AUGUST 2000

FINAL REPORT

ENVIRONMENTAL ASSESSMENT FOR INFRASTRUCTURE WITHIN U.S. BORDER PATROL NACO-DOUGLAS CORRIDOR COCHISE COUNTY, ARIZONA

IMMIGRATION AND NATURALIZATION SERVICE
WASHINGTON, D.C.

FINDING OF NO SIGNIFICANT IMPACT

INFRASTRUCTURE WITHIN U.S. BORDER PATROL NACO-DOUGLAS CORRIDOR, COCHISE COUNTY, ARIZONA

The primary purpose of the preferred alternative is to assist in fulfilling the U.S. Border Patrol's (USBP) mission to reduce illegal immigration and drug trafficking along the border by increasing their ability to detect, deter and apprehend illegal entrants. The preferred alternative would allow for the continuation of infrastructure projects that have been approved by the Immigration and Naturalization Service (INS) and have undergone the appropriate National Environmental Policy Act (NEPA) documentation and review. Implementation of the preferred alternative would also allow projects that have been identified as necessary in the reasonably foreseeable future to continue, provided they are addressed in separate NEPA documentation, as appropriate, and tiered to this Environmental Assessment (EA).

Projects that have been planned and approved by INS include construction of fences, vehicle barriers, permanent and portable lighting, remote video surveillance (RVS) systems, and improvements to roads and water crossings. Each of these has been addressed in previous NEPA documents and their cumulative effects are described in this EA. None of these projects were reported to have a significant effect on the human or natural environment and, thus, will be implemented as planned and with the appropriate mitigation measures. Cumulative effects of these projects and those proposed in the future are also addressed in this EA. Subsequent NEPA documents that are prepared to addressed the specific projects within the Naco-Douglas corridor shall tier from this document and update the cumulative effects analysis.

No significant adverse affects to the natural or human environment are expected upon implementation of the preferred alternative. In addition, no adverse effects to cultural resources or Federally protected threatened/endangered species or habitats are expected, provided adequate analysis of future projects is performed and the appropriate mitigation measures are employed. Based upon the results of the EA and the environmental design measures to be incorporated as part of the proposed actions, it has been concluded that the preferred alternative would not have a significant adverse effect on the environment.

Richard J. Diefenbeck
Director, Office of Administration
Headquarters Facilities and Engineering Division

August 30, 2000
Date

FINAL

ENVIRONMENTAL ASSESSMENT

FOR INFRASTRUCTURE WITHIN

U.S. BORDER PATROL NACO-DOUGLAS CORRIDOR,

COCHISE COUNTY, ARIZONA

August 2000

Lead Agency:

U.S. Immigration and Naturalization Service
Headquarters, Facilities and Engineering Division
425 I Street NW
Washington, D.C. 20536

Responsible Official:

Richard Diefenbeck, Director
INS Facilities and Engineering Division
425 I Street NW
Washington, D.C. 20536

Environmental Officer:

Kevin Feeney
INS Facilities and Engineering Division
425 I Street NW, Room 2030
Washington, D.C. 20536
(202) 353-9412

ABSTRACT

PROPOSED ACTIONS:	Infrastructure improvements that will be addressed include, but are not limited, to roads, fences, vehicle barriers, helipads, USBP stations, remote video surveillance (RVS) sites, lights, and checkpoints. The cumulative effect of these improvement projects since 1995 and into the reasonably foreseeable future, and in conjunction with other programs or projects proposed or implemented by other agencies, is the primary focus of this EA.
PURPOSE AND NEED:	The improvements that have been completed or are being proposed by INS and USBP are in an effort to enhance the USBP's capability to gain, maintain and extend control of the US/Mexico border.
ALTERNATIVES ADDRESSED:	The No Action Alternative would require the immediate cessation of all current projects and a moratorium on any future infrastructure projects for the subsequent five years. The Current Action Alternative would involve elimination of any proposed construction activities and completion of only those actions that are currently approved. The Future Infrastructure Alternative would allow the projects currently approved or funded and those anticipated to be completed over the next five years. This is the preferred alternative.
ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTIONS:	The proposed action would involve minimal construction activities within sites that have been, for the most part, previously disturbed. No significant adverse effects to air quality, water quality, cultural resources, unique areas, soils, protected species, or land use are expected. Once site-specific plans are formulated for currently approved and future activities, surveys for sensitive resources shall be required and mitigation may be required. In addition, coordination with the appropriate Federal and state agencies would be necessary.
CONCLUSIONS:	Based on the findings of this analysis and assuming that all mitigation measures recommended herein are implemented, no significant adverse impacts would occur from the preferred alternative. Increased or enhanced interdiction of illegal drug and alien entry and activities would have positive, indirect socioeconomic benefits.

(This page left intentionally blank)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF EXHIBITS

(This page left intentionally blank)

SECTION 1.0
INTRODUCTION

CHAPTER 1 – INTRODUCTION AND PURPOSE AND NEED

1.0 INTRODUCTION

This Environmental Assessment (EA) addresses the actual and potential cumulative effects, beneficial and adverse, of the Immigration and Naturalization Service (INS) and U.S. Border Patrol (USBP) activities within the USBP Douglas and Naco Station areas of operation (AO). This EA evaluates the past, on-going and future INS and USBP infrastructure projects within the Douglas and Naco AOs, hereinafter referred to as the Naco-Douglas corridor. For the purposes of this EA, the Naco-Douglas corridor is defined as a 10-mile wide corridor along the US/Mexico border from the western boundary of the USBP Naco AO to the eastern boundary of the USBP Douglas Station AO (Figure 1-1).

These improvements have been completed or are being proposed by INS and USBP in an effort to enhance the USBP's capability to gain, maintain and extend control of the US/Mexico border. Infrastructure improvements that will be addressed include, but are not limited, to roads, fences, vehicle barriers, helipads, lights, USBP stations, and checkpoints. These infrastructure improvements may be installed by military units and/or private construction contractors. The cumulative effect of these improvement projects since 1995 and into the reasonably foreseeable future, in conjunction with other programs or projects proposed or implemented by other agencies is the primary focus of the this EA. This EA was prepared in accordance with the National Environmental Policy Act of 1969, the President's Council on Environmental Quality (CEQ) Regulations for the Implementation of NEPA as well as the INS' Procedures for Implementing NEPA (28 CFR 61).

1.1 BACKGROUND

1.1.1 INS Organization

The INS has the responsibility to regulate and control immigration into the United States. The INS has four major areas of responsibility: (1) facilitate entry of persons legally admissible to the United States, (2) grant benefits under the Immigration and Nationality Act (INA) of 1952

(This page left intentionally blank)

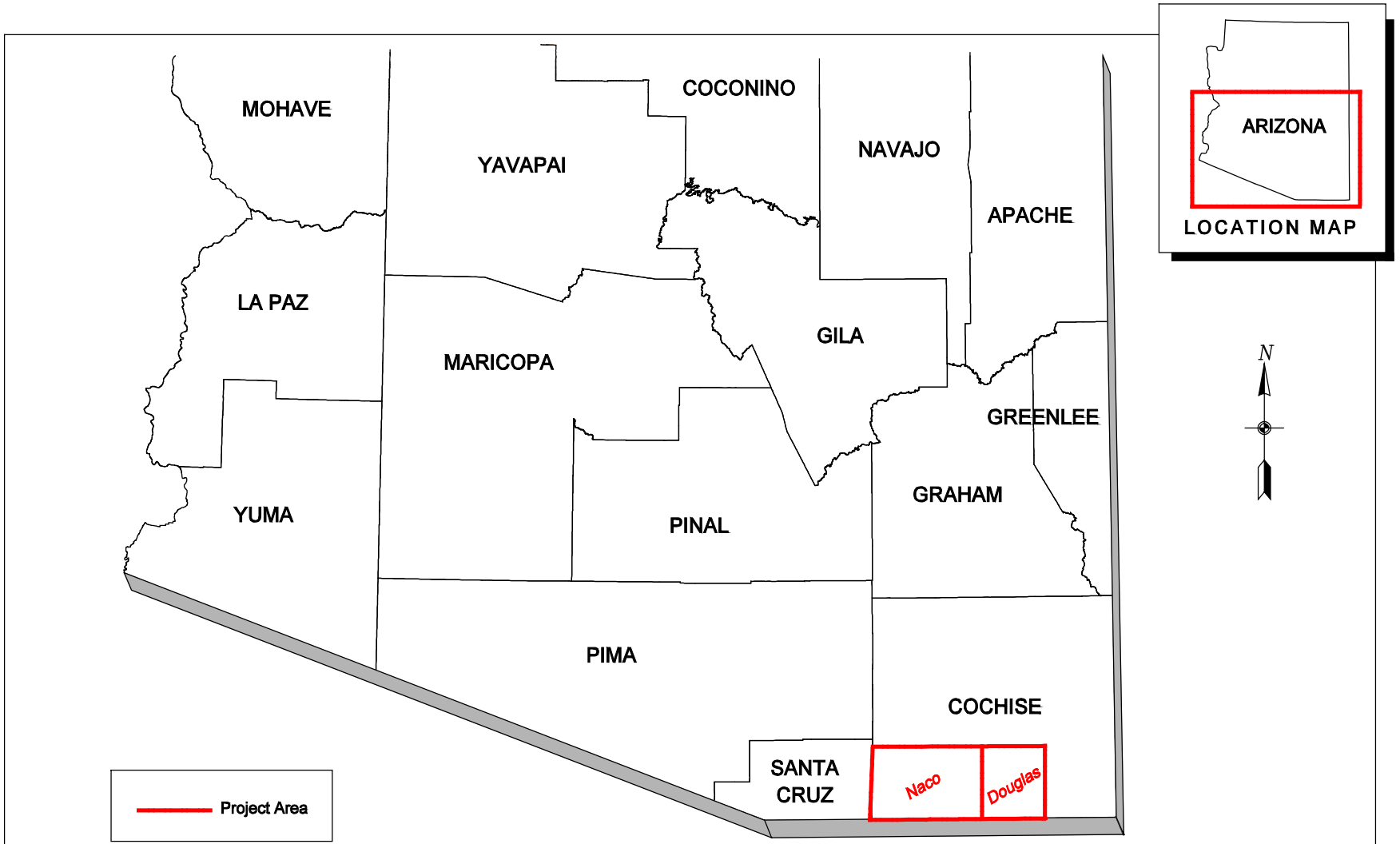


Figure 1-1: Naco-Douglas Corridor Location Map

Scale: not to scale

Date: July 2000

GSRC GULF SOUTH RESEARCH CORPORATION

(This page left intentionally blank)

including assistance to persons seeking permanent resident status or naturalization, (3) prevent unlawful entry, employment or receipt of benefits, and (4) apprehend or remove aliens who enter or remain illegally in the United States.

