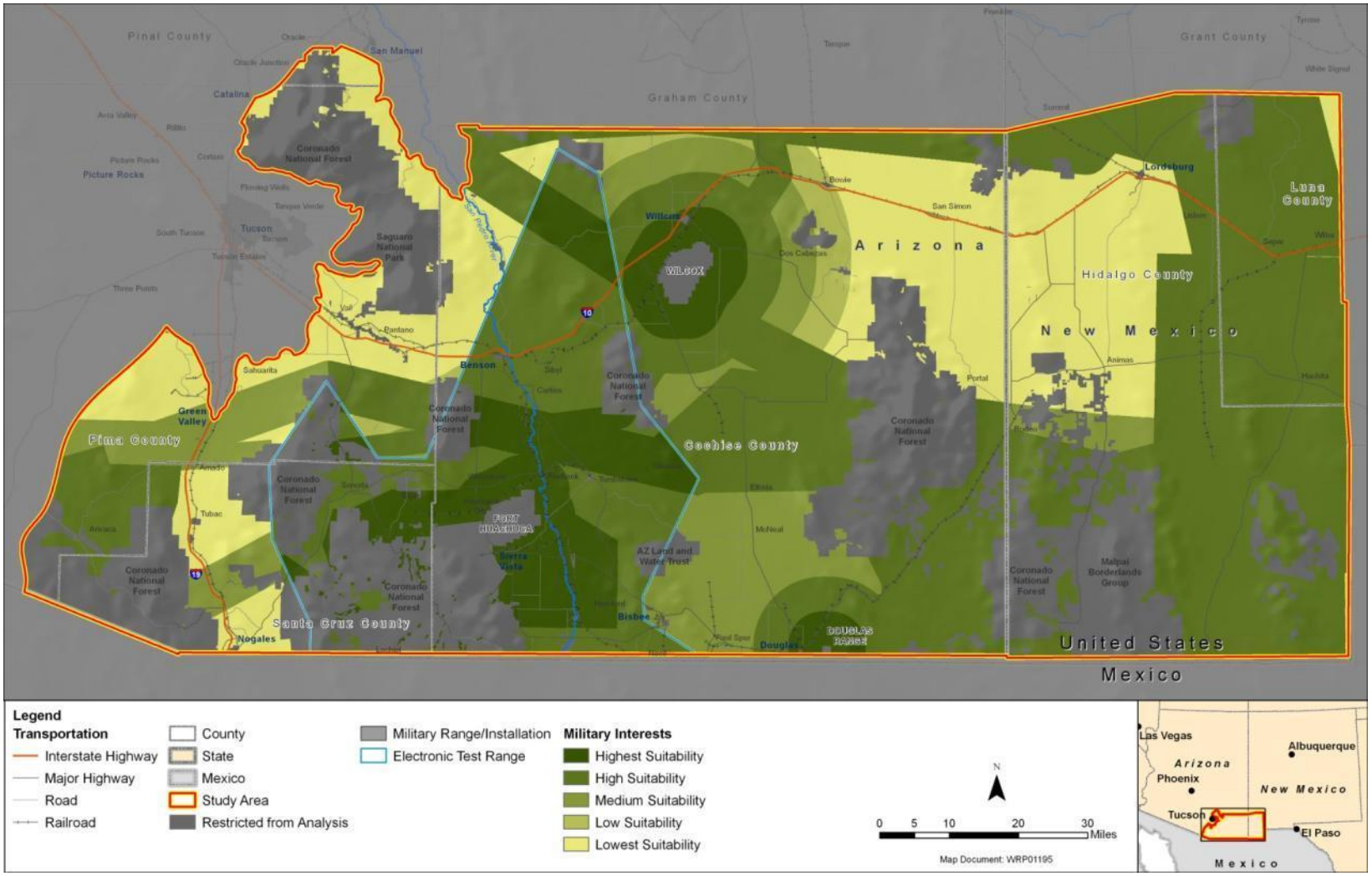


Figure 1.2-3 DoD Considerations Suitability

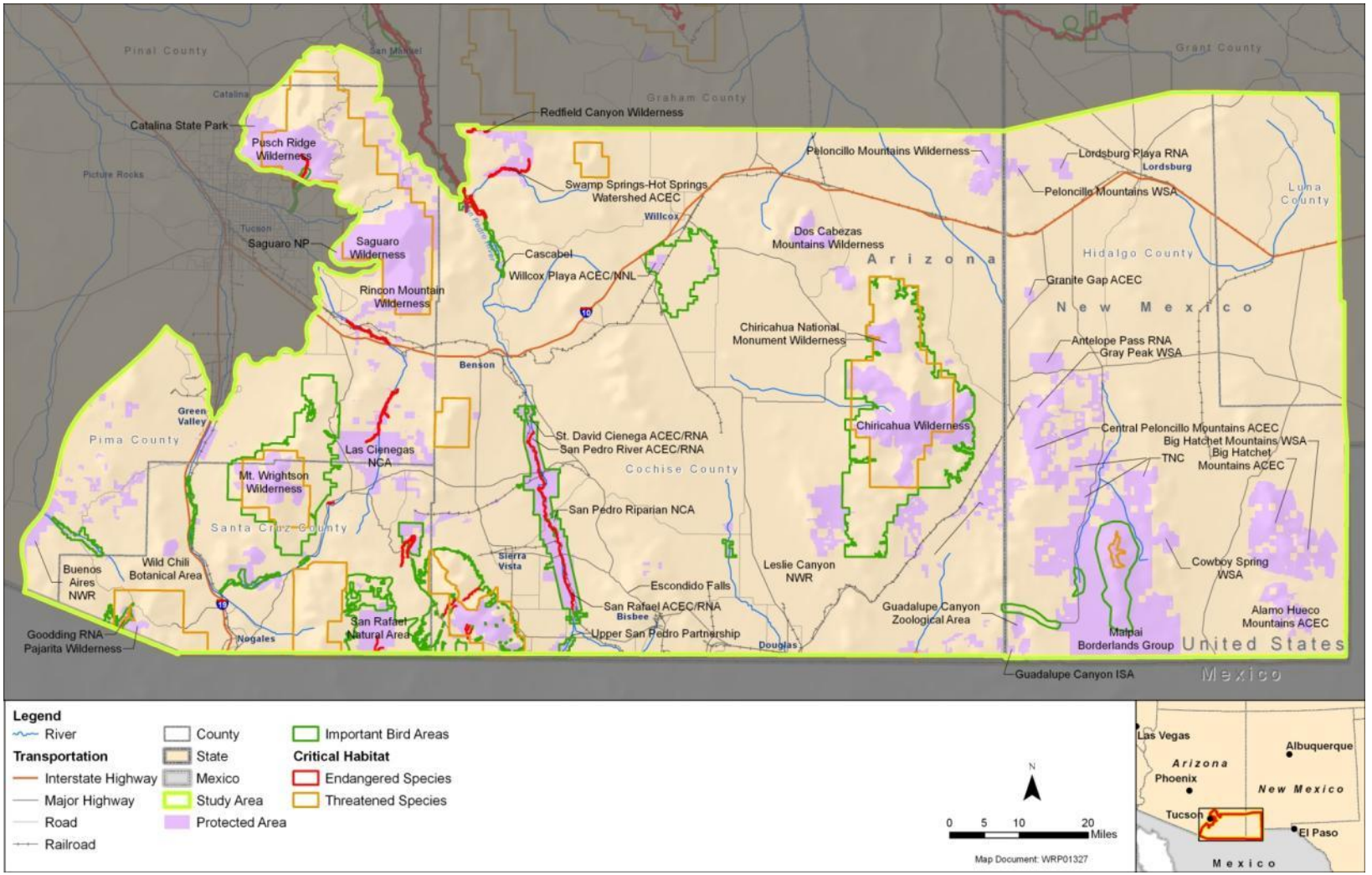


Figure 1.2-4 Threatened and Endangered Species Habitat and Important Bird Areas

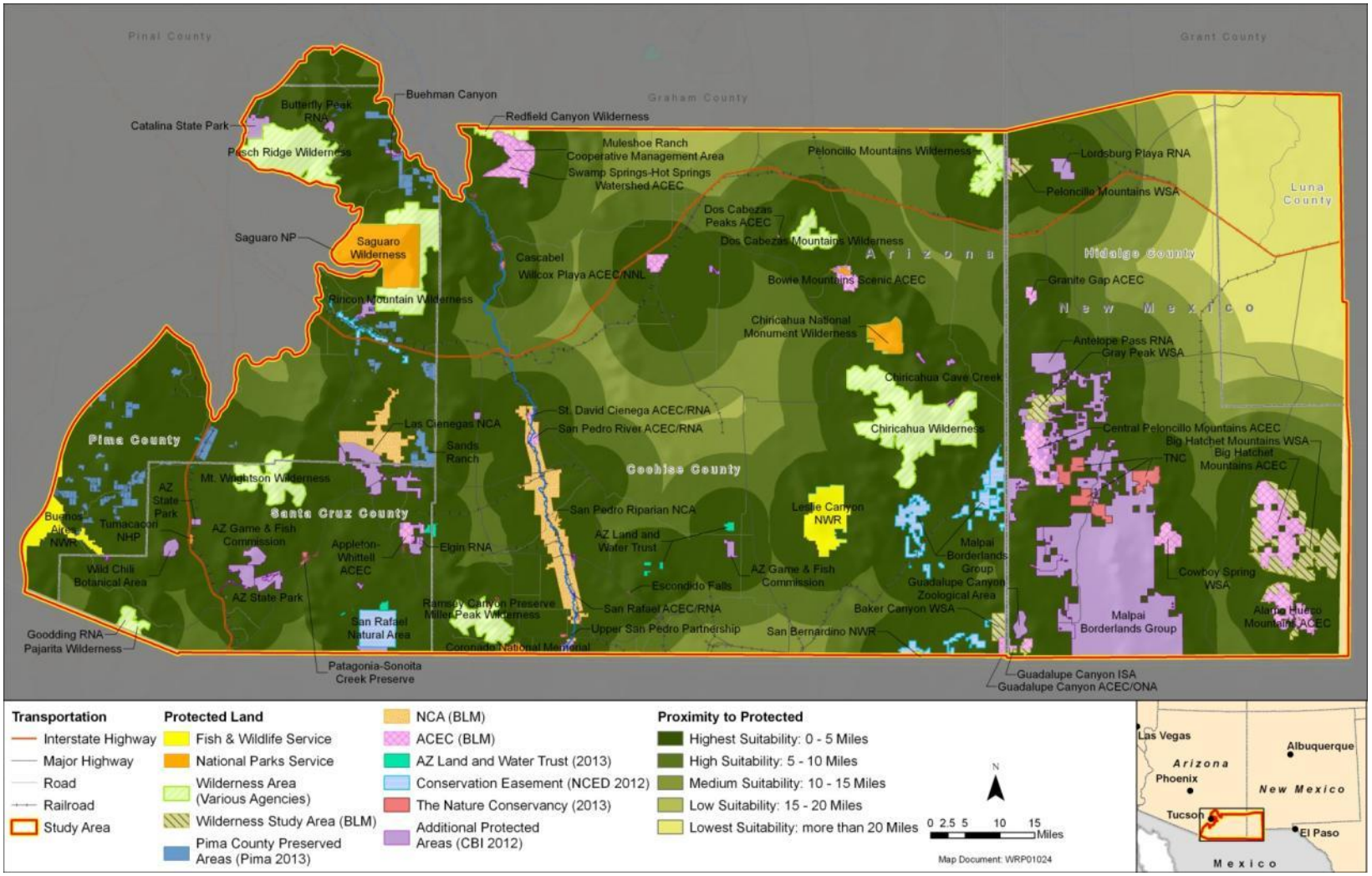


Figure 1.2-5 Proximity to Protected Areas

Another objective of the project, from a natural resource perspective, was to protect areas that would build or enhance wildlife connectivity areas, or wildlife corridors. Although data to represent this interest exist, wildlife corridors had not been studied or designated continuously or consistently across the study area, so a mixture of data was used (Figure 1.2-6). For Arizona, a collection of identified Missing Linkages, from the Arizona Wildlife Linkages Workgroup, was incorporated into the analysis. Wildlife blocks and potential linkage zones were ranked 3 and 4 and designated wildlife corridors, were ranked 5. For New Mexico, results were incorporated from a comprehensive New Mexico Game and Fish (NMGF) "Green Infrastructure" analysis. This analysis examined a variety of factors and data and ranked the suitability of an area to form an interconnected green space network, i.e. corridors, across the state.

The SoAZ/NM Team also considered water management, water quality, and watershed protection. NMGF completed a "Water Quality and Supply" dataset that identified potential risks to water availability and supplying clean water, and ranked watersheds and other land areas that were important for maintaining a healthy, sustainable water supply. No comparable data for Arizona could be found and to conduct a similar study was outside the scope of this project. Therefore, the NMGF data was not considered in the final GIS model to ensure suitability was ranked fairly across the study area. Watershed concerns will be considered at other phases of this project.

Habitat quality datasets varied between the states, so a combination of datasets was used (Figure 1.2-7). For New Mexico, a comprehensive analysis "Biodiversity" by NMGF was included. This dataset identified areas that provided habitat for plants and animals including Threatened and Endangered species. For Arizona, Arizona Game and Fish (AZGF) modeled areas of wildlife conservation potential across the state based on five indicators of wildlife conservation value: species of greatest conservation need, species of economic and recreational importance, sportfish, unfragmented areas and riparian habitat. The resultant dataset, "Species and Habitat Conservation Guide", was then included in this model to represent habitat quality.

The GIS model was applied to all the ranked data. Each consideration or input was assigned a weighted value which contributed to an area's final suitability result. The sum of all DoD considerations (Figure 1.2-3) and natural resource considerations (Figure 1.2-8) were weighted equally at 50 percent. The final Level 5 suitability model returned an output displaying lands ranked 1 to 5, with 1 being not suitable and 5 being the most suitable for land protection and other projects by the SoAZ/NM Team (Figure 1.2-9).

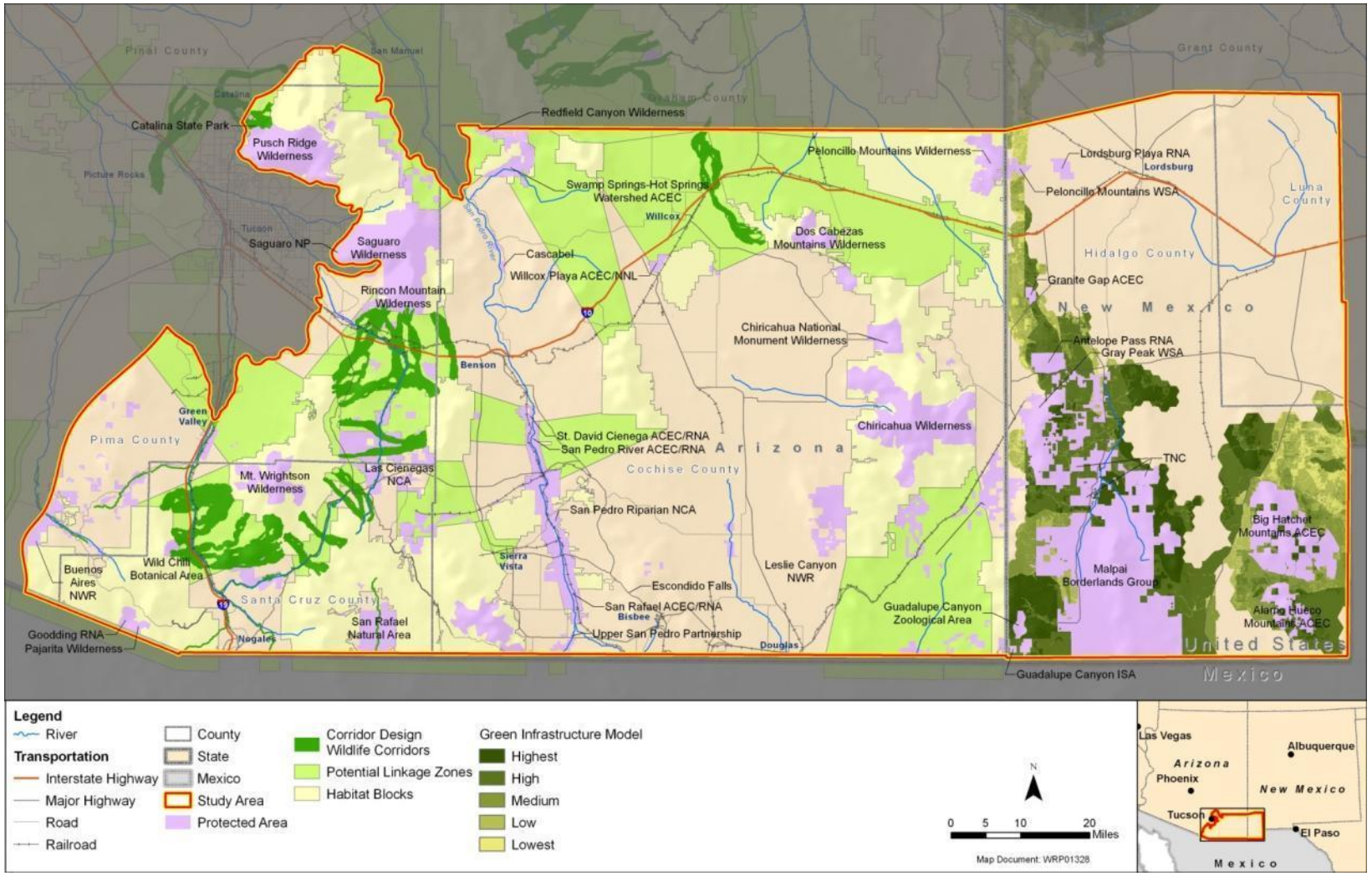


Figure 1.2-6 Potential Wildlife Corridor Areas

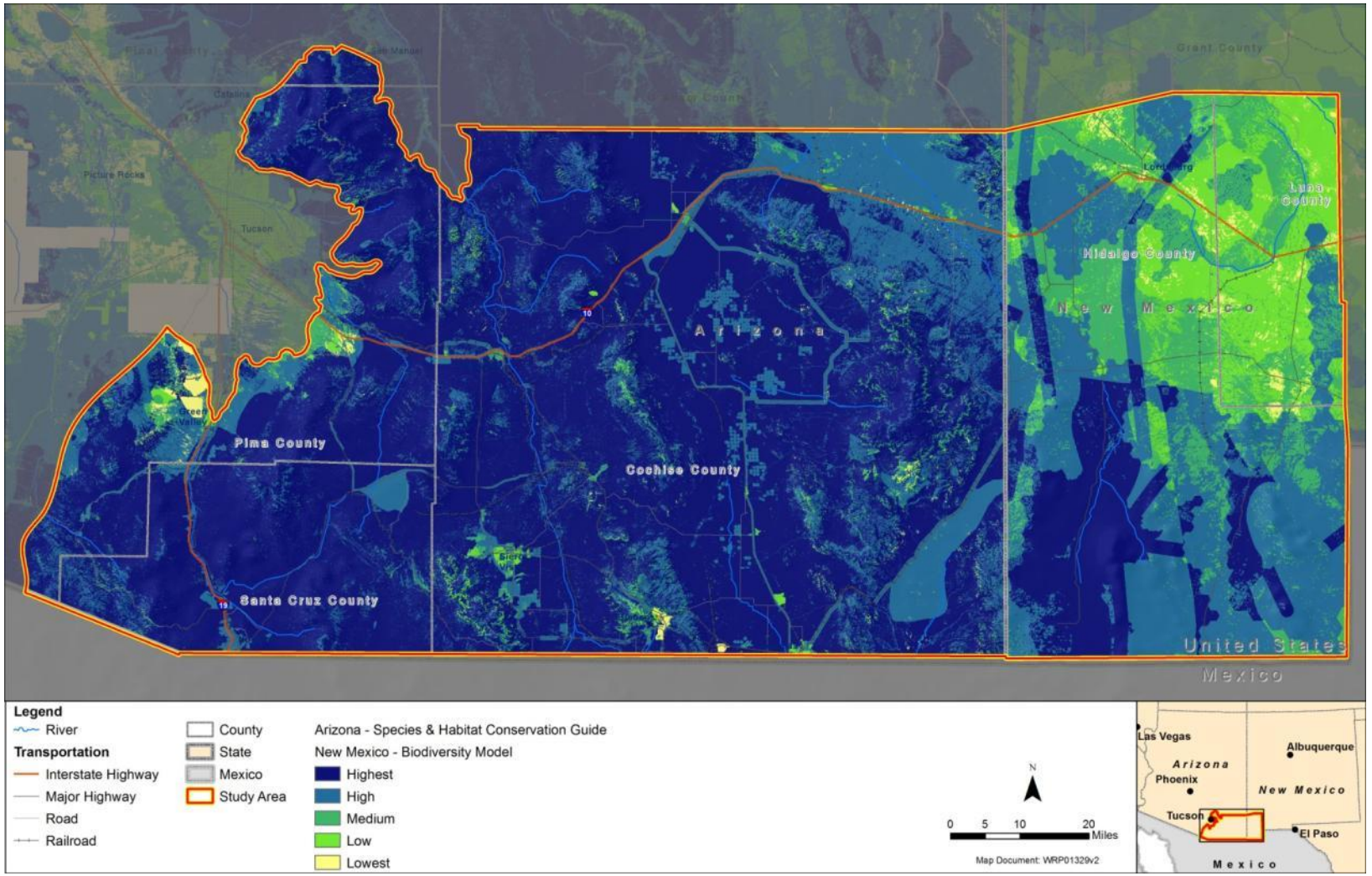


Figure 1.2-7 Habitat Quality

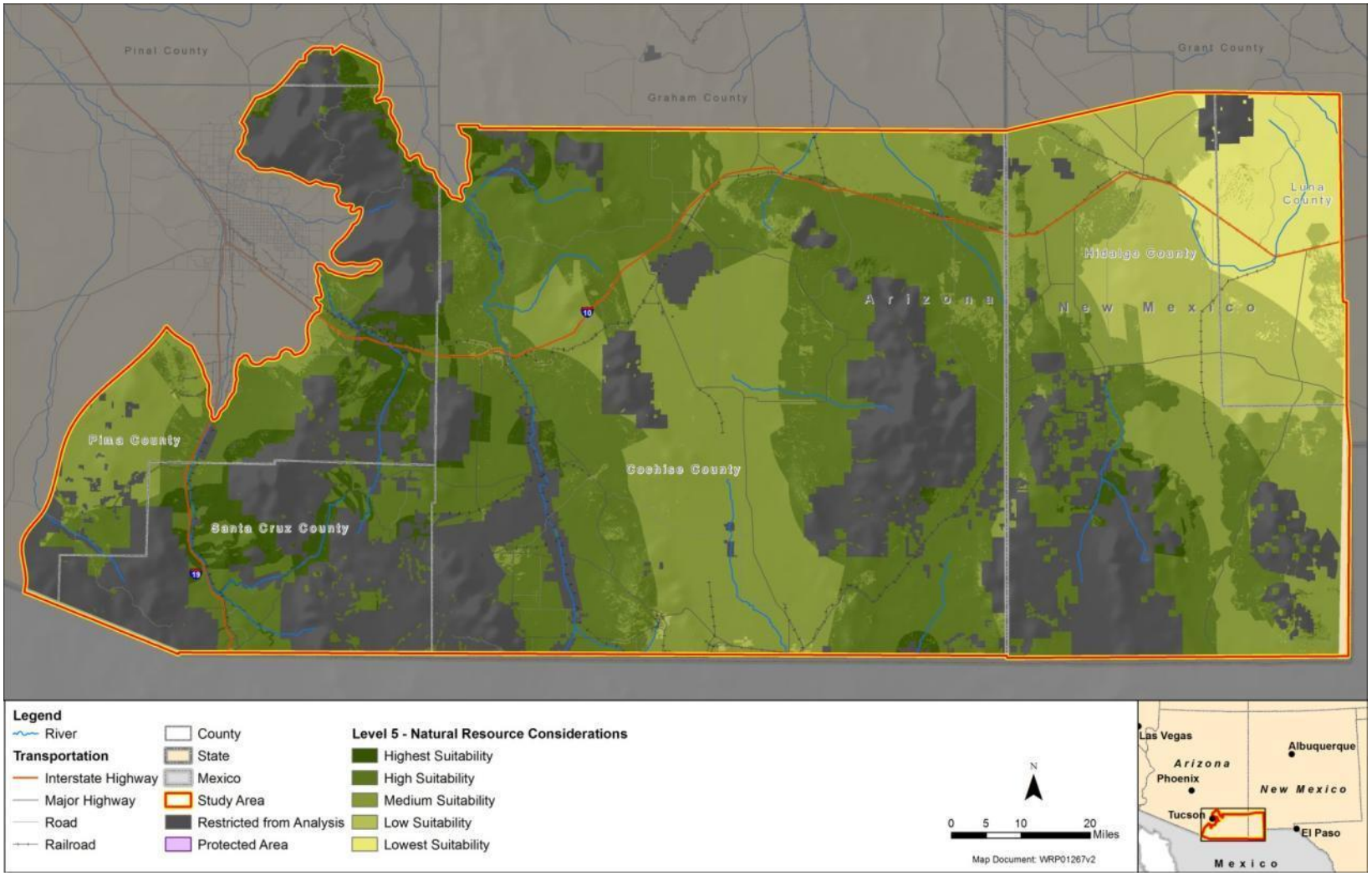


Figure 1.2-8 Natural Resources Considerations Suitability

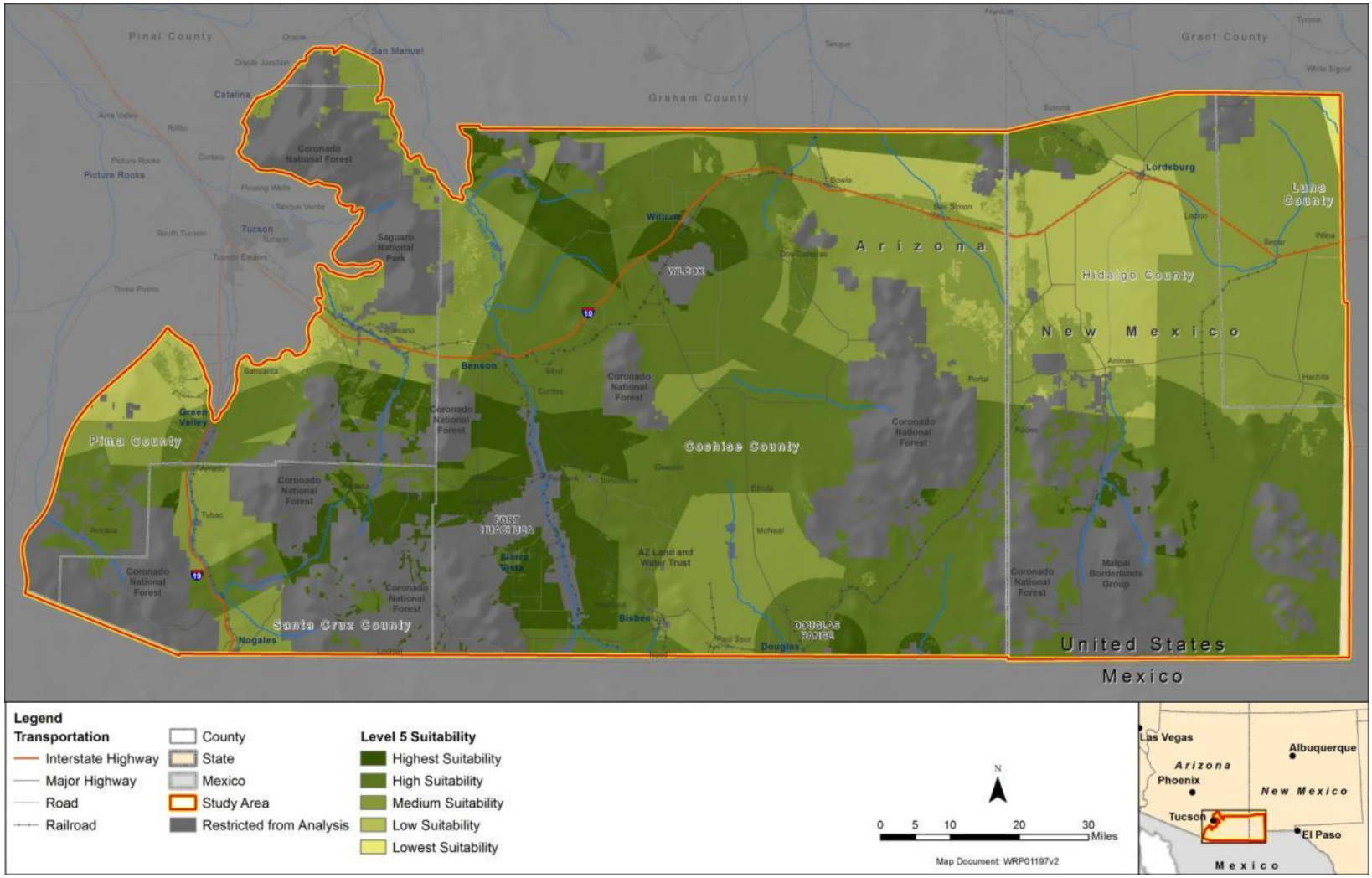


Figure 1.2-9 Level 5 Suitability

Section 1.3 Level 4 Analysis: Land Ownership and Land Use

Introduction

The Level 4 analysis further examined those areas rated high in the level 5 analysis. The analysis considered general ownership and land use data, as the SoAZ/NM Team considered certain types of land use and status more suitable for conservation, potential acquisition, or protection status change,

Level 4 Suitability Methods, Datasets and Results

The analysis used a general land ownership dataset for the entire study area. If a higher resolution dataset (i.e. more detailed ownership, use, and/or boundary information, was avaliable) the dataset was added to the analysis.

Detailed land use and ownership data was obtained from zoning or parcel datasets, which were avaliable from some county GIS Departments. Not all datasets were complete (e.g. sometimes zoning codes were missing); the best available information was noted and used.

Similar to the level 5 analysis, features in the datasets were ranked from 1 through 5 indicating no suitability (1) to highly suitable lands for possible protection (5). Rural, agricultural, or very low density rural residential lands were ranked highest . Commercial, industrial, and residential areas and similarly used lands were ranked low. From the general ownership dataset, BLM, state, and other private lands werealso given a suitability rank (Table 1.3-1 and Figure 1.3-1).

The ranked data was put in the GIS model, which measured an area's suitability as a combination of this data and Level 5 suitability results (Figure 1.3-2). This analysis helped narrow the SoAZ/NM Team focus.