In regards to the latter responsibility, the U.S. Congress in 1924 created the USBP to be the law enforcement arm of the INS. The USBP's primary function is to detect and deter the unlawful entry of aliens and smuggling along the nation's borders between the ports-of-entry (POE). With the increase in illegal drug trafficking, the USBP also has become the leader for drug interdiction.

Since 1980, an average of 150,000 immigrants have been naturalized every year. At the same time, however, illegal aliens have become a significant issue. INS apprehension rates are currently averaging more than 1.5 million illegal aliens throughout the country. The INS estimates that there are currently from three to six million illegal aliens in the United States. Other studies have indicated higher numbers, closer to 10 million.

The USBP field activities are administered under the Field Operations Division. As mentioned previously, the USBP's primary function is to detect and prevent the unlawful entry of aliens and smuggling along the nation's borders. With the increase in illegal drug trafficking, the USBP also has assumed a major Federal responsibility for illegal drug interdiction. In fiscal year (FY) 1999, the USBP made almost one million apprehensions of illegal immigrants and seized more than 1.1 million pounds of marijuana and over 29,000 pounds of cocaine (USBP 2000).

Still, the United States is also experiencing epidemic levels of drug use and drug-related crimes as reported by the Office of National Drug Control Policy (1998 and 1999):

- illegal drugs cost our society approximately $110 billion annually;
- 1.5 million Americans were arrested in 1997 for violating drug laws;
- 819 persons per 100,000 population were murdered during drug related offenses;
- 322,000 Americans are casual heroin users and over 800,000 are heavy users;
- 1.5 to 3 million Americans are casual cocaine users and over 800,000 are heavy users;
- state and Federal prison populations (drug-related crimes) doubled between 1989 and 1996; and,
- over 10 % of Americans used some form of illicit drug in 1998.

1.1.2 Tucson Sector

The mission of the USBP Tucson Sector is to protect the US/Mexico border in Arizona through the detection and prevention of smuggling and illegal entry of aliens. The mission includes the enforcement of the Immigration and Nationality Act (INA) and Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) of 1996 and the performance of an uniformed, Federal law enforcement agency with authority delegated by the U.S. Attorney General.

In the mid-1990s, the Attorney General and INS Commissioner announced a comprehensive strategy to strengthen enforcement of the Nation's immigration laws. The first priority of this strategy focused on strengthening immigration control efforts along the entire 2,200 miles of the US-Mexico border. A new border strategy, known as "prevention through deterrence" was developed and adopted to concentrate additional resources on the front lines at the most active illegal entry points along the international border (GAO 1997). In response to this directive, the USBP developed its own plan to implement the U.S. Attorney General's strategy. The intent of this plan is to maximize alien apprehensions through the presence of human and physical barriers, thereby making illegal entry so difficult that it is considered futile. The plan directs enforcement efforts at the areas of greatest illegal activity along the international border. The Tucson Sector has incorporated this strategy into its current operational plan. Infrastructure that has been completed, is currently under construction, and is proposed is considered essential in order to assure that the Tucson Sector, in general, and the USBP Naco and Douglas Stations, in particular, satisfy their missions.

1.1.3 Regulatory Authority

The primary sources of authority granted to officers of the INS are the INA, found in Title 8 of the United States Code (8 U.S.C.), and other statutes relating to the immigration and naturalization of aliens. The secondary sources of authority are administrative regulations implementing those statutes, primarily those found in Title 8 of the Code of Federal Regulations (8 C.F.R. Section 287), judicial decisions, and administrative decisions of the

Board of Immigration Appeals. In addition, the IIRIRA mandates INS to acquire and/or improve equipment and technology along the border, hire and train new agents for the border region, and develop effective border enforcement strategies.

Subject to constitutional limitations, INS officers may exercise the authority granted to them in the INA. The statutory provisions related to enforcement authority are found in Sections 287(a), 287(b), 287(c), and 287(e) [8 U.S.C. § 1357(a,b,c,e)]; Section 235(a) [8 U.S.C. § 1225]; Sections 274(b) and 274(c) [8 U.S.C. § 1324(b,c)]; Section 274(a) [8 U.S.C. § 1324(a)]; and Section 274(c) [8 U.S.C. § 1324(c)] of the INA. Other statutory sources of authority are Title 18 of the United States Code (18 U.S.C.), which has several provisions that specifically relate to enforcement of the immigration and nationality laws; Title 19 [19 U.S.C. § 1401(i)], relating to US Customs Service cross-designation of INS officers; and Title 21 [21 U.S.C. § 878], relating to Drug Enforcement Agency cross-designation of INS officers.

1.2 PURPOSE AND NEED

The U.S. experiences a substantial influx of illegal immigrants and drugs each year. Both of these illegal activities cost the American citizens billions of dollars annually due directly to criminal activities, as well as the cost of apprehension, detention and incarceration of criminals; and, indirectly in loss of property, illegal participation in government programs and increased insurance costs. INS has estimated that there were approximately five million illegal aliens residing in the U.S. in October 1996, and their numbers increased at an average rate of about 275,000 per year between October 1992 and October 1996 (GAO 1997). To combat these rising numbers, the Clinton Administration committed additional resources to law enforcement agencies, including the USBP. As indicated in Figure 1-2, the numbers of agents assigned to the Douglas and Naco Stations have doubled and tripled, respectively, since FY 1996.

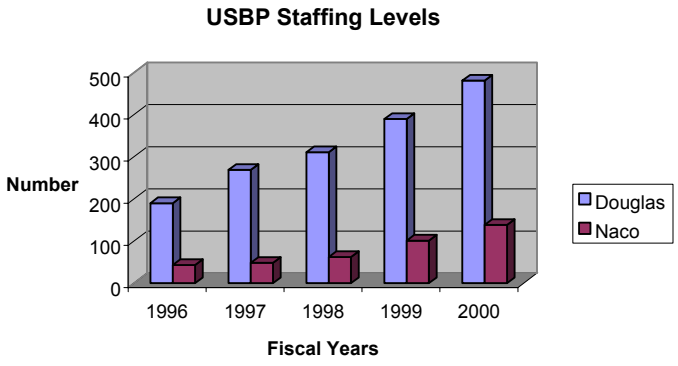


Figure 1-2. USBP Staffing Levels at Douglas and Naco Stations (Source: USBP 2000)

USBP stations along the United States/Mexico border experienced a 19% increase in the number of drug seizures from fiscal year (FY) 1998 to FY 1999, and an overall 30% increase since FY 1995. More importantly, the value and number of drug seizures along the southwestern border represent at least 95% of those made by the USBP throughout the nation. In particular, the USBP Stations at Naco and Douglas have experienced tremendous increases over the past five years, partially in response to successful deterrence programs in other borders such as San Diego and El Paso. During the period from FY 1994 to FY 1999, the Naco Station experienced a 2,423 % increase in the number of apprehensions of undocumented aliens (UDA) and a 254% increase in the number of seizures made involving marijuana (Figure 1-3). The Douglas Station experienced a 488% increase in UDA apprehensions and a 52% increase in marijuana seizures during the same time (Figure 1-4).