Land Use Type	Rank
Rural, Agriculture, Very Low Density Residential	5
BLM	4
State Land	3
County, Municipal Land	2
Residential, Planned Development, Industrial, Commercial	1

T
A
Table 1.3-1 Land Use Suitability Rank

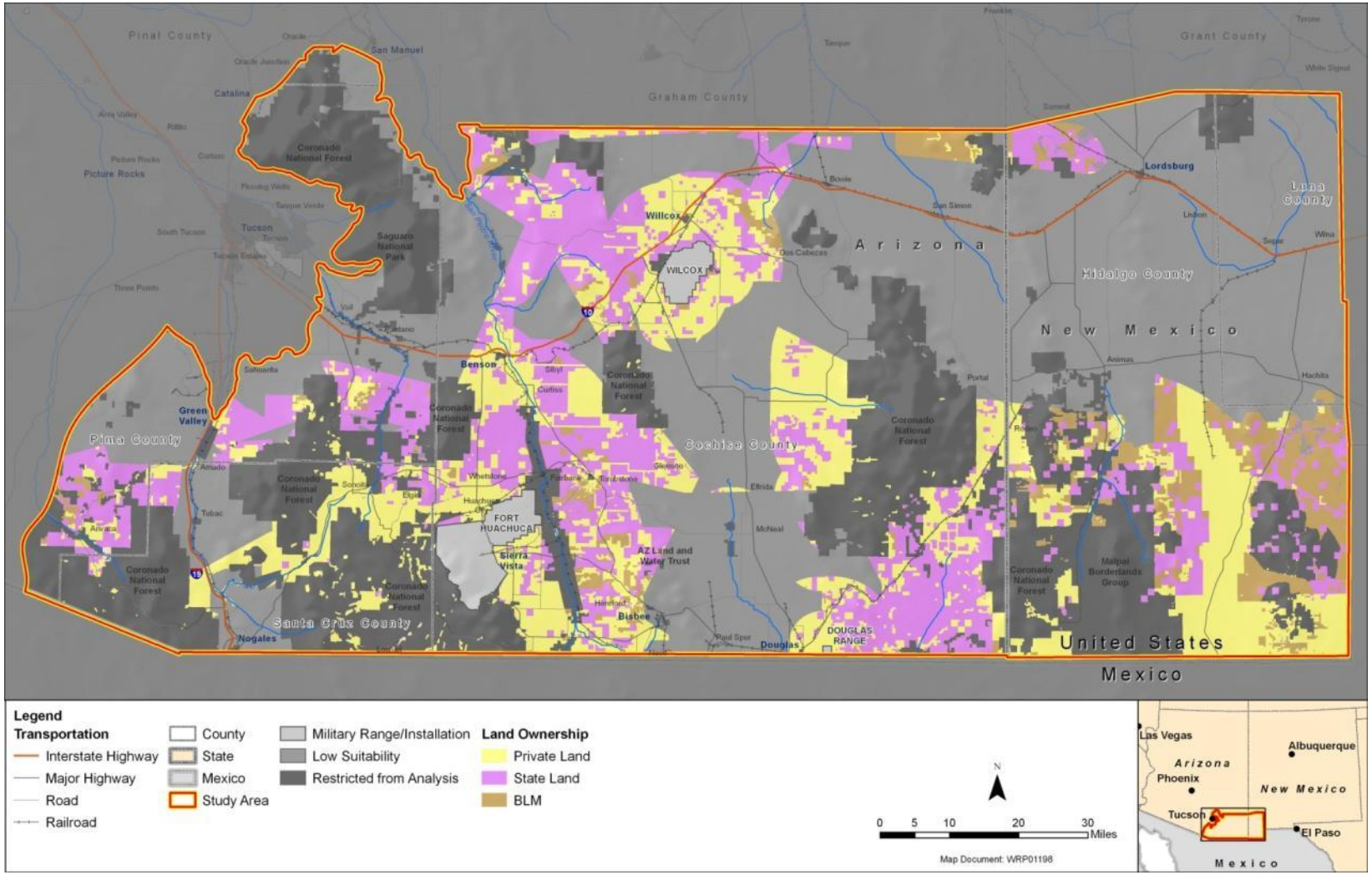


Figure 1.3-1 General Land Ownership

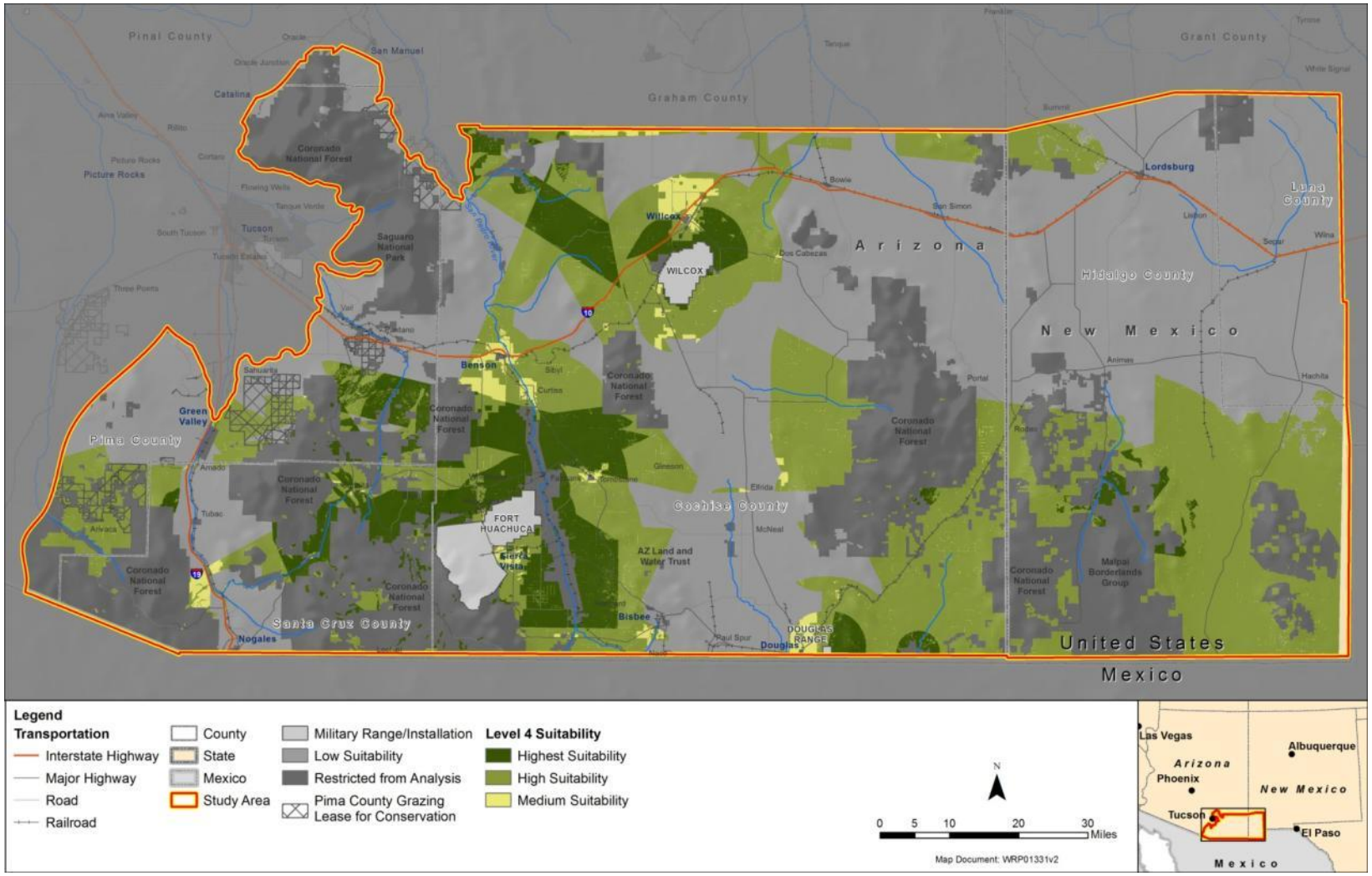


Figure 1.3-2 Level 4 Suitability

Section 1.4 Level 3 Analysis: Areas of Disturbance, Projected Population Growth and Determining Focus Areas

Introduction

The analysis to date demonstrated that lands of excellent or good suitability exist throughout the study area. The level 3 analysis examined areas of disturbance. Population growth concerned the SoAZ/NM Team, but this factor was not addressed as no appropriate dataset covering the entire study area could be obtained. The SoAZ/NM Team met to discuss the suitability results and recommended MT further focus the GIS analysis to three geographic areas for additional study in the final 2 levels of analysis.

Level 3 Suitability Methods, Datasets and Results

SoAZ/NM Team determined areas of disturbance not captured previously should be classified as unsuitable areas for project action. This included populated urban areas, transportation features, and other activities such as mining sites. Several datasets created by The Nature Conservancy that consistently compiled this information across the study area were incorporated in the analysis (Figure 1.4-1) and combined with Level 4 results to create the final Level 3 GIS land suitability recommendations (Figure 1.4-2). The SoAZ/NM Team met to discuss results and selected portions of the original study area for further analysis and action.

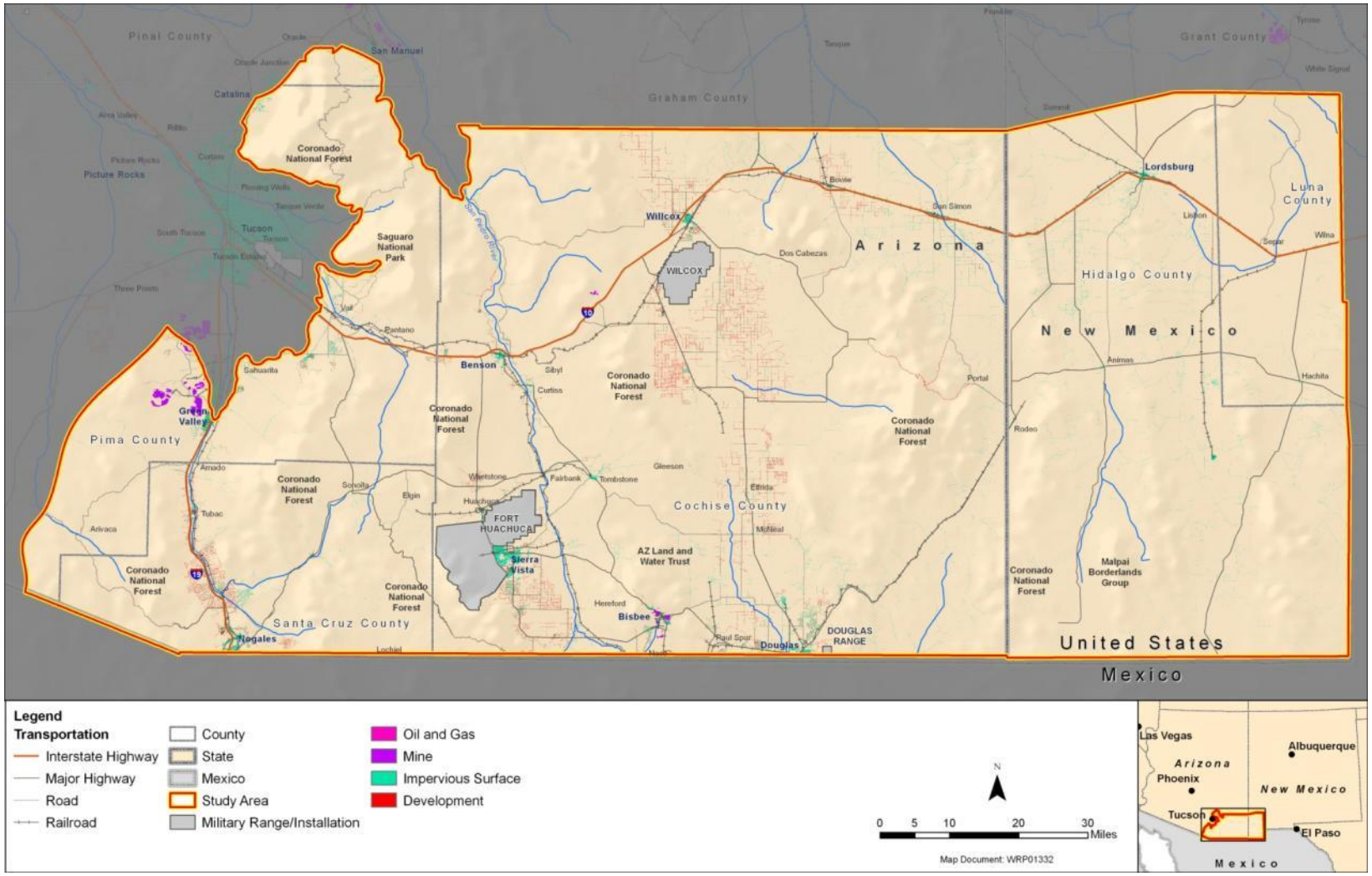


Figure 1.4-1 Ares of Disturbance

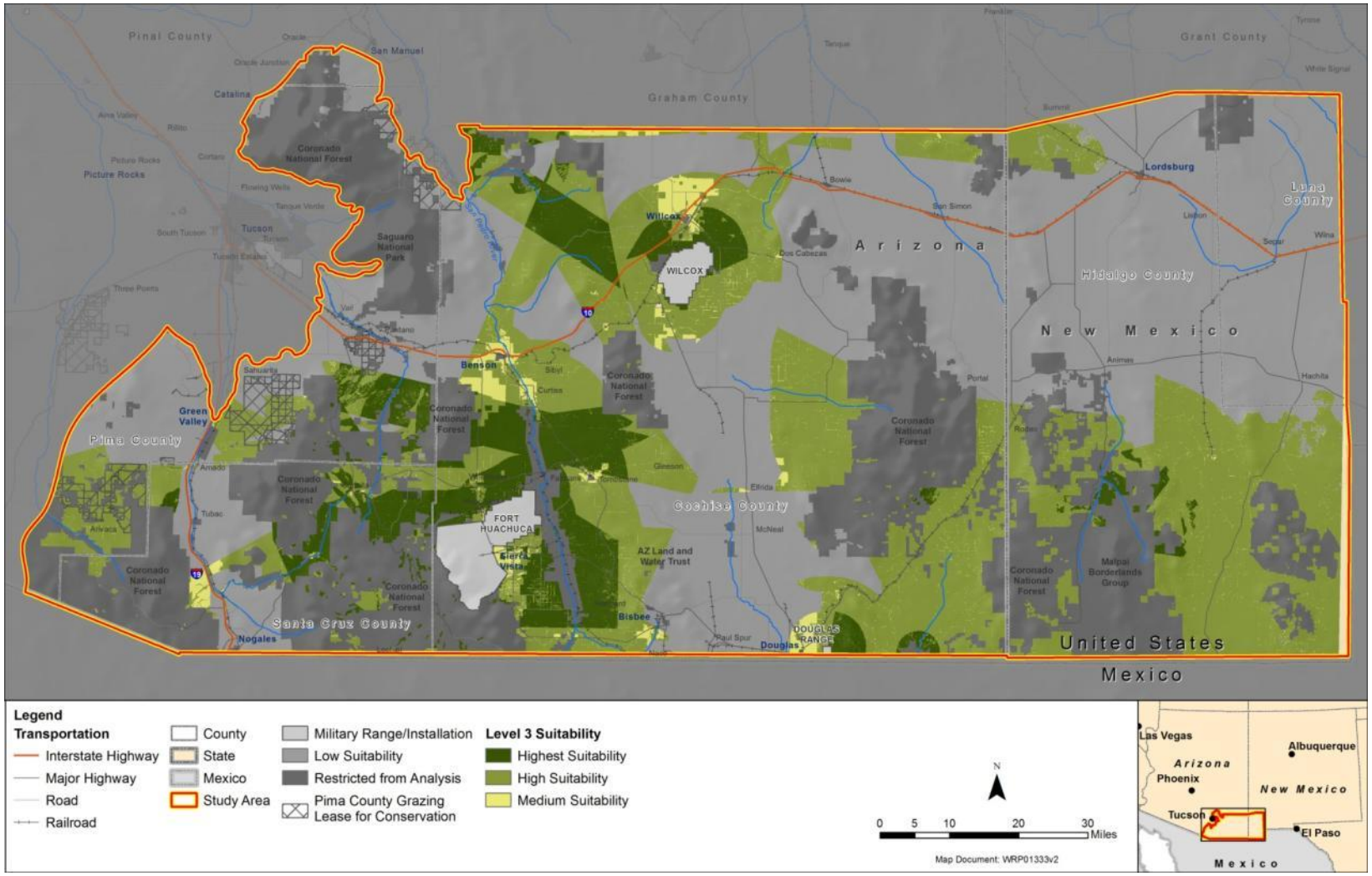


Figure 1.4-2 Level 3 Suitability

Section 2: Focus Areas

Section 2.1 Introduction

In April 2013, the SoAZ/NM Team met to review numerous maps and considered the datasets and criteria that went into the analysis. After a thorough review and discussion of the results, the SoAZ/NM Team identified three Focus areas (Figure 2.1-1) for further analysis. Focus Area 1 is a 277 mi^2 area located at the intersection of Cochise, Pima, and Santa Cruz Counties. Focus Area 2 is a 619 mi^2 area located in northwestern Cochise County. Focus Area 3 is a 439 mi^2 area located in southeastern Cochise County. Details of the three Focus areas, including Department of Defense, natural resource, and land use considerations, are found in the following section.