As depicted in Figure 1-5, total pounds of marijuana seized by agents at both stations increased by 126 % and 241%,

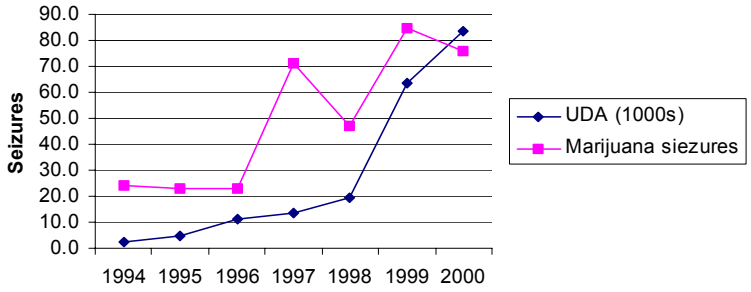


Figure 1-3. UDA Apprehensions and Marijuana Seizures, Naco Station (Source: USBP 2000)

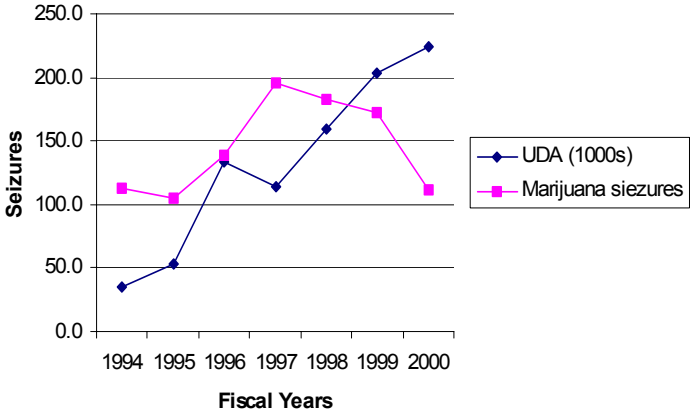


Figure 1-4. UDA Apprehensions and Marijuana Seizures, Douglas Station (Source: USBP 2000)

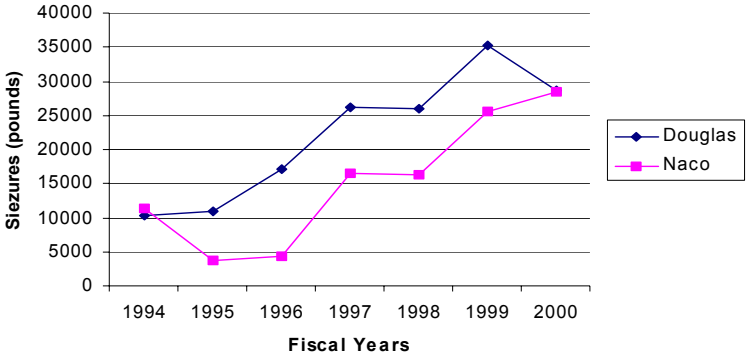


Figure 1-5 Total Pounds of Marijuana Seized by USBP Naco and Douglas Stations (Source: USBP 2000)

respectively. Thus far in FY 2000, both stations have nearly equaled or surpassed the number of apprehensions, marijuana seizures and total pounds of marijuana as the entire FY 1999. Cocaine seizures have also risen within the AO of the Douglas Station (up over 200 % from the previous two years), but have remained fairly low and constant within the Naco Station AO.

The negative impacts of widespread drug use on society continue to affect the work force, educational system, general law and order, and traditional family values and structure (Office of National Drug Control Policy 1998 and 1999). Rising rates of violent crime, serious damage to the Nation's health and economy, and strains on vital relationships with international allies led the U.S. Congress to develop the National Drug Control Strategy. The National Drug Control Strategy included the USBP and mandated a "prevention through deterrence" strategy. The National Drug Control Strategy also formulated a multi-year approach that required the USBP and other local Drug Law Enforcement Agencies to "... gain, maintain, and extend control ..." of the border region into the United States.

Although under the current Presidential administration, the number of USBP agents have dramatically increased (as shown previously in Figure 1-2), the apprehension and seizure data indicate that the number of illegal entries into the United States is increasing every day. These increases have necessitated the construction and implementation of various infrastructure systems to enhance the USBP's ability to detect and apprehend UDAs and drug traffickers.

The Tucson Sector is responsible for approximately 280 miles of the U.S.-Mexico border, most of which are remote and rugged lands, particularly along the Naco-Douglas corridor. Monitoring such a vast area creates a somewhat daunting task. Illegal immigrants and/or drug traffickers use many areas of the border to gain access to the United States. The USBP Naco and Douglas Stations use a variety of methods to detect and deter illegal drug traffickers. Deterrence is effected through the actual presence (24 hours per day, seven days per week) of the USBP agents on the border, fences and other physical (natural and man-made) barriers, lighting, and the knowledge that the illegal entrants will be detected and apprehended. Detection of the illegal traffickers is accomplished through a variety of low-technology and high-technology

resources including observing physical signs of illegal entry (vehicle tracks and footprints, clothes, etc.), visual observation of the illegal entries, information provided by private landowners or the general public, ground sensors, and remote video surveillance systems.

The latter two items are components of INS' Integrated Surveillance Intelligence Systems (ISIS), which has become an integral part of the detection process, thereby enhancing the agents' ability to apprehend the illegal entrants. ISIS components include, but are not limited to, unattended ground sensors, low-light television cameras, infrared cameras, towers, (and their connections to power and communication lines), and intelligent computer aided detection (ICAD). The various remote sensing systems can be used separately or in combination with several types of systems or with other, more routine, enforcement actions (i.e., patrols). However, to be most effective, or for maximum optimization, the ISIS needs to be utilized in conjunction with other infrastructure and resources.

Thus, the combination of sound infrastructure (e.g., roads, fences, barriers, and ISIS components) and adequate resources (e.g., vehicles, field agents, support personnel, etc) is essential for the effective enforcement of the border strategy and integral to the success of the USBP to gain, maintain and extend control of the border.

This EA is intended to evaluate the impacts that have occurred due to the INS/USBP projects that have been completed in the past (since 1995, which is when most construction has occurred) and to disclose the projects and their potential effects that are expected to occur in the reasonably foreseeable future. The EA addresses the actual and potential cumulative effects of all these projects as well as those proposed by other entities.

1.3 INFRASTRUCTURE DESCRIPTIONS

The following subsections provide general descriptions of the types of infrastructure that have been completed or are planned/proposed for construction. The design of each infrastructure project will vary depending upon the USBP Station's strategic needs, local

terrain, regulatory constraints and guidelines, community perceptions, and funding. The intended use or purpose of the infrastructure is also briefly discussed.

1.3.1 Road Projects

USBP agents in the Naco-Douglas corridor patrol hundreds of miles of border roads each day using 4-wheel drive vehicles, bicycles, motorcycles, foot, and horses. The majority of the dirt roads within the border region were approximately 24 feet wide when originally built. Over the years, vegetation has encroached to the point that some roads are now typically less than 10 feet wide. In addition, most roads have experienced wind and water erosion that has resulted in long, impassable stretches. The current conditions of these roads do not allow efficient use of the roads by the USBP. Typically, upgrading or repair of these roads would produce a road width of 20 feet with parallel drainage, where appropriate. Bridges, culverts, low water crossings, gabions, water bars, and other drainage or erosion control structures have been and are proposed to be constructed to reduce erosion and concomitant road maintenance activities. Improved roads would provide for safer driving for the USBP agents and improve their response capabilities while enhancing the stability of the local environment.

1.3.2 Fences and Barriers

Border fences have proven to be an effective deterrent in numerous areas (e.g., San Diego, Naco, Nogales, and Tecate), even though a single fence can be breached (since USBP agents can not protect the south side of the fence). Fences are typically constructed in urban or developed areas, particularly around legal POEs. Military surplus steel landing mat fences have been the type of fence most commonly constructed along the border. However, numerous other styles, including bollard, Sandia, and steel picket fences, have also been used, as illustrated in Exhibit1-1. Fences are generally 10-14 feet high and usually constructed within six feet of the US/Mexico border, although the

(This page left intentionally blank)

Bollard fence

Landing mat fence

Picket or decorative fence

Sandia fence

Exhibit 1-1 Various styles of fences used along the border

(This page left intentionally blank)

designs can vary depending upon the, presence of other natural or man-made physical barriers, local terrain, and the USBP Station's enforcement strategy.

Vehicle barriers typically consist of 4- to 5-inch diameter pipe approximately three feet high to prevent vehicles from crossing the border at selected areas. The only excavated foundation is generally the holes used to secure upright supports in the ground with concrete. Vehicle barriers are usually constructed along the southern edge of existing roads, particularly roads that are adjacent to the US/Mexico border. As the name implies, vehicle barriers are designed to impede illegal vehicle entry; they do not preclude pedestrian or wildlife movement. A schematic of a typical vehicle barrier is shown in Figure 1-6.

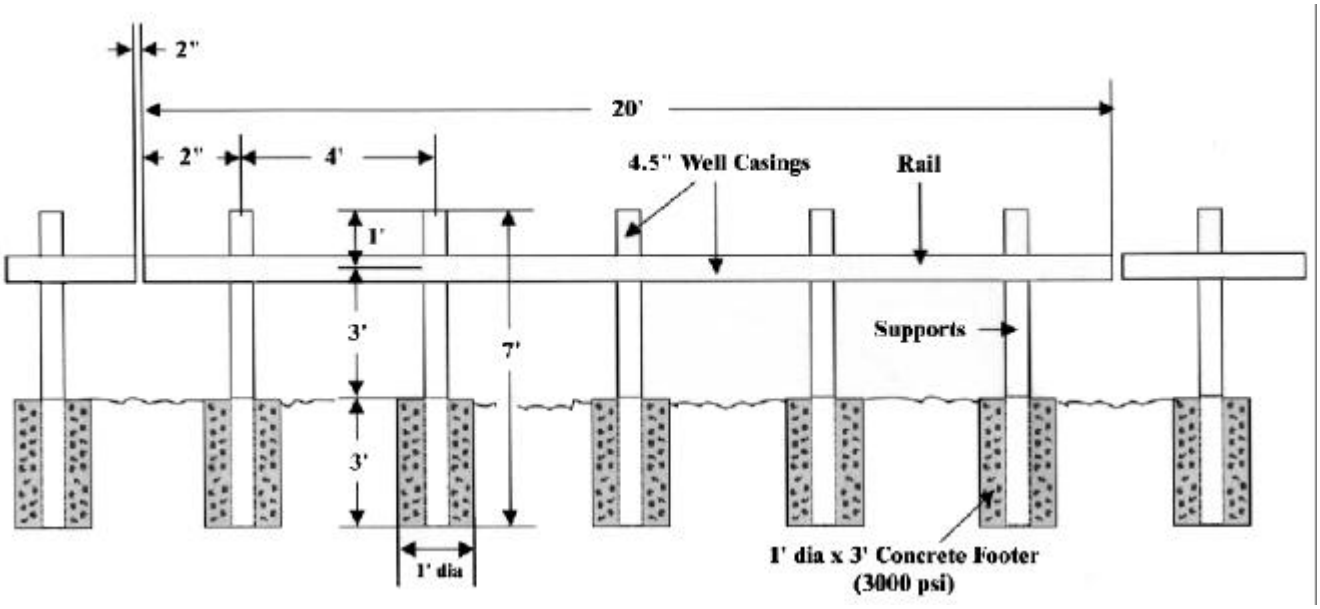
1.3.3 ISIS Components

As mentioned previously, the Integrated Surveillance and Intelligence System (ISIS) program consists of a network of remote sensing technologies including ground sensors, lighting, remote surveillance systems (RVS), and global positioning systems (GPS).

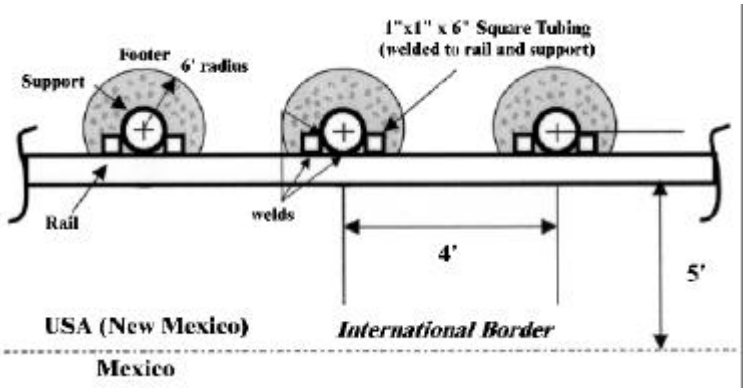
Two types of lighting have been and could be used: permanent lighting and portable (temporary) lighting. Some of the portable lighting may eventually be replaced by permanent lighting, but such actions would be addressed in supplemental NEPA documentation. In urban areas, permanent lights serve as a deterrent and enhance the USBP agents' apprehension capabilities and safety. The permanent lights are stadium-type lights on approximately 30-foot poles with two to four lights per pole. Light bulbs can range from 400 to 1,000 watts. The poles are either wooden and encased in concrete and steel culverts to prevent them from being cut down, or made of steel with concrete footings. The average distance between the permanent light poles is 300 feet. Permanent lights are powered by overhead or underground electrical lines.

Portable lights are often used in areas where USBP intelligence indicates increases in UDA and smuggling activities may occur. Portable lights are powered by a 6-kilowatt, diesel generator that is self-contained. Portable lights will generally operate continuously every night and will require refueling every day prior to the next night's operation. The portable light systems can be towed to the desired location by USBP

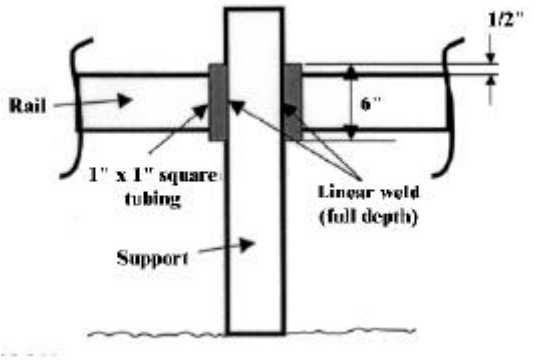
(This page left intentionally blank)



MEXICO SIDE PERSPECTIVE



TOP PERSPECTIVE



USA SIDE PERSPECTIVE

Adapted from MAJ Scott A. Spellmon, 22 DEC 99

Figure 1-6: Schematic Drawings of Vehicle Barrier

GULF SOUTH RESEARCH CORPORATION

SCALE: ON MAP

DATE: JULY 2000

(This page left intentionally blank)

vehicles, but they are typically spaced approximately 500 to 600 feet apart. The light from the portable lights does not overlap, leaving areas of darkness between them.

Cameras (low-light and infrared) and other RVS systems are placed on wooden or concrete poles that are 40 to 80 feet high, depending upon the local terrain and surrounding development. RVS components can also be installed on top of existing structures such as buildings, water towers, and billboards.

(This page left intentionally blank)

SECTION 2.0
PROPOSED ACTION AND ALTERNATIVES

CHAPTER 2 – ALTERNATIVES

2.0 ALTERNATIVES

The purpose of this section is to describe the alternatives that were considered during the preparation of the EA. As mentioned in Chapter 1, the objective of this EA is evaluate and disclose the impacts which have occurred in the past five years and the cumulative effects that might occur as a result of currently approved and future projects. Therefore, only three alternatives will be addressed: (1) No Action Alternative; (2) Current Action Alternative and; (3) Future Infrastructure Alternative. Each of these is discussed in the paragraphs below.

2.1 ALTERNATIVE 1. NO ACTION ALTERNATIVE

The No Action Alternative would require the cessation of all current projects and a moratorium on future infrastructure projects for five years. For the purposes of this EA, current projects arre defined as those approved or funded by USBP Tucson Sector and/or INS Headquarters. No projects are presently under construction. Future projects are those that are conceptually planned or proposed, but have not been approved or funded at the time of this EA. The No Action Alternative would eliminate any additional impacts that would occur as a result of completion of current projects and would eliminate the potential for other effects within the reasonably foreseeable future. Effects that have occurred in the past five years would be the only direct effects associated with the No Action Alternative. These effects are discussed in detail in Chapter 4 of this EA.

2.1.1 Naco Corridor

Infrastructure projects that have been completed during the past five years for the Naco Corridor include the following projects (Figure 2-1).

1. Improvements to 32 miles of border road
2. Installation of two miles of stadium-style lights
3. Retrofit of one RVS site

(This page left intentionally blank)

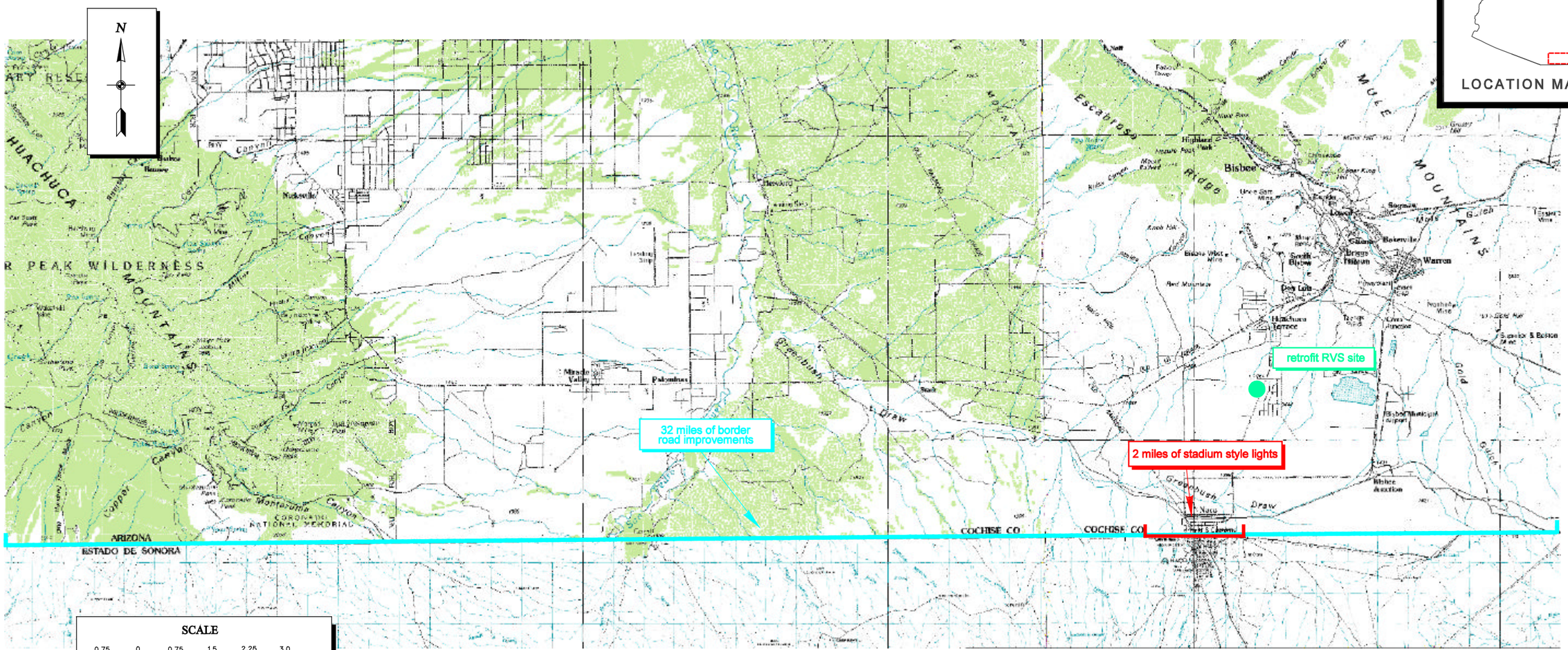


Figure 2-1: Naco Corridor Completed Projects

GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

(This page left intentionally blank)

2.1.2 Douglas Corridor

Infrastructure projects that have been completed during the past five years for the Douglas Corridor include the following projects (Figure 2-2).