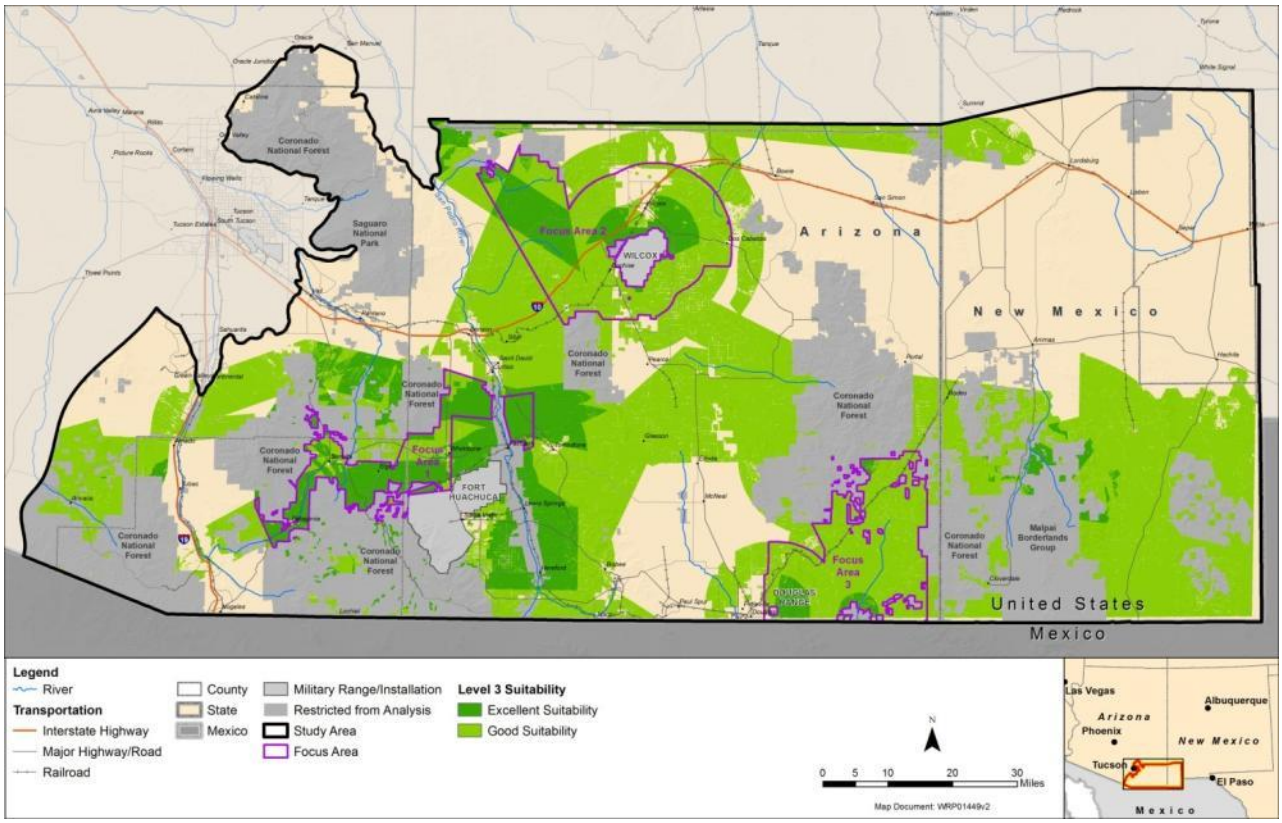
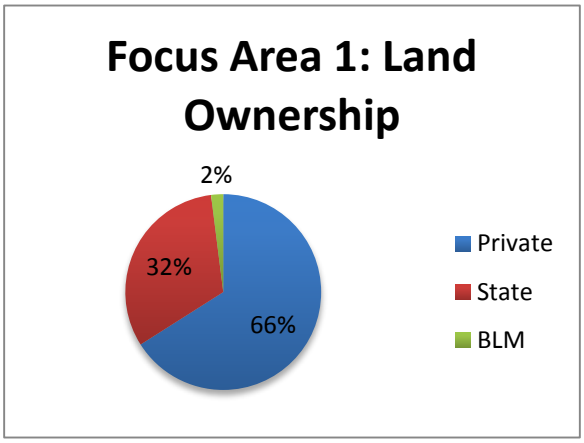


Figure 2.1 Focus Area Overview and Suitability

Section 2.2 Focus Area 1: The Intersection of Cochise, Pima and Santa Cruz Counties

Focus Area Description

Focus Area 1 is a 277 mi^2 area located at the intersection of Cochise, Pima, and Santa Cruz Counties. Approximately two-thirds of the area is privately-owned land, one-third state-trust land, and a small percentage of BLM-managed land. The majority of land use is rural, with some residential areas in Cochise County. Overall, this Focus Area has the most land ranked as having excellent suitability.



Department of Defense Interest

Focus Area 1 is in proximity to Fort Huachuca, and includes land adjacent to the northern boundary of the installation. The entire Focus Area is within the Fort's Electronic Testing and Training Range. Several low level airspace areas (1000ft AGL or less) lie above the Focus Area, including Special Use Airspace areas R2303A and R2303B and Military Training Routes VR259, VR260 and VR263.

Conservation Interest

Focus Area 1 is near threatened and endangered species designated critical habitat for five species and eight important bird areas surround the area. Potential linkage zones cover a majority of the Focus Area, while three wildlife corridors have been designated within the Focus Area. Watersheds covering the Focus Area include the San Pedro River Watershed in the east, and the Santa Cruz River Watershed in the west. Numerous protected areas border the Focus area and 52 species of Greater Conservation Need are in the vicinity of the Focus Area.

See the following Tables and Figures relating to Focus Area 1.

Table 2.2-1 Natural Resource Considerations, Focus Area 1

Focus Area 1: Natural Resource Considerations	
Endangered Species	Huachuca water-umbel, Gila chub
Threatened Species	Yaqui catfish, Beautiful shiner, and the Mexican spotted owl
Important Bird Areas	Santa Rita Mountains, Coronado National Forest (found to the west), Huachuca Mountains, Appleton-Whittell Research Ranch of the National Audubon Society (south-central), Sonoita Creek Patagonia TNC Preserve (west), San Pedro River National Conservation Area (east), Sonoita Creek State Natural Area/ Patagonia Lake (west), Coronado National Forest (found to the south)
Potential Linkage Zones	Santa Rita (west), Santa Rita - Empire Complex (northwest), Las Cienegas – Huachuca (central), Whetstone - San Pedro River (northeast), Dragoon - San Pedro River (east)
Missing Linkage Corridors	Tumacac-SantaRitas, Patagonia-SantaRita, Rincon-SantaRitas-Whetstones (north)
Watersheds	San Pedro River (east), Santa Cruz River (west)
Surrounding Protected Areas	Appleton-Whittell Area of Critical Environmental Concern, Appleton-Whittell Research Ranch, Elgin Research Natural Area, Elgin Research Ranch, Kartchner Caverns State Park, Las Cienegas National Conservation Area, Mt. Wrightson Wilderness, Patagonia Lake State Park, Saint David Cienega Research Natural Area, San Pedro Riparian National Conservation Area, San Pedro River Research Natural Area, Sonoita Creek State Natural Area, AZ Game and Fish State Wildlife Management Area, Diamond C Ranch – Mesa and Sycamore/Lyle, Canelo Hills Preserve and Patagonia-Sonoita Creek Preserve, Babocomari River, Sands Ranch Pima County Conservation Area

Table 2.2-2 Species of Greater Conservation Need, Focus Area 1

Focus Area 1: Species of Greater Conservation Need[3] (by Quad)		
American Peregrine Falcon	Desert Sucker	Rose-throated Becard
Arizona Cave Amphipod	Elegant Trogon	Slevin's Bunchgrass Lizard
Arizona grasshopper sparrow	Five-striped Sparrow	Sonora Sucker
Arizona Shrew	Giant Spotted Whiptail	Sonora Tiger Salamander
Arizona Treefrog (Huachuca/Canelo DPS)	Gila Chub	Sonoran Desert Tortoise
Azure Bluebird	Gila Longfin Dace	Speckled Dace
Bald Eagle - Winter Population	Gila Topminnow	Sprague's Pipit
Banded Rock Rattlesnake	Hooded Nightsnake	Tarahumara Frog
Black-capped Gnatcatcher	Huachuca Springsnail	Thick-billed Kingbird
Black-tailed Prairie Dog	Jaguar	Thornscrub Hook-nosed Snake
Brazilian Free-tailed Bat	Lesser Long-nosed Bat	Twin-spotted Rattlesnake
Cactus Ferruginous Pygmy-owl	Lowland Leopard Frog	Violet-crowned Hummingbird
Cave Myotis	Mexican Spotted Owl	Western Barking Frog
Chihuahuan Black-headed Snake	Northern Beardless-Tyrannulet	Western Black Kingsnake
Chiricahua Leopard Frog	Northern Buff-breasted Flycatcher	Western Red Bat
Desert Box Turtle	Northern Green Ratsnake	Yellow-billed Cuckoo (Western U.S. DPS)
Desert Massasauga	Northern Mexican Gartersnake	
Desert Pupfish	Pale Townsend's Big-eared Bat	

Table 2.2-3 Land Use Statistics, Focus Area 1

General Ownership:

	Square Miles	Percent
BLM	5.50	2
State	88.87	32
Private	183.04	66

Land Use/Zoning (by County):

Cochise County:

Area 1	Number of Parcels	Total Area (acres)	Total Area (mi^2)	Percent
Industry	3	22.84	0.04	0.02
Business	246	3063.85	4.79	2.20
Mixed: Residential, Business	3	23.96	0.04	0.02
Residential	973	10218.16	15.97	7.33
Mixed: Rural, Industry	2	10869.95	16.98	7.79
Mixed: Rural, Business	5	76.96	0.12	0.06
Rural	592	113513.60	177.36	81.40
Unknown	257	1664.35	2.60	1.19

Santa Cruz County

	Number of Parcels	Total Area (acres)	Total Area Sqmi	Percent
Industry				
Business		264.07	0.41	0.32
Residential		459.87	0.72	0.56
Rural		78257.45	122.28	94.87
Unknown		0.15	0.00	0.00
Preservation		32.81	0.05	0.04
BLM		118.62	0.19	0.14
Forest Service		1916.20	2.99	2.32
State Land		371.01	0.58	0.45
Suburban Ranch		1069.46	1.67	1.30
Total	3139			

Pima County

	Number of Parcels	Total Area (acres)	Total Area (mi^2)	Percent
Rural Homestead	170	3601.59	5.63	100.00

* In order to not dissect parcels, total area does not equal general ownership total area.