1. Improvements to 25 miles of border road
2. Construction of five miles of fence within the City of Douglas (picket and landing mat)
3. Construction of 0.5 miles of new road
4. Installation of five miles of stadium style lights
5. Construction of 5-mile, 8-foot wide light pole maintenance road
6. Installation of eight RVS sites
7. Use of seven miles of portable generator lights
8. Construction of two miles of new road (extension of Brooks Highway to border)

Each of these projects within the Naco-Douglas corridor have been completed and thus the direct impacts have been incurred and the projects are expected to remain in place; these effects are discussed in more detail in Chapter 4. No new infrastructure projects, however, would be constructed under the No Action alternative. Although this alternative would significantly reduce the potential effects of current and future projects, it would not facilitate the USBP's mission to gain and maintain control of the border. Indeed, it would hinder their ability to satisfy this mission since road and fence maintenance and installation of ISIS components would not be realized, and thus, deterrence could not be achieved.

2.2 ALTERNATIVE 2. CURRENT ACTION ALTERNATIVE

The Current Action Alternative would involve elimination of proposed (future) construction activities and completion of only those actions that are currently approved by INS and/or the USBP. This alternative would incorporate all the infrastructure that has been implemented during the past five years (described under the No Action alternative) and any normal maintenance and operation requirements associated with the infrastructure.

(This page left intentionally blank)

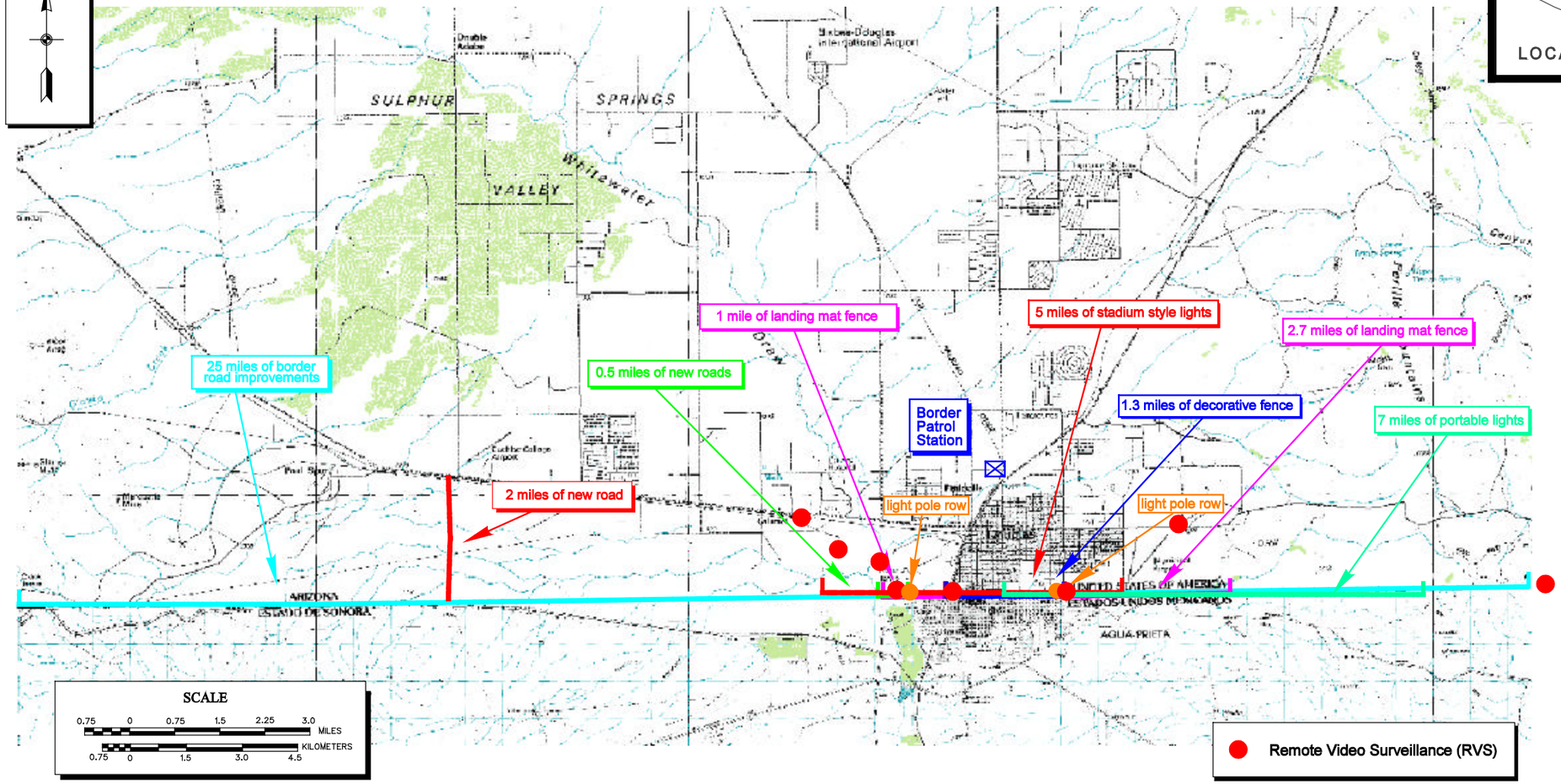


Figure 2-2: Douglas Corridor Completed Projects

gsrc / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

(This page left intentionally blank)

2.1.2 Naco Corridor

Infrastructure that is currently approved or funded by INS/USBP within the Naco Corridor includes the following projects (Figure 2-3).

1. Extension of nine miles of steel landing mat fence
2. Construction of 6.25 miles of vehicle barrier
3. Improvements to eight miles of border road
4. Installation of five miles of stadium style lights
5. Installation of seven RVS site, with one alternative site (EA completed and FONSI signed)
6. Construction of two low water crossings

2.2.1 Douglas Corridor

Infrastructure that is currently approved or funded by INS/USBP in the Douglas Corridor includes the following projects (Figure 2-4).

1. Installation of five RVS sites
2. Acquisition and use of 73 portable generator lights along border

While the completion of infrastructure that is currently approved would facilitate the detection, deterrence and apprehension of illegal trans-border activities, the USBP's continued ability to effectively respond to changes in the illegal entrants strategy or mode of operations would be severely hampered if the Current Action alternative was selected. Illegal entrants would quickly identify areas that were either limited or void of adequate infrastructure and relocate their operations to these areas. The USBP would either have to increase their enforcement footprint farther to the north, thereby decreasing the chance for apprehension, or increase the risk to the agents' health and safety by requiring that they enter high traffic areas without sufficient roads, barriers, or ISIS components.

(This page left intentionally blank)

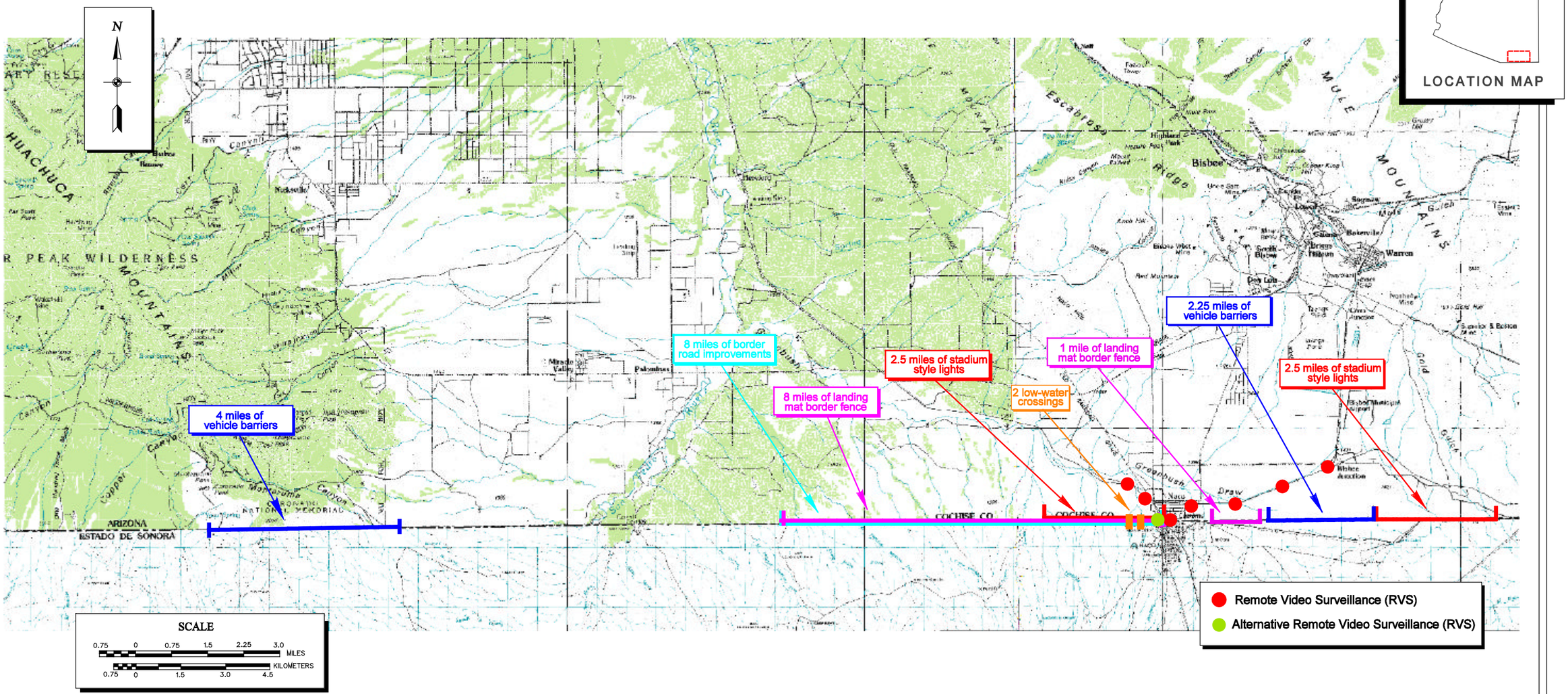


Figure 2-3: Naco Corridor Current Projects

gsrc / GULF SOUTH RESEARCH CORPORATION

DATE: March 2001

SCALE: ON MAP

(This page left intentionally blank)