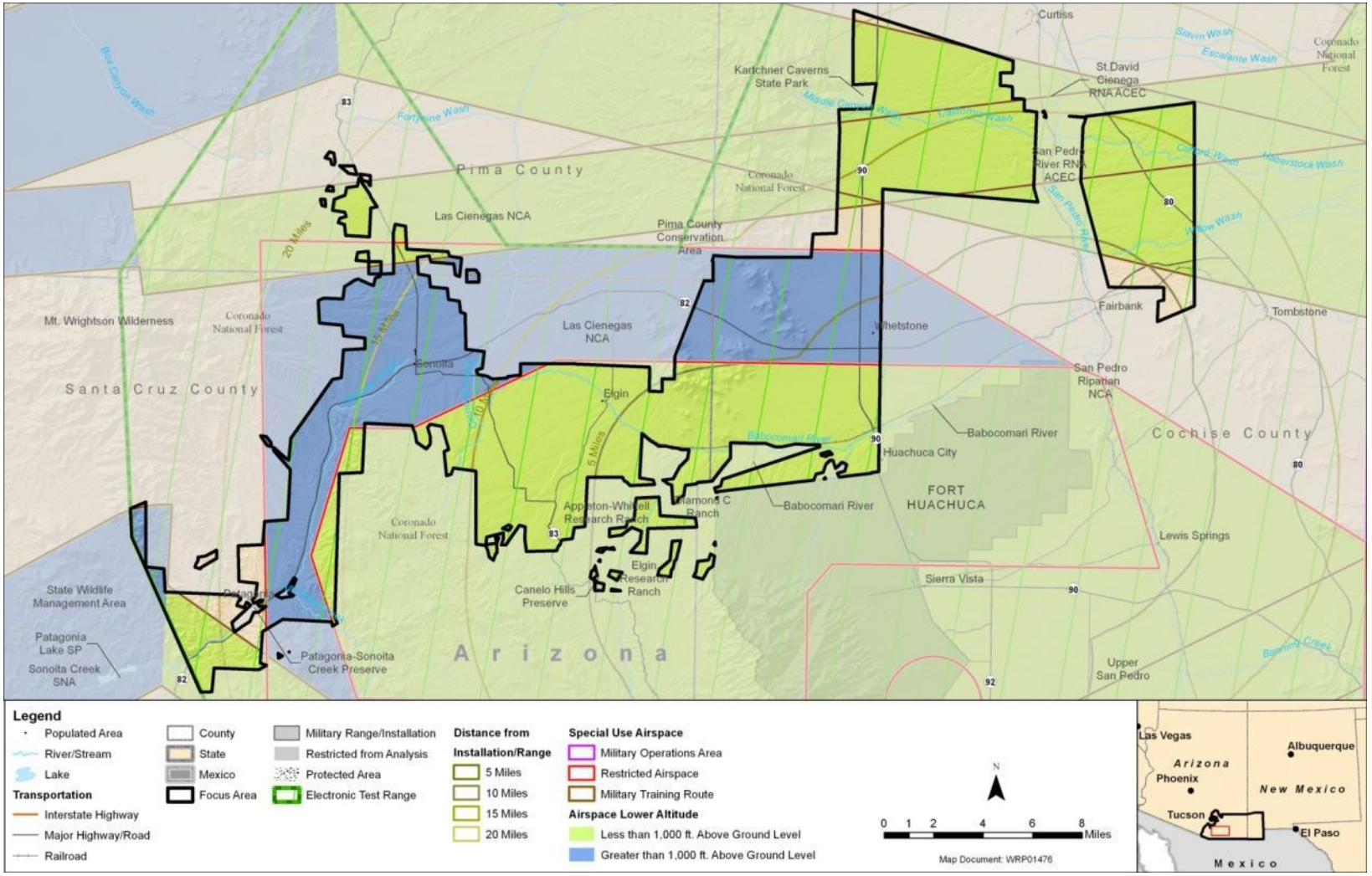


Figure 2.2-1 Focus Area 1 DoD Considerations

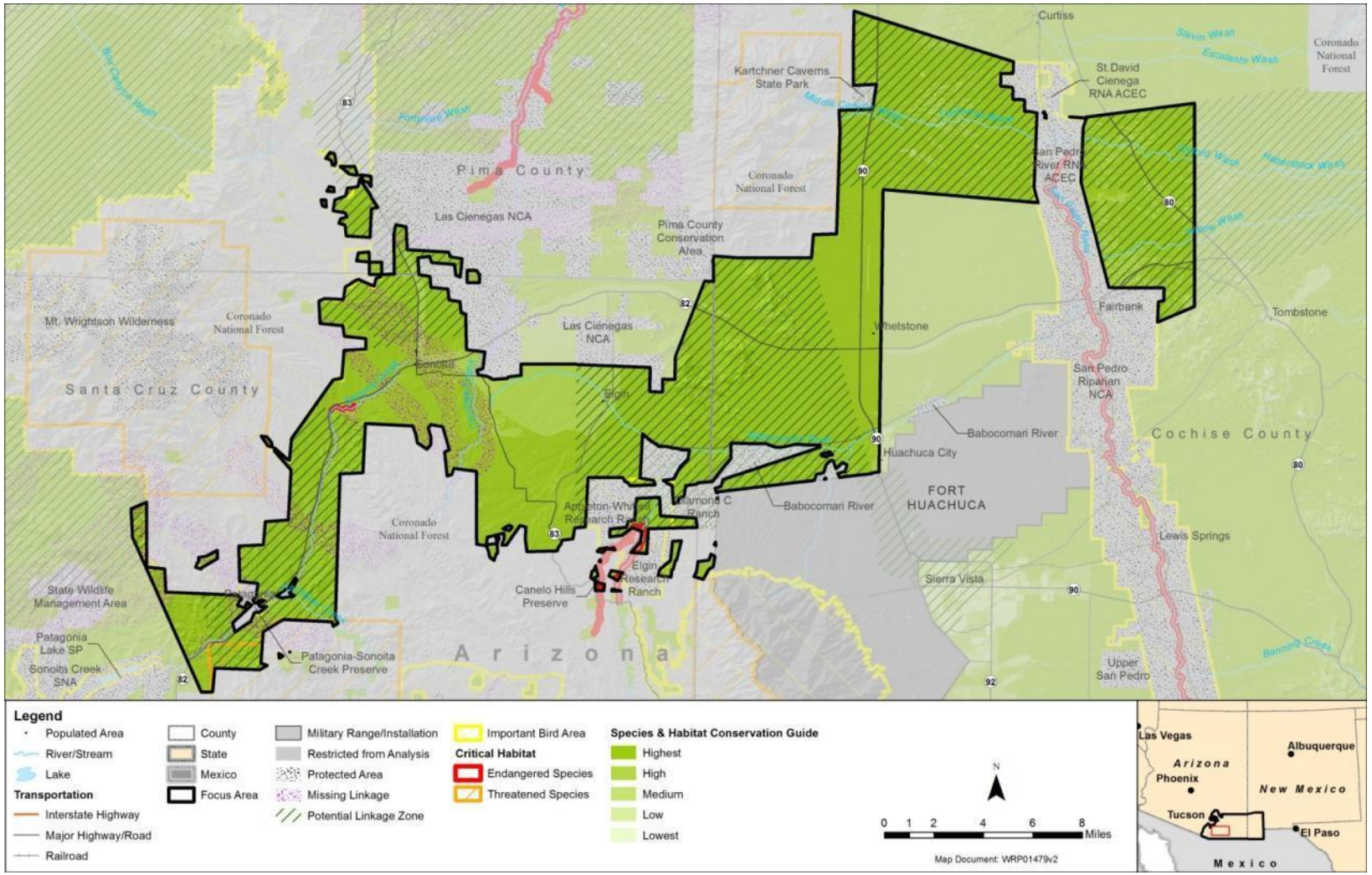


Figure 2.2-2 Focus Area 1 Natural Resources Considerations

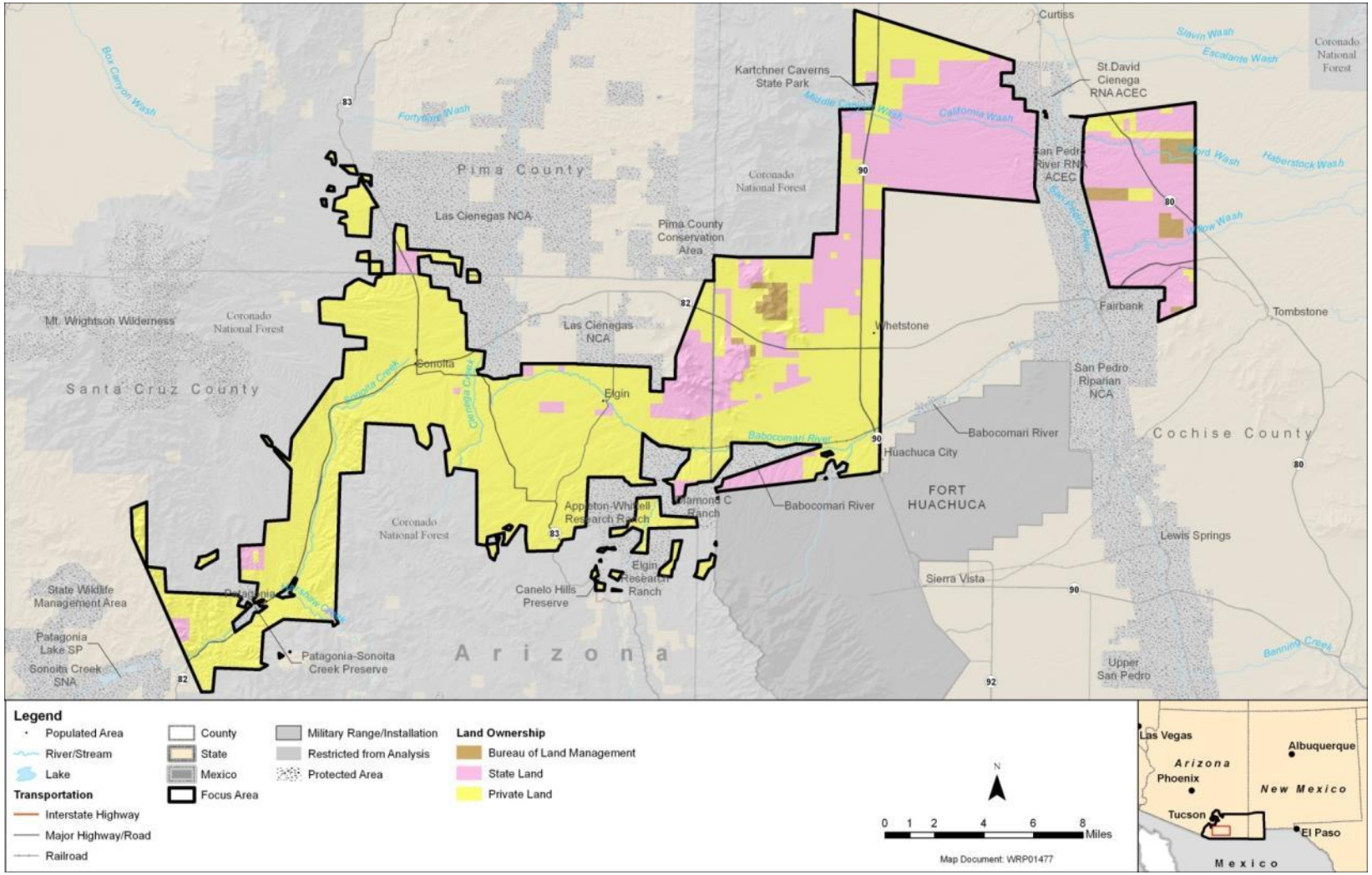


Figure 2.2-3 Focus Area 1 General Land Ownership

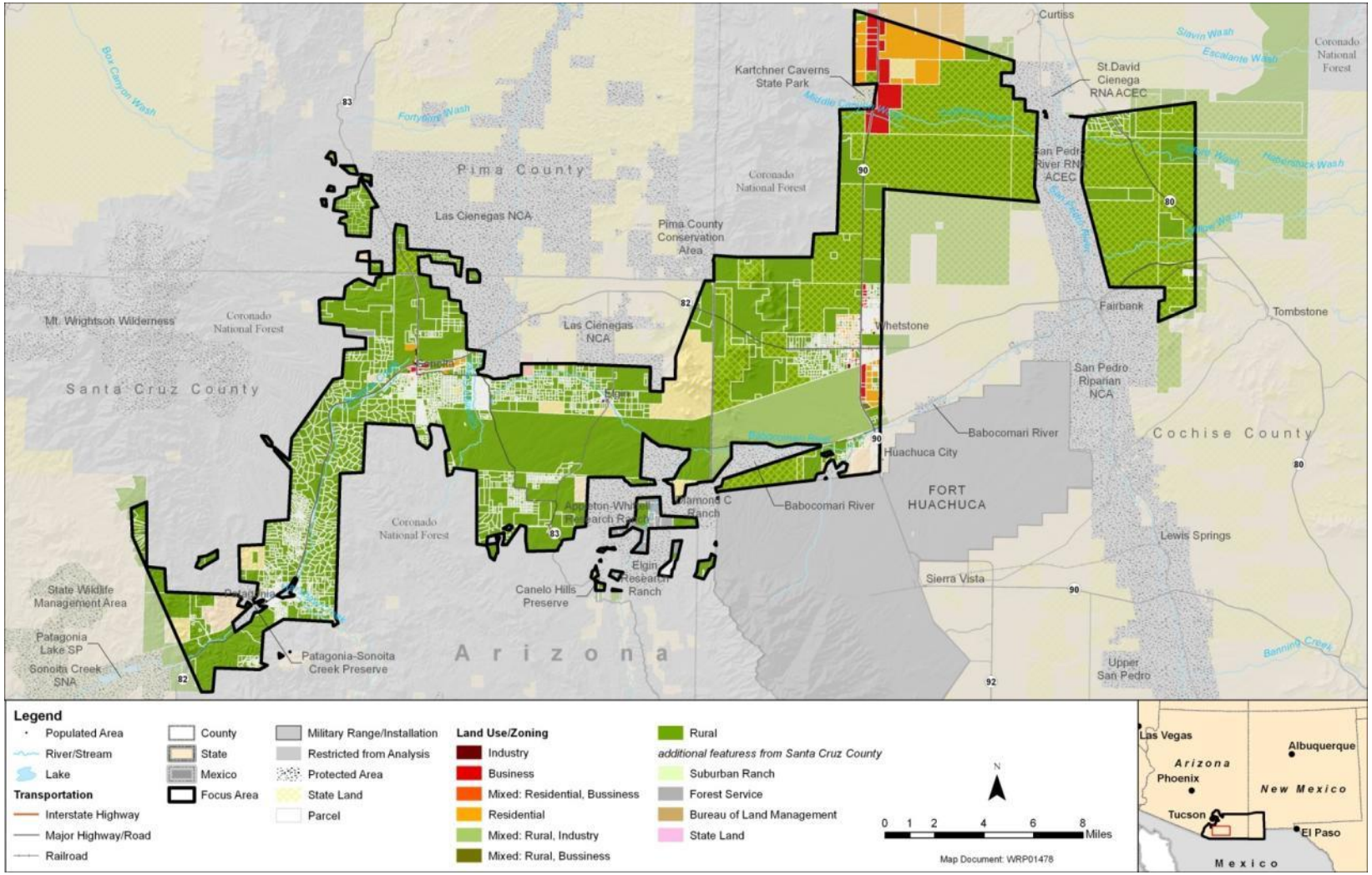


Figure 2.2-4 Focus Area 1 Land Use

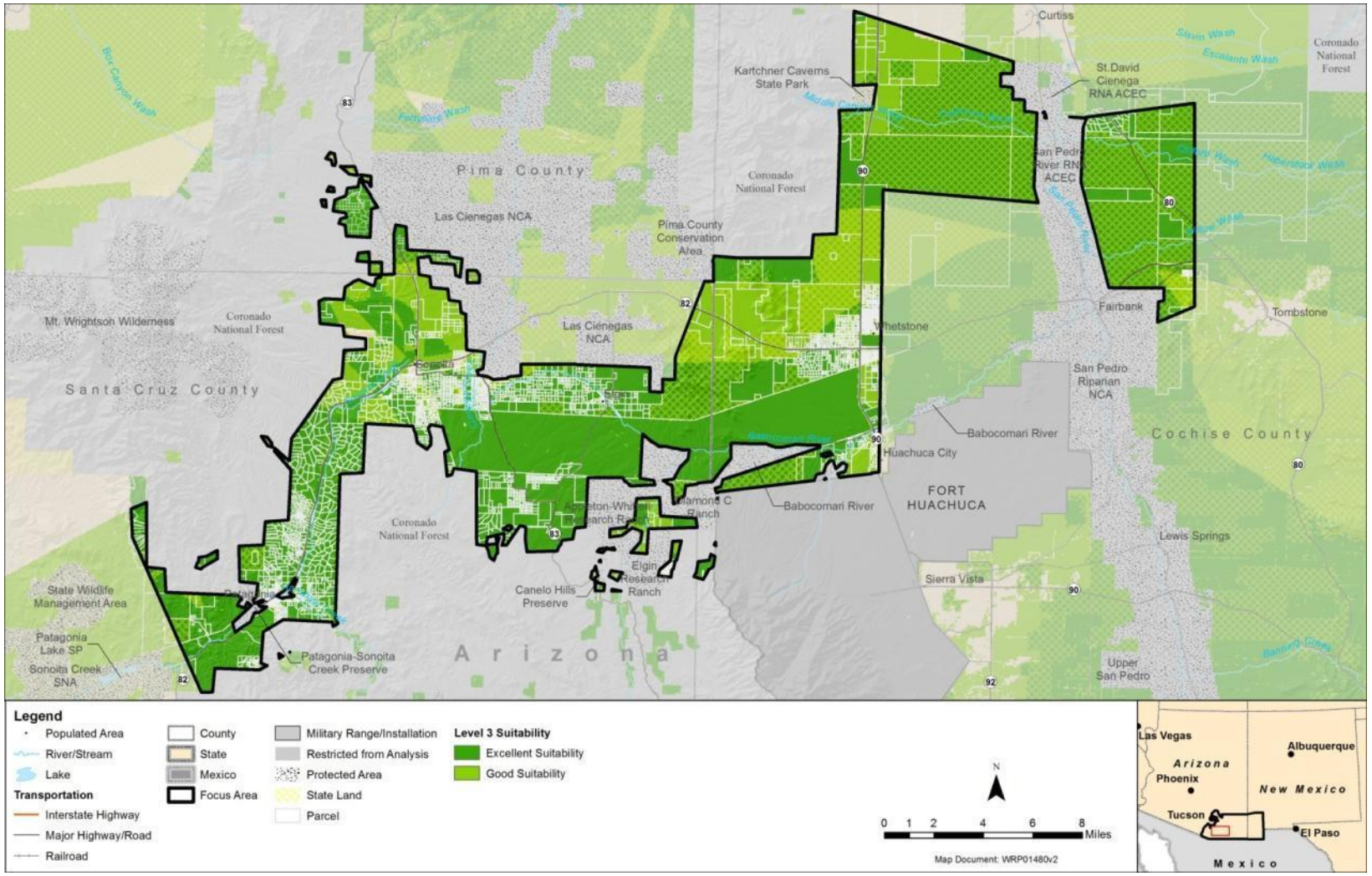
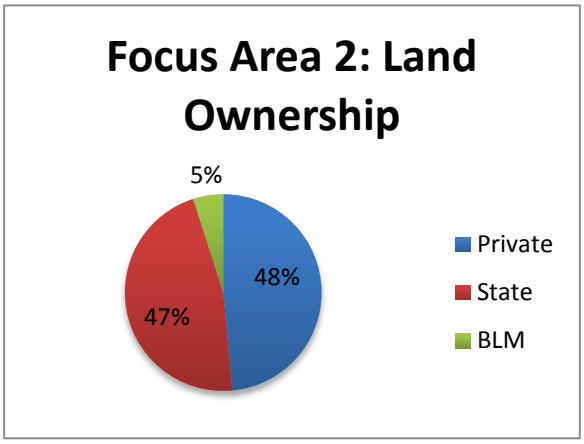


Figure 2.2-5 Focus Area 1 Suitability

Section 2.3 Focus Area 2

Focus Area Description

Focus Area 2 is a 619 mi^2 area located in northwestern Cochise County. Approximately half of the area is privately-owned land, 47 percent is state trust land, and BLM manages five percent of the area (Table and Figure). Most of the area (94%) is rural zoned parcels and when combined with other factors are considered of good suitability (Tables and Figures).



Department of Defense Interests

Focus Area 2 completely surrounds the Wilcox Range. The western portion of the Focus Area falls within the Fort's Electronic Testing and Training Range. Two low level airspace areas (1000ft AGL or less) lie above portions of the Focus Area, i.e. Military Training Routes VR259, VR260 (Figure).

Conservation Interests

Focus Area 2 is near threatened and endangered species designated critical habitat for 2 species. In addition the Focus Area surrounds an important bird area, and another is found to the west. Three potential linkage zones cover a majority of the Focus Area and one wildlife corridor has been designated within the Focus Area. Three watersheds intersect the Focus Area, although the Willcox Playa Watershed covers the majority of the area. Many protected areas border or are found near the Focus area and 26 species of Greater Conservation Need are found in the vicinity of the Focus Area.

See the following Tables and Figures relating to Focus Area 2.

Table 2.2-4 Natural Resource Considerations, Focus Area 2

Focus Area 1: Natural Resource Considerations	
Endangered Species	Gila chub
Threatened Species	Mexican spotted owl
Important Bird Areas	Willcox Playa/Lake Cochise, and the Lower San Pedro River (which resides to the west)
Potential Linkage Zones	Galliuro - Winchester – Dragoon (western), Wilcox Playa - Winchester - Pinaleno - Dos Cabezas (central), and Pinaleno - Dos Cabezas - San Simon Valley (east)
Missing Linkage Corridors	Galiuro-Pinaleno-DosCabezas (east)
Watersheds	Willcox Playa (majority), San Pedro River (western portion Focus Area), and Upper Gila River (eastern portion of the Focus Area)
Surrounding Protected Areas	Dos Cabezas Mountains Wilderness, Dos Cabezas Peaks Area of Critical Environmental Concern, Redfield Canyon Wilderness, Swamp Springs/Hot Springs Waterhsed Area of Critical Environmental Concern, Wilcox Playa Wildlife Area, Willcox Playa National Natural Landmark, Cascabel, Hot Springs, and Muleshoe Ranch Preserve

Table 2.2-5 Species of Greater Conservation Need, Focus Area 2

Focus Area 1: Species of Greater Conservation Need[3] (by Quad)		
American Peregrine Falcon	Gila Chub	Rufous-winged Sparrow
Arizona Striped Whiptail	Gila Longfin Dace	Sonora Sucker
Bald Eagle - Winter Population	Golden Eagle	Sonoran Desert Tortoise
Banded Rock Rattlesnake	Hooded Nightsnake	Speckled Dace
Chiricahua Leopard Frog	Lesser Long-nosed Bat	Western Black Kingsnake
Desert Box Turtle	Lowland Leopard Frog	Western Burrowing Owl
Desert Pupfish	Mexican Spotted Owl	Western Yellow Bat
Desert Sucker	Northern Beardless-Tyrannulet	Yellow-billed Cuckoo (Western U.S. DPS)
Giant Spotted Whiptail	Plains Leopard Frog	

Table 2.2-6 Land Use Statistics, Focus Area 2

General Ownership:

	Square Miles	Percent
BLM	29.13	5
State	288.54	47
Private	301.78	49

Land Use/Zoning:

Zoning	Number of Parcels	Total Area (acres)	Total Area (mi^2)	Percent
Industry	24	475.46	0.74	0.08
Business	670	2690.63	4.20	0.45
Mixed: Residential, Business	12	473.38	0.74	0.08
Residential	9945	29469.21	46.05	4.97
Mixed: Rural, Residential	8	922.17	1.44	0.16
Mixed: Rural, Industry	5	519.40	0.81	0.09
Rural	2297	553956.75	865.55	93.41
Unknown	4298	4558.38	7.12	0.77

* In order to not dissect parcels, total area does not equal general ownership total area.

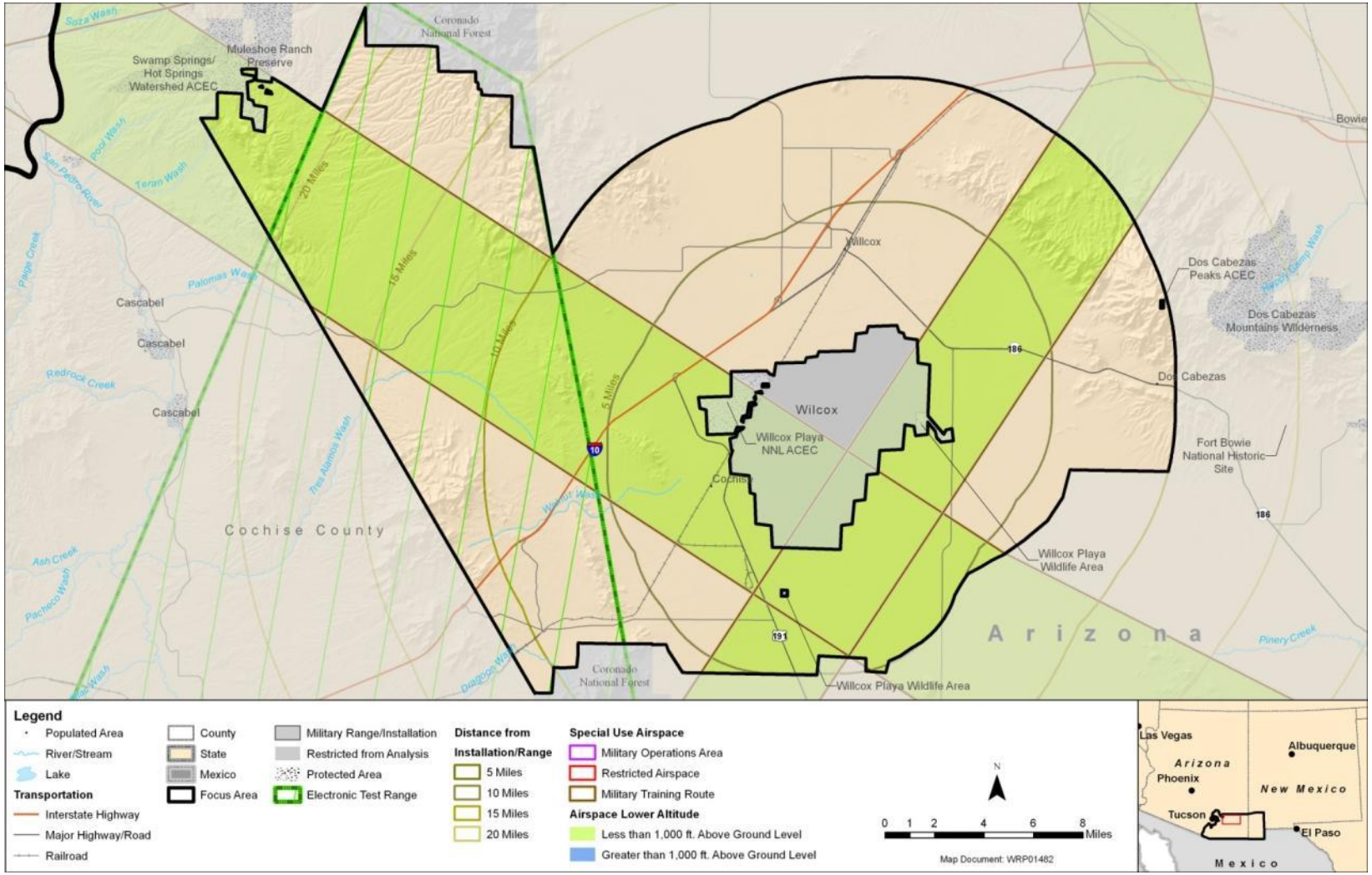


Figure 2.2-6 Focus Area 2 DoD Considerations

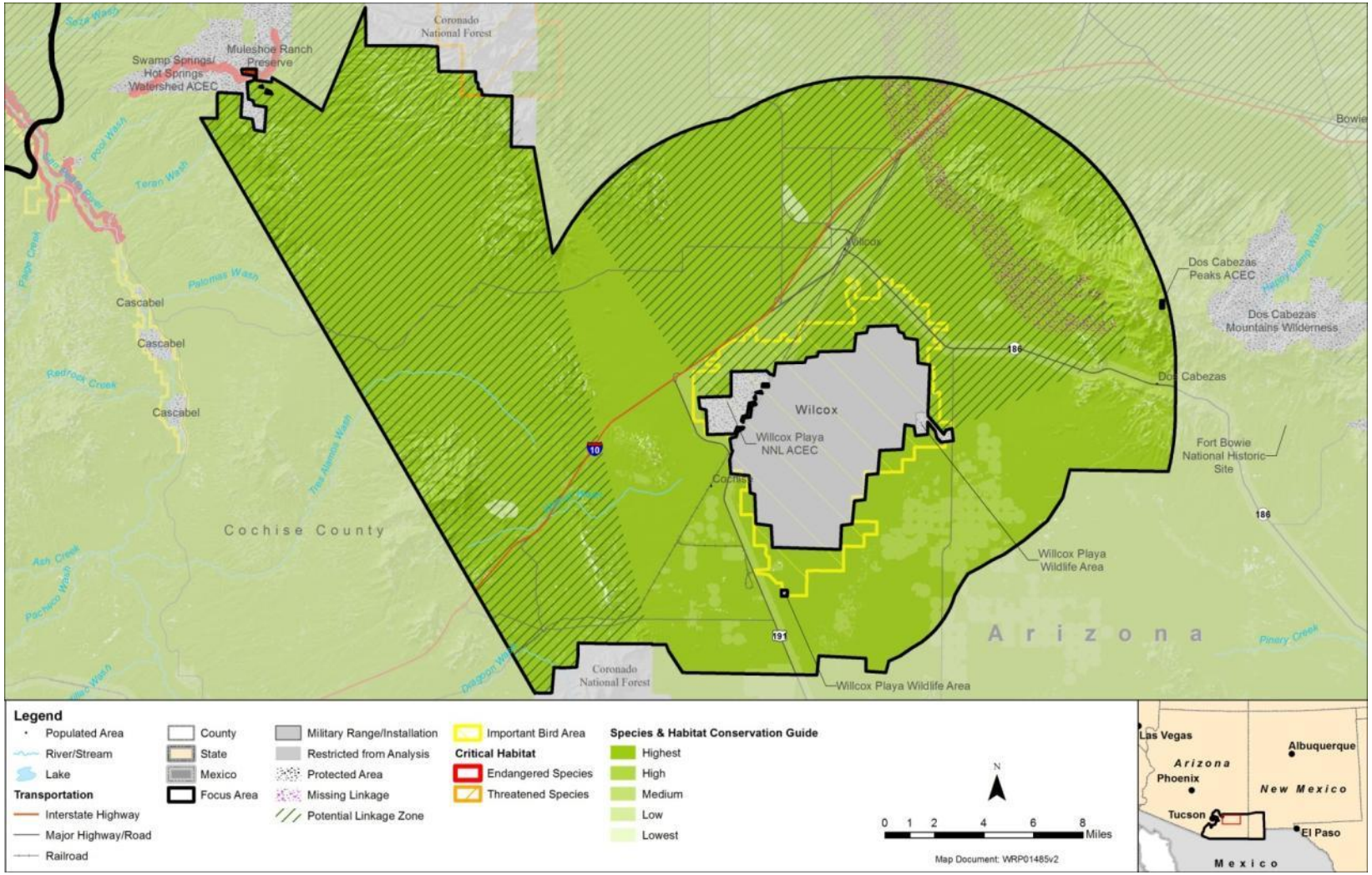


Figure 2.2-7 Focus Area 2 Natural Resource Considerations

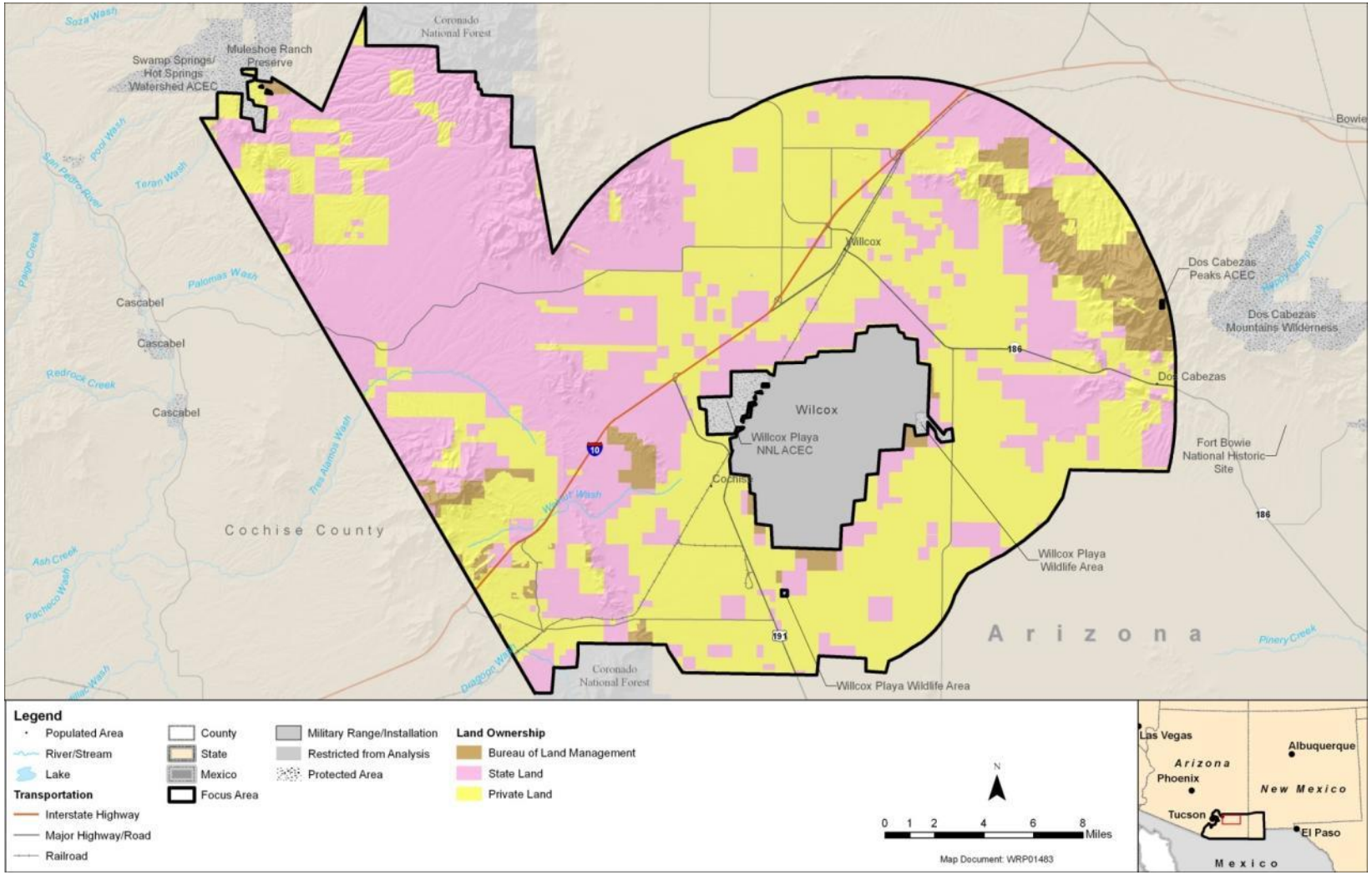


Figure 2.2-8 Focus Area 2 General Land Ownership

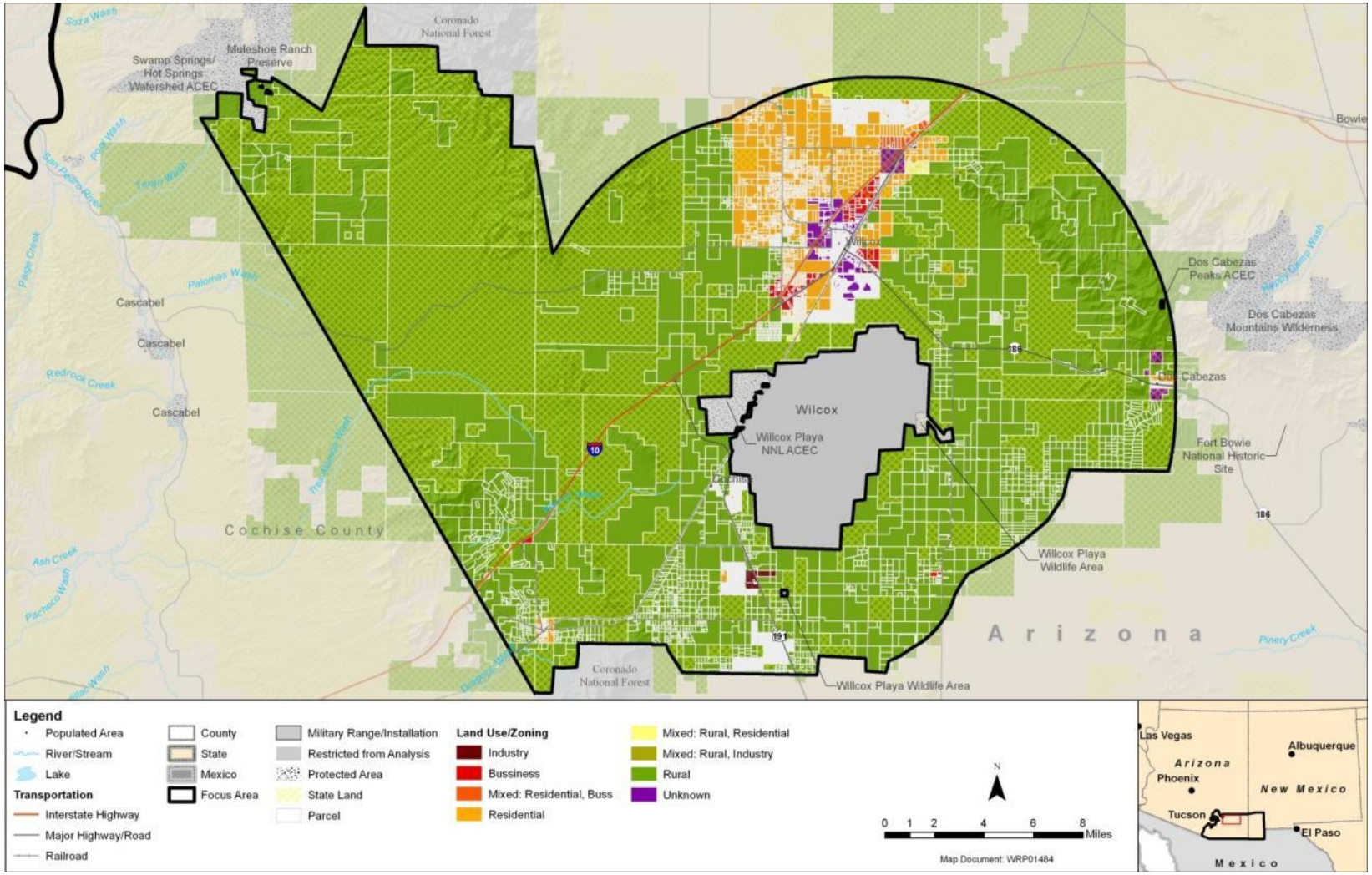


Figure 2.2-9 Focus Area 2 Land Use

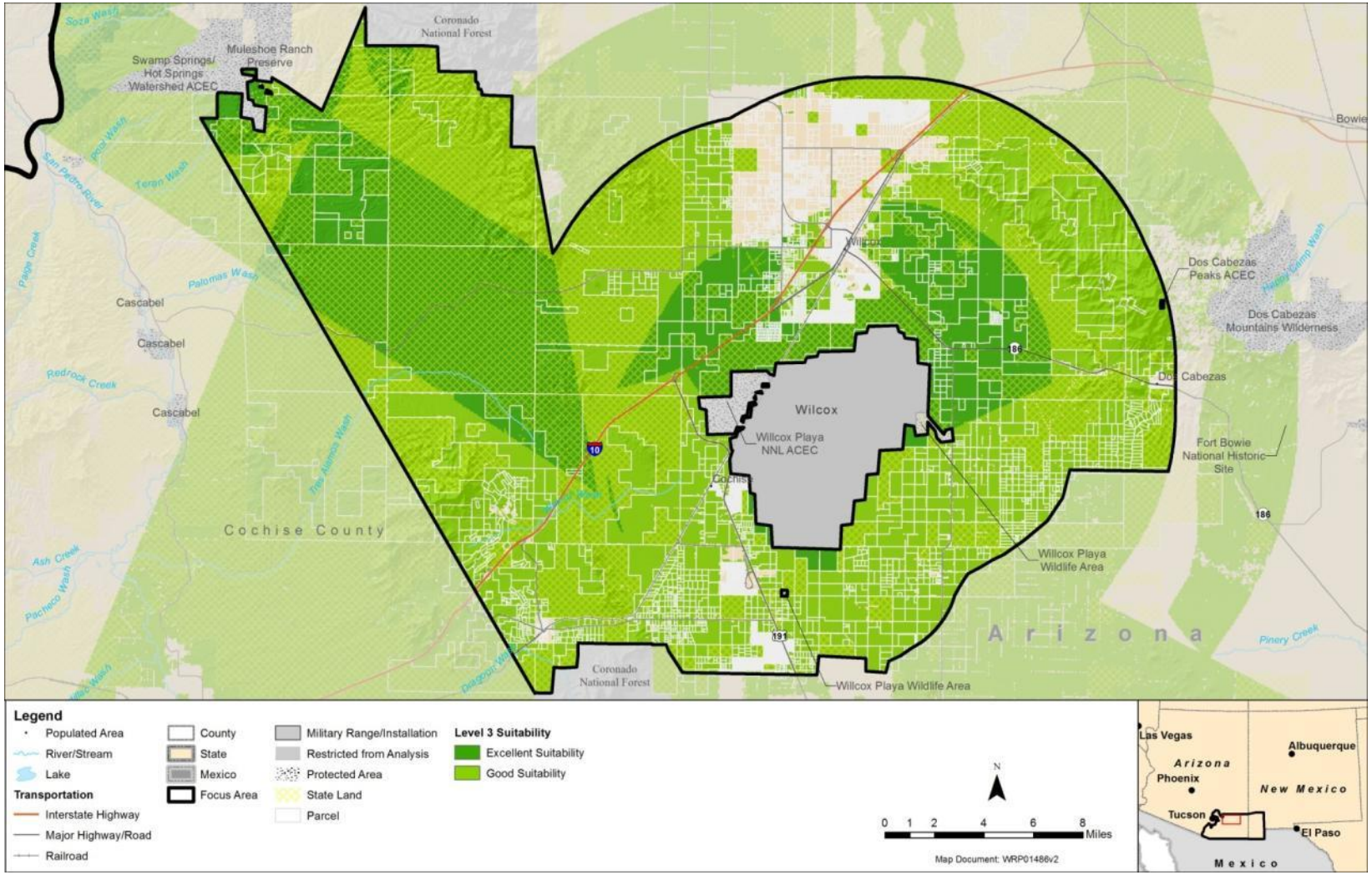
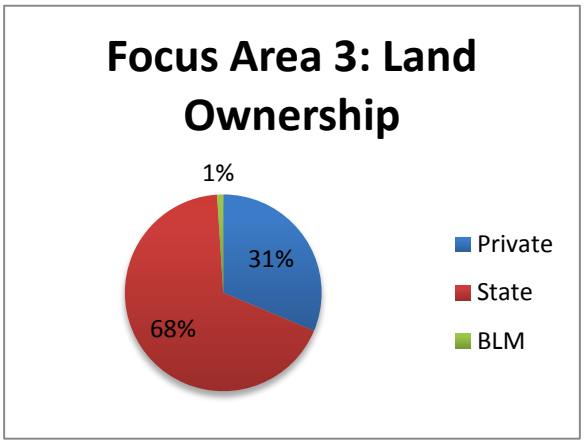


Figure 2.2-10 Focus Area 2 Suitability

Section 2.4 Focus Area 3

Focus Area Description

Focus Area 3 is a 439 mi^2 area located in southeastern Cochise County. Approximately one-third of the area is privately-owned land and two-thirds is state trust land. Only 1% of the area is BLM owned (Table and Figure). Almost the entire Focus area is rural zoned parcels and with other factors considered, ranks of good suitability (Tables and Figures).



Department of Defense Interests

Focus Area 3 surrounds the Douglas Range. The entire Focus Area is below DoD airspace training areas. Low level airspace areas (1000ft AGL or less) above the Focus Area include Special Use Airspace areas Tombstone A MOA, Tombstone B MOA and Military Training Routes: VR259, VR26.

Conservation Interests

Focus Area 3 is near threatened and endangered species designated critical habitat for four species. In addition, three important bird areas are near or adjacent to the Focus Area. The Chiricahua–Peloncillo potential linkage zone covers almost the entire Focus Area although no specific wildlife corridors have been designated in the area. Two watersheds, the Rio Yaqui Watershed and the White Water Draw intersect the Focus Area. Finally many protected areas border or are found near the Focus area and 41 species of Greater Conservation Need are found in the vicinity of the Focus Area.

See the following Tables and Figures relating to Focus Area 3.

Table 2.2-7 Natural Resource Considerations, Focus Area 3

Focus Area 1: Natural Resource Considerations	
Endangered Species	Yaqui chub
Threatened Species	Yaqui catfish, Beautiful shiner, and the Mexican spotted owl