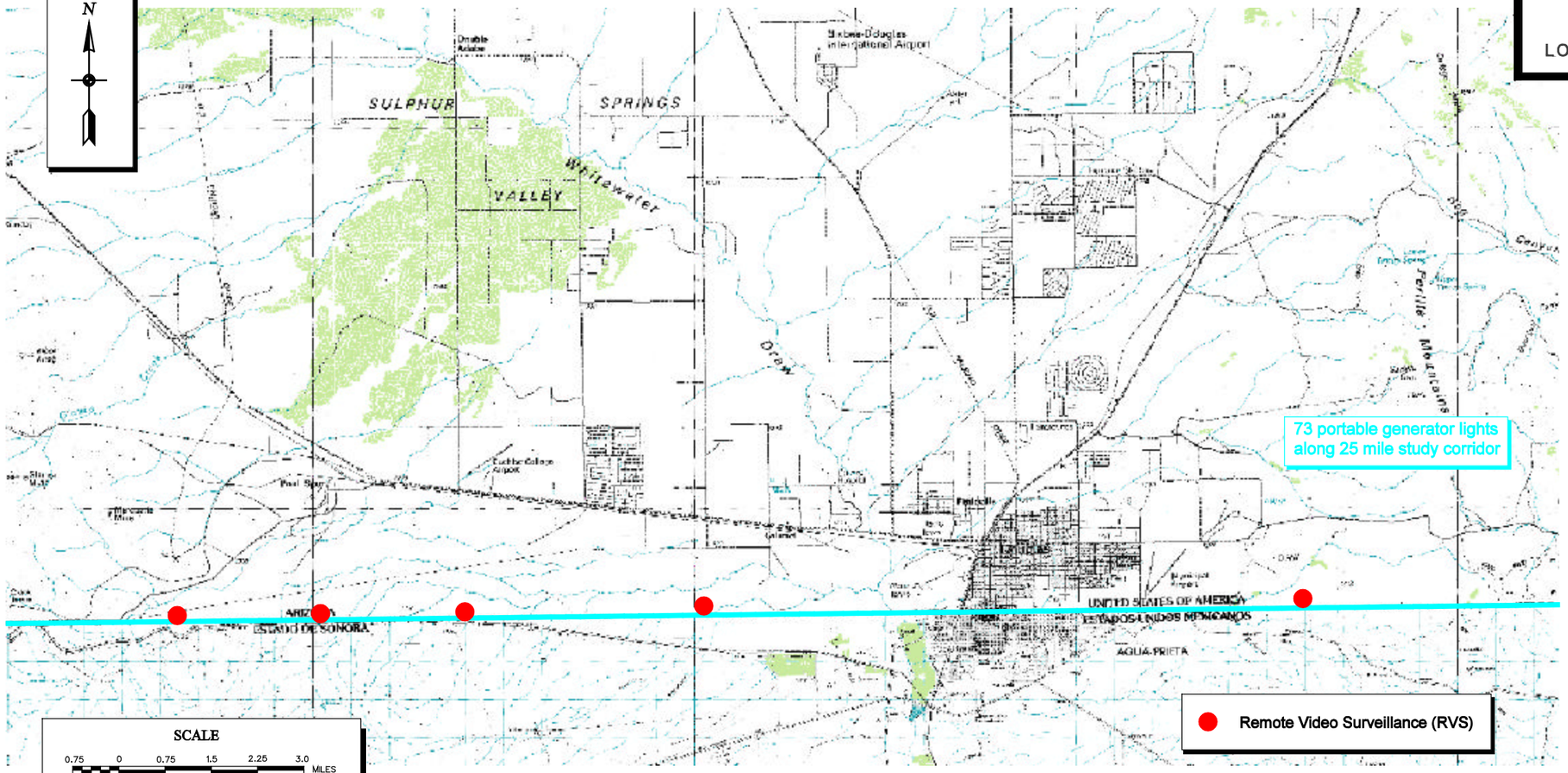


Figure 2-4: Douglas Station Current Projects

gsrc / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

(This page left intentionally blank)

2.3 ALTERNATIVE 3. FUTURE INFRASTRUCTURE ALTERNATIVE

The Future Infrastructure Alternative would allow the projects currently approved or funded and those anticipated to be completed during the reasonably foreseeable future. Completion of these projects would significantly enhance the USBP's ability to gain and maintain control of the border. *Thus, this alternative is the preferred alternative.*

In addition to projects currently being constructed and completed during the past five years, as described in Alternatives 1 and 2, this alternative would include several construction projects involving roads, bridges, fences, and ISIS components.

2.3.1 Naco Corridor

Proposed infrastructure to be constructed by INS/USBP in the Naco Corridor includes the following projects (Figure 2-5):

1. Use of 11.5 miles of portable generator lights
2. Construction of a new Border Patrol Station
3. Installation of eight RVS sites, with four alternative sites

2.3.2 Douglas Corridor

Proposed infrastructure to be constructed by INS/USBP in the Douglas Corridor includes the following projects (Figure 2-6):

1. Construction of a bollard fence at Whitewater Draw
2. Construction of 7.5 miles of landing mat fence
3. Installation of eight miles of stadium style lights
4. Installation of an additional five RVS sites
5. Upgrade to a natural all-weather surface road along US/Mexico border (25 miles)
6. Construction of a new Border Patrol Station

This alternative would result in direct impacts to the region's natural environment. The magnitude of these effects would vary depending upon the amount of native vegetation removed, the duration and time of year construction activities occur, and climatic conditions. Still, the overall direct effects would not expected to be significant, as is discussed in more detail in Chapter 4. Minor indirect effects would also occur but would be outweighed by the benefits derived from the reduction of illegal trans-border traffic and fewer enforcement actions required north of the immediate border vicinity.

(This page left intentionally blank)

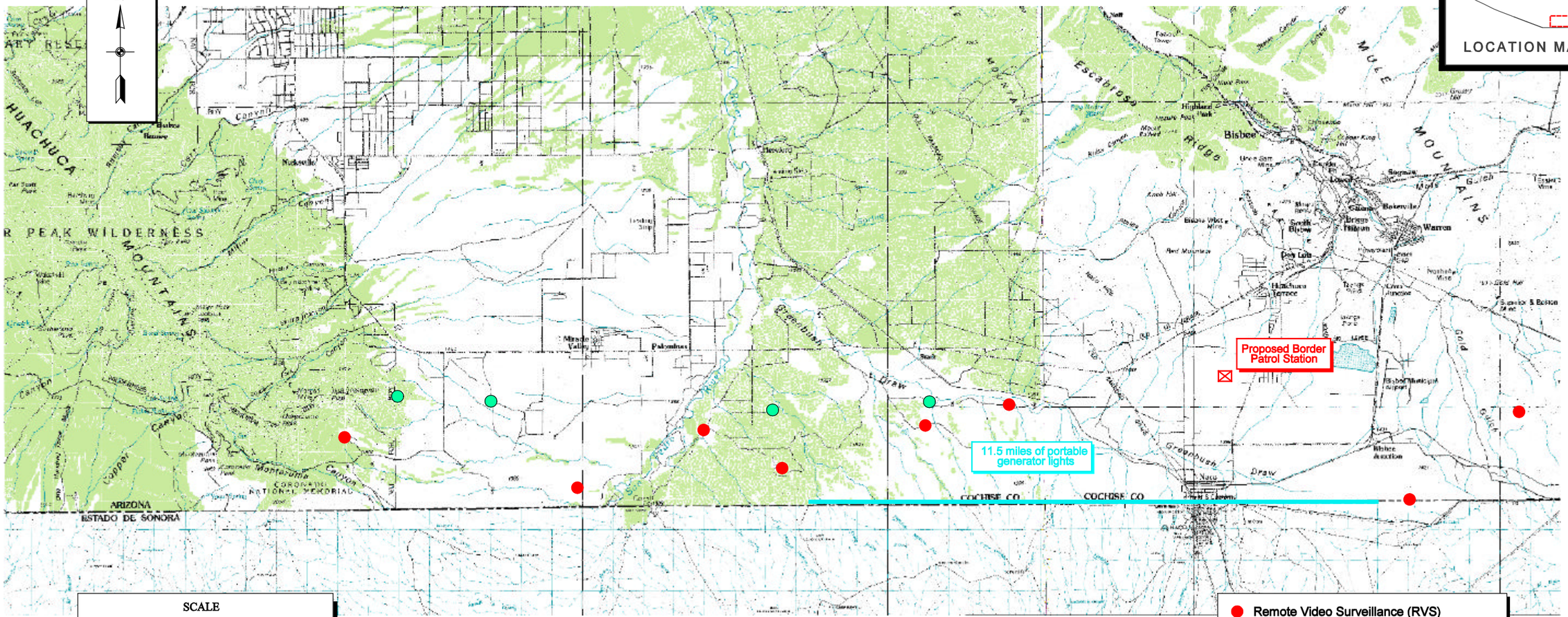


Figure 2-5: Naco Corridor Proposed Projects

GSRC / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

(This page left intentionally blank)

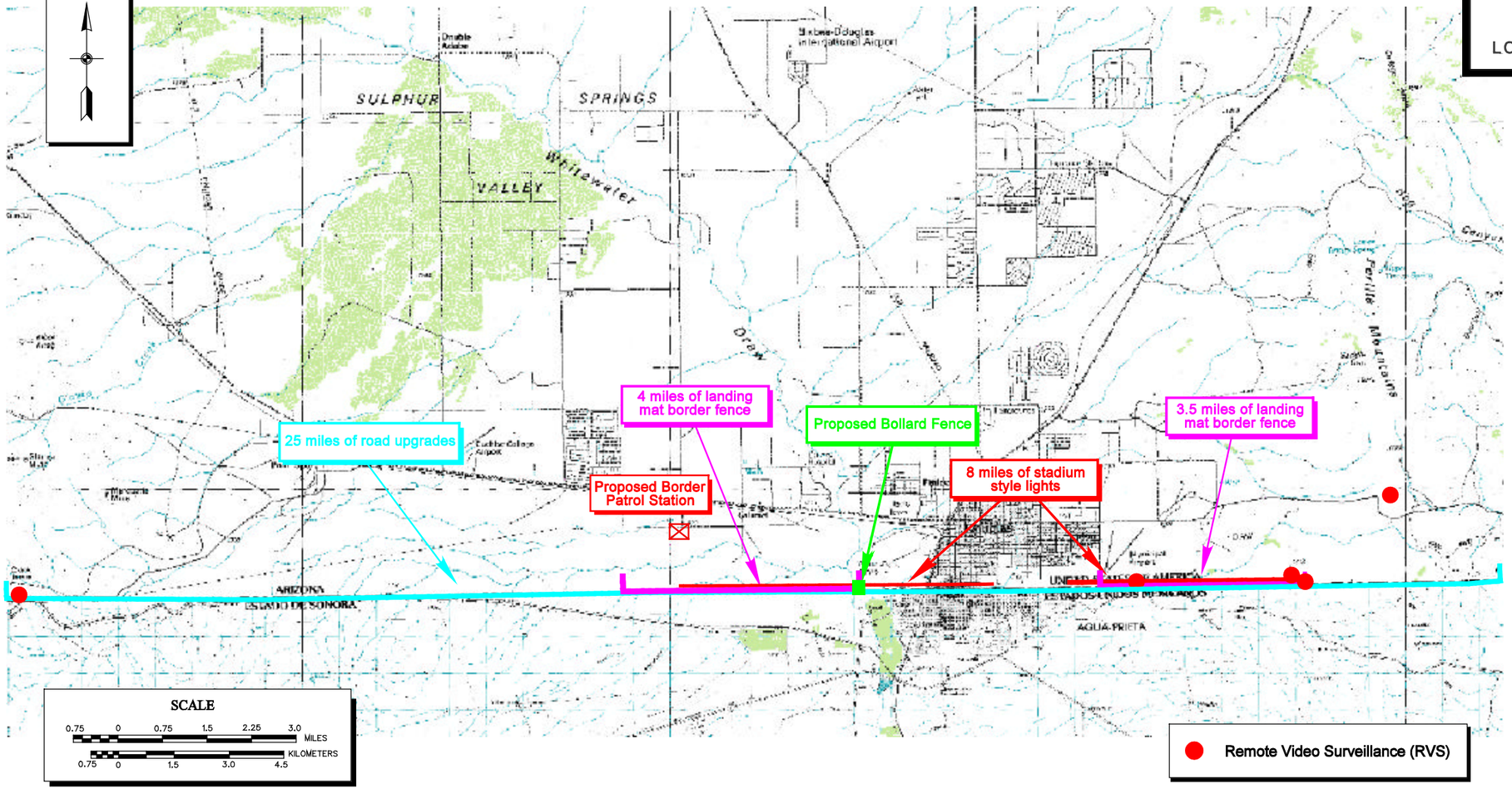


Figure 2-6: Douglas Corridor Proposed Projects

gsrc/ GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

(This page left intentionally blank)

Even though the future infrastructure alternative would have unavoidable impacts and irretrievable losses of resources, this alternative is the preferred alternative because the infrastructure is absolutely necessary to gain and maintain control of the US border. Integrated Surveillance Intelligence Systems (ISIS) components would have slight direct effects on the human and natural environments. Operations of lights, however, may cause disturbances to wildlife and humans, depending upon the location, number, power, type, and timing/duration of the lights. Increases in the ISIS components alone would enhance the detection of illegal activities, but would not facilitate the apprehension of the illegal entrants. In fact, without maintenance of the existing infrastructure, the USBP's apprehension capabilities would be further degraded. If apprehension is not assured, deterrence will not be achieved.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

Consideration of various combinations of Alternatives 2 and 3 were considered during the preparation of this EA. These combinations centered on the implementation of only specific types of projects such as only the ISIS components or only the road projects. However, each of these types of projects are considered essential to the USBP in order to develop an enforcement system that will allow the USBP to effect the enforcement strategy. Implementation of ISIS components only would enhance the technological capabilities to detect illegal activities, but would not facilitate the apprehension of illegal entrants. Likewise, additional roads and fences would assist in the deterrence and apprehension of illegal entrants, but the rate of detection would not be as high without the ISIS components. Deterrence will only evolve when detection and subsequent apprehension can be assured.

2.5 RELATIONSHIP TO OTHER PROGRAMS

Although most of the area along the Naco-Douglas corridor is rural, there are numerous plans and proposals for expansion and construction in the area. These plans are briefly presented herein as a basis for assessing cumulative impacts and to identify any potential conflicts among the proposed projects.

2.5.1 Transportation

Cochise County presently maintains 1,440 miles of roads of which 546 miles are paved and 894 miles are dirt. It was determined that Cochise County needs $8,000,000 per year to adequately manage, operate and maintain its roads and $162,000,000 to properly construct and improve county roads to nationally accepted standards, construct new bridges and acquire needed rights-of-way. Future plans in Cochise County identified to meet these selected needs include: upgrade dirt local roads to a double bituminous surface treatment (DBST), upgrade low volume collectors to DBST, construct selected box culverts on major roads, and to upgrade some dirt roads to asphalt surfaces. There are several projects that are planned in the near future within the study area, primarily in the Douglas area.

- The Arizona Department of Transportation (ADOT) is planning a fence replacement on U.S. Highway 80 just southeast of Bisbee. This project involves replacing existing fences, gates, and cattle guards along their existing alignment as well as removing vegetation from within right-of-way to create an adequate clear-zone (ADOT 1998a).

- ADOT is planning a pavement preservation project on U.S. Highway 191 near Douglas. It consists of furnishing and placing asphalt rubber over the existing roadway surface to improve safety of this segment of the roadway (ADOT 1998b).

- ADOT is planning an intersection improvement project on U.S. Highway 191 in Douglas. The project will widen U.S. Highway 191 to provide right and left turns at the intersection of Cochise Industrial Park which will allow for safer turning movements for large trucks (ADOT 1998c).

- ADOT is planning to restore the structural integrity of the pavement surface and to replace the existing Mule Pass Canyon Bridge. The project is located on State Route 80 in the city of Bisbee (ADOT 1998d).

2.5.2 Urban Development

2.5.2.1 Cochise County

According to the Cochise County Comprehensive Plan (1996), the overall goal of the county is:

> "to promote the future growth of Cochise County is an orderly, harmonious, environmentally and economically responsible manner. Free enterprise market dynamics shall be allowed to determine land use activity patterns to the maximum extent feasible within the public's legitimate interests of health, safety, welfare, conservation, and convenience."

No immediate plans are in currently being implemented for development on a county level.

2.5.2.2 Bisbee

Bisbee is located 100 miles southeast of Tucson within the southeast corner of the USBP Naco Station AO. Bisbee is the county seat of Cochise County and is located about eight miles north of Naco and 21 miles northwest of Douglas. Bisbee was one of the richest mineral sites in the world in the 1800's, producing nearly three million ounces of gold and more than eight billion pounds of copper. After the mines played out, the population shrunk and the town now has evolved into an artist and retirement community. It relies heavily on tourism, particularly for the mine tours in the area. According to Brena Mercer (2000), Bisbee's Community Development Director, Bisbee is basically a shrinking community at this time with critical infrastructure concerns. There is a 50 home subdivision struggling to begin developing at this time and there are no specific plans for any future development (Bisbee Strategic Plan for Community and Economic Development 1999).

2.5.2.3 Douglas

Douglas is located on the Mexican border across from Agua Prieta, Sonora, Mexico and is the legal POE that provides access to the Janos Highway, the shortest route to Mexico City by paved roads from the western U.S. It is reached via Interstate 10 to U.S. Highway 80 and is 118 miles southeast of Tucson. It is located in the center of the USBP Douglas Station AO.

The City of Douglas has plans to construct a commercial truck bypass for U.S. Highway 80 along U.S. Highway 191 with a new commercial truck border crossing on the western

edge of Douglas. They also recommend that an additional border crossing be added east of the municipal airport. However, no plans have been finalized as of (Douglas General Plan 1993).

Douglas and Agua Prieta share an aquifer that goes between the mountains south of Willcox to between the Mexican Sierras Caniza and Anibacachi. The real danger to this aquifer is the agricultural pumping north of Douglas. Pumping activities in the area north of Douglas have decreased the depths to groundwater. This upward movement of the aquifer has created a depression near Elfrida. If this continues, Douglas may have a very serious groundwater problem and the Arizona Department of Water Resources may create an Active Management Area for the Basin.