Important Bird Areas	Chiricahua Mountains, Coronado National Forest (found to the north), Clanton Canyon and Guadalupe Canyon (which reside to the east)
Potential Linkage Zones	Chiricahua – Peloncillo
Watersheds	Rio Yaqui Watershed (majority), White Water Draw (a portion of the western Focus Area)
Surrounding Protected Areas	Chiricahua Wilderness, Guadalupe Canyon ISA (Wilderness Study Area), Guadalupe Canyone ONA (Outstanding Natural Area), Guadalupe Canyon Zoological Area, Leslie Canyon, National Wildlife Refuge, Leslie Creek National Wildlife Refuge, Malpai Borderlands Group, San Bernardino National Wildlife Refuge

Table 2.2-8 Species of Greater Conservation Need, Focus Area 3

Focus Area 1: Species of Greater Conservation Need[3] (by Quad)		
Arizona grasshopper sparrow	Gray Catbird	San Bernardino Springsnail
Banded Rock Rattlesnake	Greater Western Bonneted Bat	Slevin's Bunchgrass Lizard
Beautiful Shiner	Hooded Nightsnake	Swainson's Thrush
Black-capped Gnatcatcher	Jaguar	Thick-billed Kingbird
Brazilian Free-tailed Bat	Lesser Long-nosed Bat	Violet-crowned Hummingbird
Buff-collared Nightjar	Lowland Leopard Frog	Western Red Bat
Cave Myotis	Mexican Stoneroller	Western Yellow Bat
Chiricahua Leopard Frog	New Mexico Milksnake	Yaqui Black-headed Snake
Cockrum's Desert Shrew	New Mexico Ridge-nosed Rattlesnake	Yaqui Catfish
Desert Box Turtle	Northern Beardless-Tyrannulet	Yaqui Chub
Desert Massasauga	Northern Green Ratsnake	Yaqui Longfin Dace
Giant Spotted Whiptail	Northern Mexican Gartersnake	Yaqui Topminnow
Gila Longfin Dace	Plains Leopard Frog	Yellow-billed Cuckoo (Western U.S. DPS)
Golden Eagle	Reticulate Gila Monster	

Table 2.2-9 Land Use Statistics, Focus Area 3

General Ownership:

	Square Miles	Percent
BLM	5.42	1
State	296.38	67
Private	137.57	31

Land Use/Zoning:

Zoning	Number of Parcels	Total Area (acres)	Total Area (mi^2)	Percent
Industry	1	41.14	0.06	0.01
Business	1	3.94	0.01	0.00
Residential	11	237.07	0.37	0.07
Mixed: Rural, Residential	2	510.31	0.80	0.16
Mixed: Rural, Industry	1	39.75	0.06	0.01
Rural	1130	321454.94	502.27	99.53
Unknown	22	688.55	1.08	0.21

* In order to not dissect parcels, total area does not equal general ownership total area.

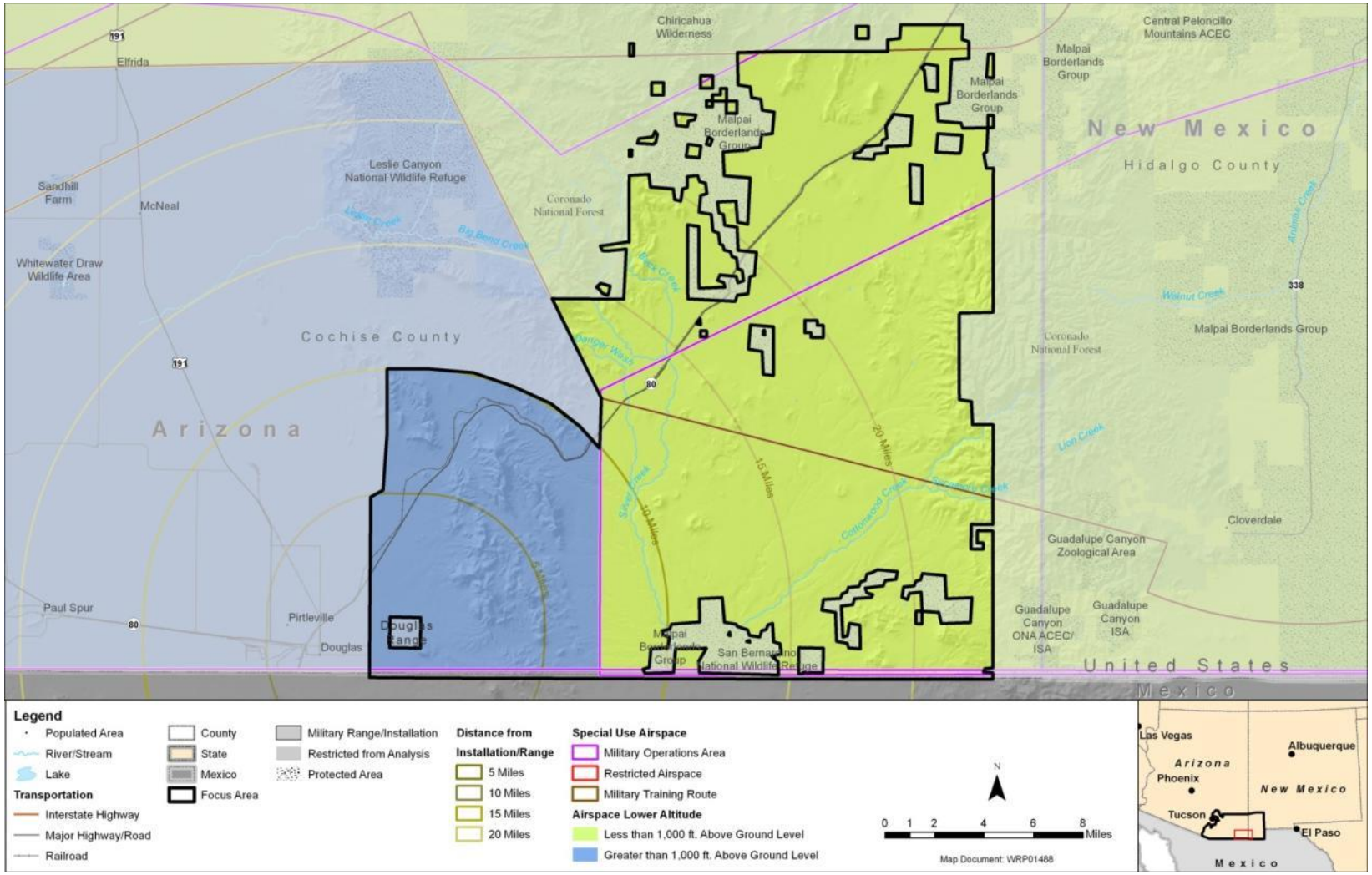


Figure 2.2-11 Focus Area 3 DoD Considerations

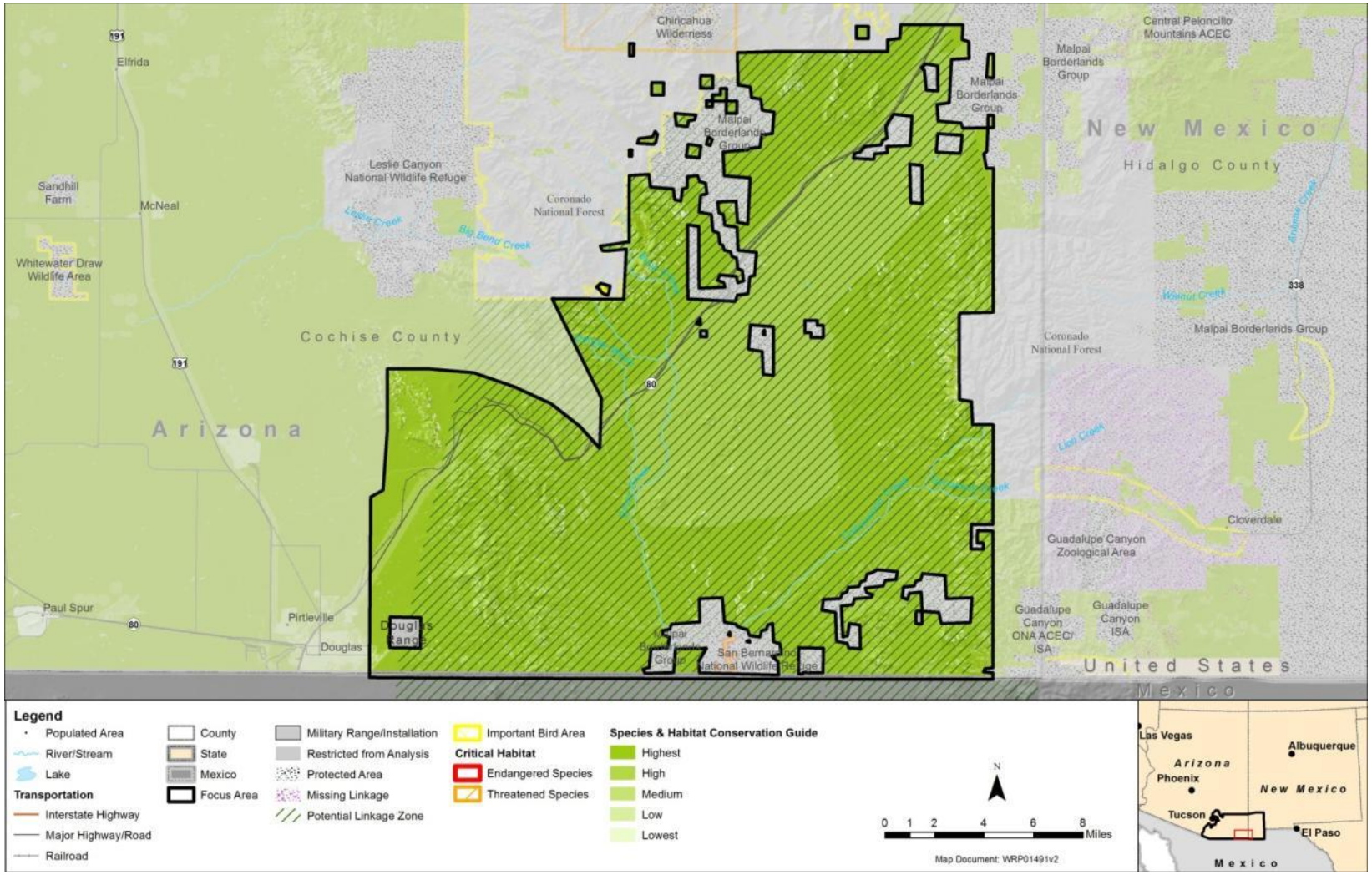


Figure 2.2-12 Focus Area 3 Natural Resource Considerations

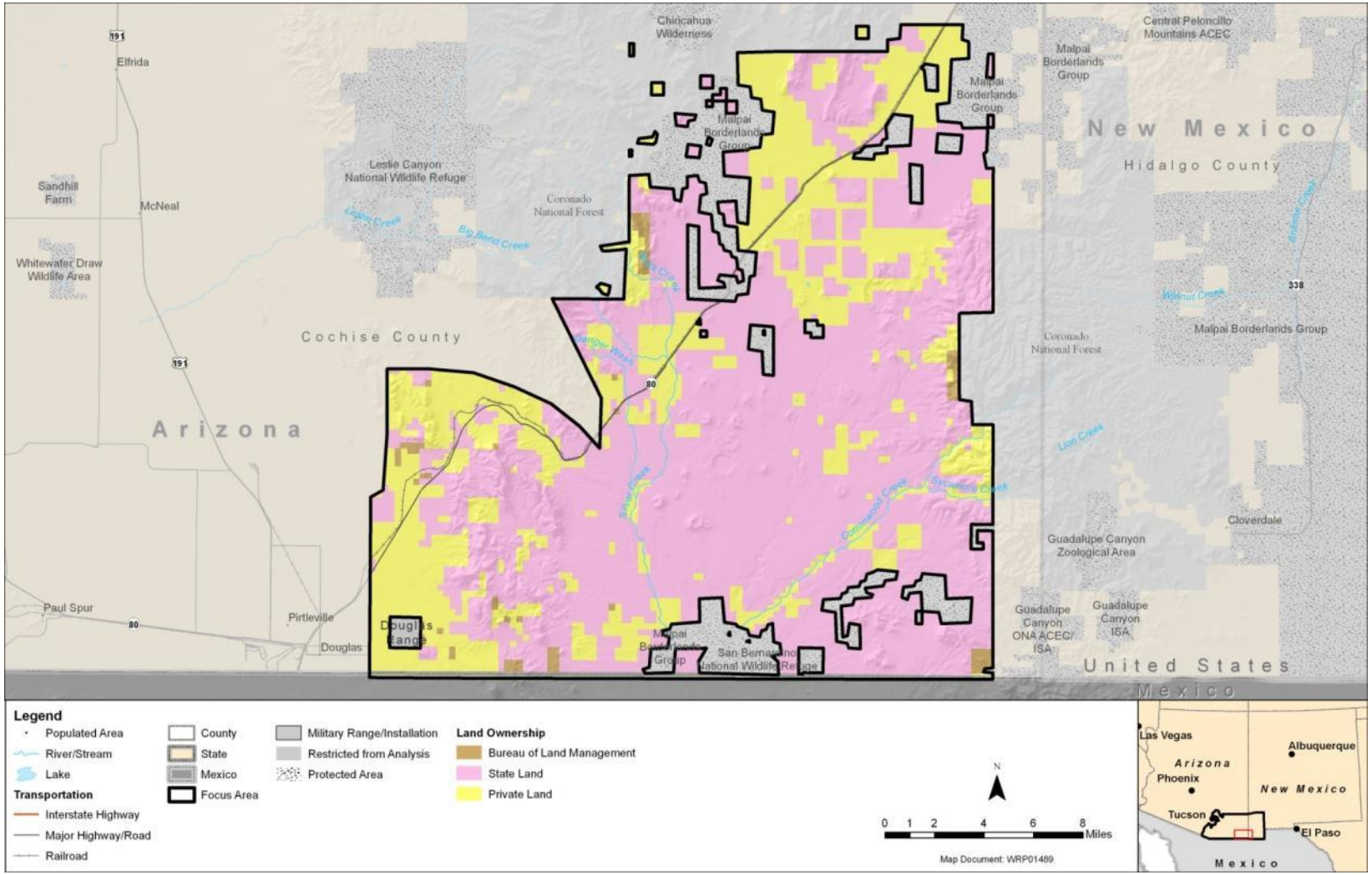


Figure 2.2-13 Focus Area 3 General Land Ownership

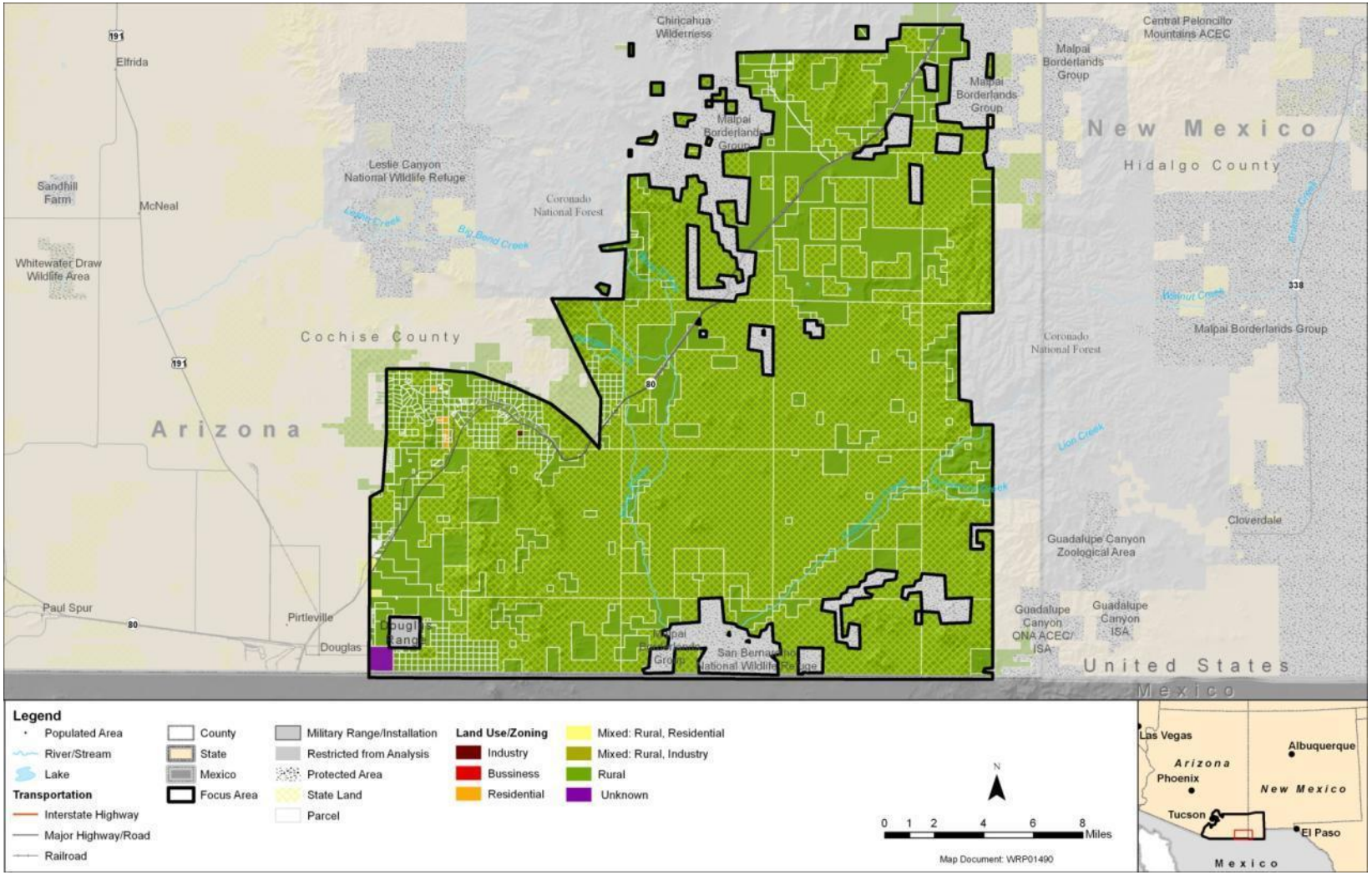


Figure 2.2-14 Focus Area 3 Land Use

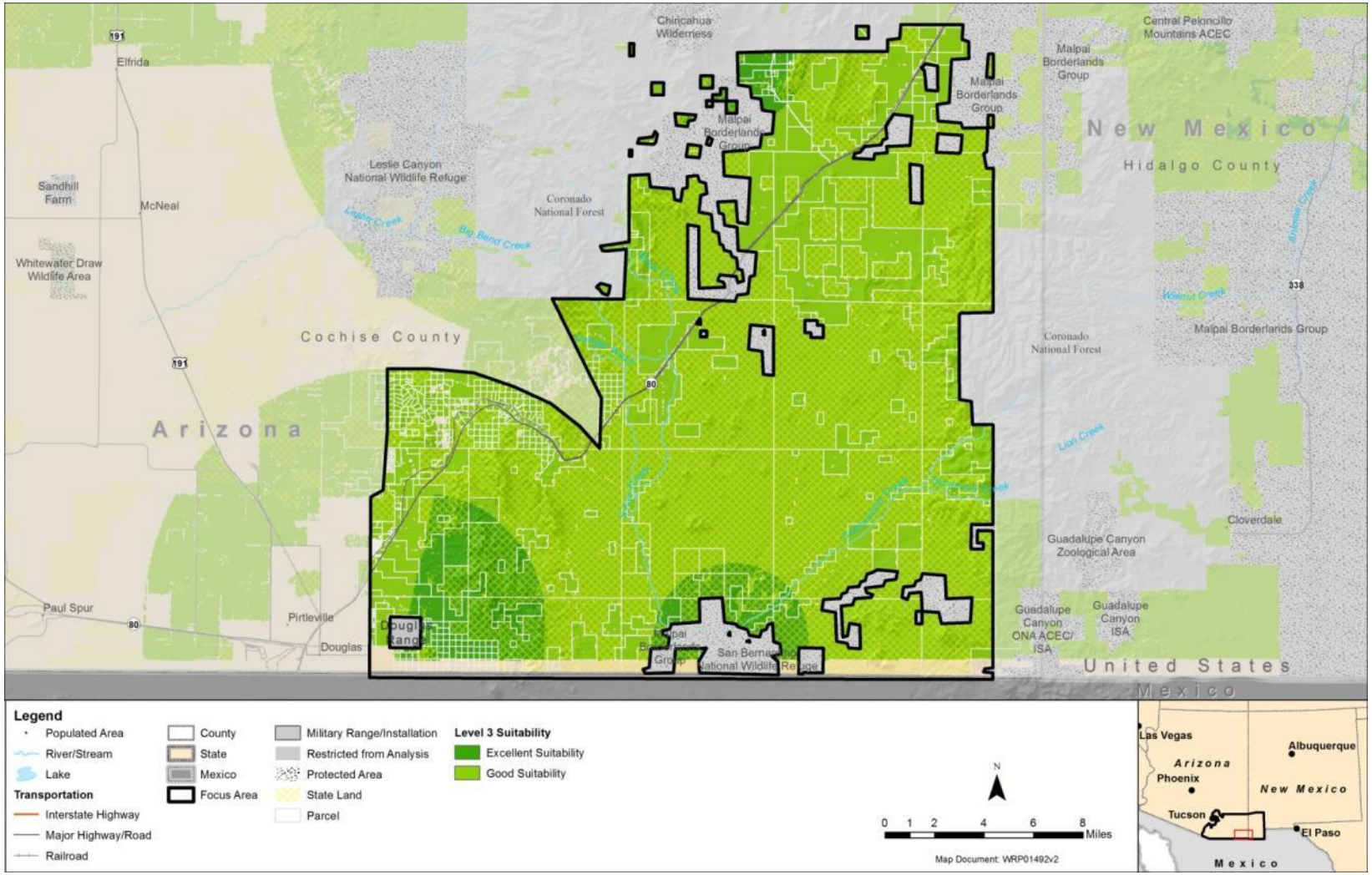


Figure 2.2-15 Focus Area 3 Suitability

Section 2.5 Future Analysis

This GIS suitability analysis was completed to guide the WRP SoAZ/NM Project Team with information on which areas to focus that are important to ecological and military values.

The next steps in the project are to explore the different methods in protecting the selected corridors, conduct analysis to determine cost to develop and/or maintain the corridors, community involvement (buy in) and identifying potential actions based on land status and stakeholder input.

Representative Entities involved in the Southern Arizona /New Mexico Project

WRP appreciates the involvement and input in the Southeastern Arizona/New Mexico project by the following entities. In particular, WRP acknowledges Col. (ret.) Thomas Finnegan for his outstanding leadership throughout this project.

- Arizona Land and Water Trust
- Arizona State Land Department
- Arizona State Parks
- Arizona State University
- Audubon
- Arizona Army National Guard
- Arizona Department of Transportation
- Arizona Game & Fish
- Arizona Governor's Office
- Arizona Military Affairs Commission
- Arizona State Land Department
- Arizona Zoological Society
- Border Patrol
- Bureau of Land Management
- Bureau of Reclamation
- City of Sierra Vista
- Cochise County
- Colorado State University
- Desert Landscape Conservation Cooperative
- DOT&E
- Federal Highway Administration
- Ft. Huachuca
- Life Net Nature
- Luke AFB 56RMO
- National Park Service
- New Mexico State University
- OSD(I&E)
- Sky Island Alliance
- Sonoran Institute
- Southeastern Arizona Government
- Southwestern Power Group
- The Nature Conservancy
- Trust for Public Lands
- U.S. Department of Interior
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- U.S. Geological Survey
- University of Arizona
- USDA-NRCS
- White Sands Missile Range

References

Military GIS Data Sources

- Army Installations: Cadastre Data Department of Defense Installations, *US Army Environmental Command*, 2006.
- Buffalo Soldier Electronic Test Range: Fort Huachuca Range GIS Support, 2010.
- Military Installations, Ranges, and Training Areas: Defense Installation Data Infrastructure (DISDI), *National Geospatial Intelligence Agency (NGA),* 2010.
- Military Special Use Airspace (SUA): Digital Aeronautical Flight Information File (DAFIF), *National Geospatial Intelligence Agency (NGA),* July 2012.
- Military Training Route (MTR) Corridors: Digital Aeronautical Flight Information File (DAFIF), *National Geospatial Intelligence Agency (NGA),* July 2012.

Natural Resources GIS Data Sources

- Arizona Land and Water Trust Easements: Easements, *Arizona Land and Water Trust*, 2013.
- Arizona Potential Linkage Zones and Habitat Blocks: Wildlife Linkages, *Arizona Department of Transportation*. 2006.
- Arizona Species of Greater Conservation Need: Arizona Natural Heritage, Heritage Data Management System, *Arizona Game and Fish Department*, 2012.
- Arizona Wildlife Connectivity Corridors: Arizona Missing Linkages, *Northern Arizona University*. 2007.
- Army Compatible Use Buffer Priority Areas: Army Compatible Use Buffer Priority Areas, The Nature Conservancy, 2012.
- Important Bird Areas: Important Bird Areas, *National Audubon Society*, 2012.
- National Conservation Easement Database: National Conservation Easement Database, *U.S. Endowment for Forestry and Communities*, 2012.
- New Mexico Green Infrastructure: New Mexico Statewide Natural Resources Assessment & Strategy and Response Plan, *New Mexico Energy, Minerals and Natural Resources Department*, 2009.
- New Mexico Biodiversity: New Mexico Statewide Natural Resources Assessment & Strategy and Response Plan, *New Mexico Energy, Minerals and Natural Resources Department*, 2009.
- Pima County Preserves: Preserve, *Pima County GIS*, 2013.
- Protected Areas Database: Protected Areas Database of the US v.2, *Conservation Biology Institute*, 2012.
- Species and Habitat Conservation Guide: Modeling Areas of Wildlife Conservation Potential, *Arizona Game and Fish Department*, 2013.
- United States Critical Habitat: Final Critical Habitat, *United States Fish and Wildlife Services,* 2012.

Land Use/Land Ownership GIS Data Sources

- Cochise County Parcels: Parcels, *Cochise County GIS*, 2013.
- Cochise County Zoning: Zoning, *Cochise County GIS*, 2013.
- General Federal Agency Land Ownership: Western US Fed Owned Land, *Bureau of Land Management,* March 2007.
- Pima County Parcels: Parcels, *Pima County GIS*, 2013.
- Pima County Zoning: Zoning, *Pima County GIS*, 2013.
- Protected Areas Database: Protected Areas Database of the US v.2, *Conservation Biology Institute*, 2012.
- Santa Cruz County Parcels: Parcels, Santa Cruz *County GIS*, 2013.
- Santa Cruz County Zoning: Zoning, Santa Cruz *County GIS*, 2013.
- Urban Areas: TIGER Files, *United States Census Bureau,* 2010.

Disturbance GIS Data Sources

- Disturbance Database: Wind and Wildlife Landscape Assessment Tool, *American Wind Wildlife Institute and The Nature Conservancy*, 2012.