There are three airports located near Douglas: the Douglas International Municipal Airport, located two miles southeast of Douglas; the Bisbee-Douglas International Airport, located nine miles north of Douglas, and the Cochise College Aviation Airport, located two miles east of Douglas. The Douglas International Municipal Airport has no immediate plans for expansion.

The Bisbee-Douglas International Airport currently is in the process of completing an EA for the proposed expansion of the airport. Because of its location, the airport is well-suited to assume a role as the major business aviation facility in Cochise County. With the recommended improvements, the airport will be made more attractive to business users. With these improvements, the aeronautical activity could increase from 3,300 total annual operations to 26,000 annual operations within the reasonably foreseeable future. They have immediate plans to reconstruct the primary runway, the primary access taxiways, and the lighting for both the runway and the taxiway. Within the next few years, they plan to reconstruct the crosswind runway, the secondary access taxiways, install lighting on primary approach, renovate the terminal buildings and hangars, and construct a terminal auto parking area. However, the final EA has not been completed as of yet, so no construction has begun (Bisbee-Douglas International Airport Master Plan 1997). The Cochise College Aviation Airport has no plans for expansion.

2.5.2.4 Naco

The Naco community is located on the US/Mexico border across from Naco, Sonora, Mexico and is a legal POE. It is located approximately 100 miles southeast of Tucson. Naco is a small community few plans for expansion in the future. A new road is proposed to carry truck traffic from the POE along the Mexican border to the east, but the construction date has not been set. There are railroad tracks (former Southern Pacific Railroad) that run through Naco, but no current rail service is in the area. There have been discussions regarding reactivating rail service and possibly establishing a rail crossing into Mexico east of Naco. No plans have been finalized for this reactivation in the near future (Naco Community Plan 1998).

The limiting factor for growth in Naco is the water supply, which currently is provided by a privately-owned firm, the Naco Water Company. The water supply and distribution system is currently in disrepair and presents a severe limitation to growth in Naco. Adequate water supply will be a consideration for all future development plans within this area.

(This page left intentionally blank)

SECTION 3.0
AFFECTED ENVIRONMENT

CHAPTER 3—AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

3.1 LAND USE

In general, the land use is indicative of the land ownership. The major land uses include agriculture, rangeland, urban, forest, recreation/special use, and water. The major Federal agencies controlling large land areas are the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM). The major state agencies controlling large areas of land are the Arizona Departments of Land and State Parks and Game and Fish. Native American Nations also own significant areas of land. Private and corporate use contains the urban areas and intensive specialized agriculture land, along with large areas of range. "Other" land ownership includes land controlled by other Federal agencies, such as, the National Park Service (NPS), Department of Defense (DoD), and U.S. Fish and Wildlife Service (USFWS), along with county and municipal lands.

3.1.1 Land Use in Cochise County

The total area of Cochise County is 6,170 square miles. The 1998 census estimated the population to be 123,750 with a population density of 20.1 per square mile (Arizona Department of Commerce 2000). The largest land use in the entire county is in the private and corporate ownership category (42%). The principal land use outside the urban areas is rangeland and agriculture (cotton, alfalfa, barley, corn, and vegetables). The Federal government controls approximately 841,000 acres (21%). The USFS controls approximately 490,000 acres (12%) of land in this county. The majority of the USFS land is the multiple-use Coronado National Forest. The USFWS controls the San Bernardino National Wildlife Refuge within Cochise County. The BLM controls approximately 350,000 acres (9%). The BLM land includes the Chiricahua National Monument and numerous multiple use areas used primarily for grazing. The State of Arizona controls approximately 1,368,000 acres (34%) which is used primarily for recreation, historical, and natural areas. The study area has three small to medium sized urban areas. According to the Arizona Department of Commerce (2000), the primary urban areas and their 1998 populations are: Douglas (15,150), Bisbee (county seat, 6,525), and Naco (759).

3.1.1.1 Land Use in the Naco Corridor

Land use within the Naco Corridor is mostly controlled by the private ownership category (54%) with 117,100 acres (Figure 3-1). This includes urban development within and near Naco and agriculture and rangeland outside of Naco. The second largest land use category is controlled by the State of Arizona (15%) with 32,900 acres. BLM controls 23,000 acres within the Naco Station with an additional 31,400 acres for the Coronado National Forest. The remaining land is used by Fort Huachuca Military Reservation (3%) and the Coronado National Memorial (2%).

3.1.1.2 Land Use in the Douglas Corridor

Land use within the Douglas corridor is mostly controlled by the private ownership category (65%) with 110,800 acres (Figure 3-2). This includes urban development within and near Douglas as well as agriculture and rangeland outside of Douglas. The State of Arizona controls the second largest amount of land (30%) with 51,400 acres. The BLM (7,500 acres) and the military (630 acres) control the remaining land.

3.1.2 Transportation

3.1.2.1 Roads

The highway system within the study area is well developed, especially the Interstate Highway System (Rand McNally 1997). Interstate 10 runs through Cochise County and continues west through the cities of Tucson and Phoenix. U.S. Highway 90 runs from Interstate 10, through Sierra Vista, into Bisbee. U.S. Highway 92 also runs from Sierra Vista to Bisbee, but takes a more southern route near Naco. U.S. Highway 80 runs from Interstate 10 (at Benson) to the New Mexico border, passing through Bisbee and Douglas. From Graham County (just above Cochise County), U.S. Highway 191 intersects Interstate 10 and runs south to Douglas. U.S. Highway 181 connects U.S. Highway 191 to the Chiricahua National Monument. U.S. Highway 186 also provides access to the Chiricahua National Monument via Interstate 10 at Willcox. Cochise County contains two legal POEs, one at Douglas and the other at Naco. The Naco-Douglas Corridor contains U.S. Highways 80 and 92 in the Naco portion (Figure 3-3) and U.S. Highways 80 and 191 in the Douglas portion (Figure 3-4).

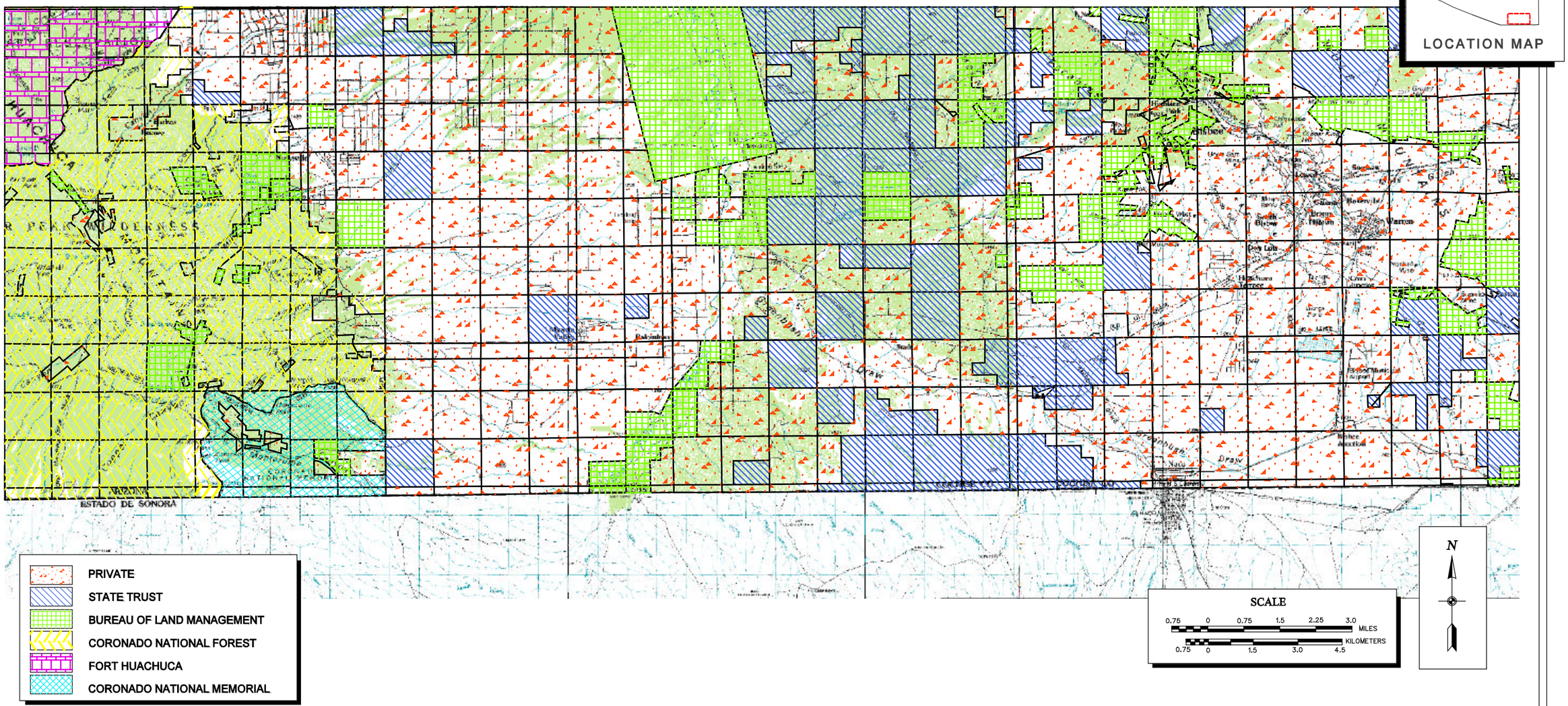


Figure 3-1: Naco Corridor Land Use

gsrc / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

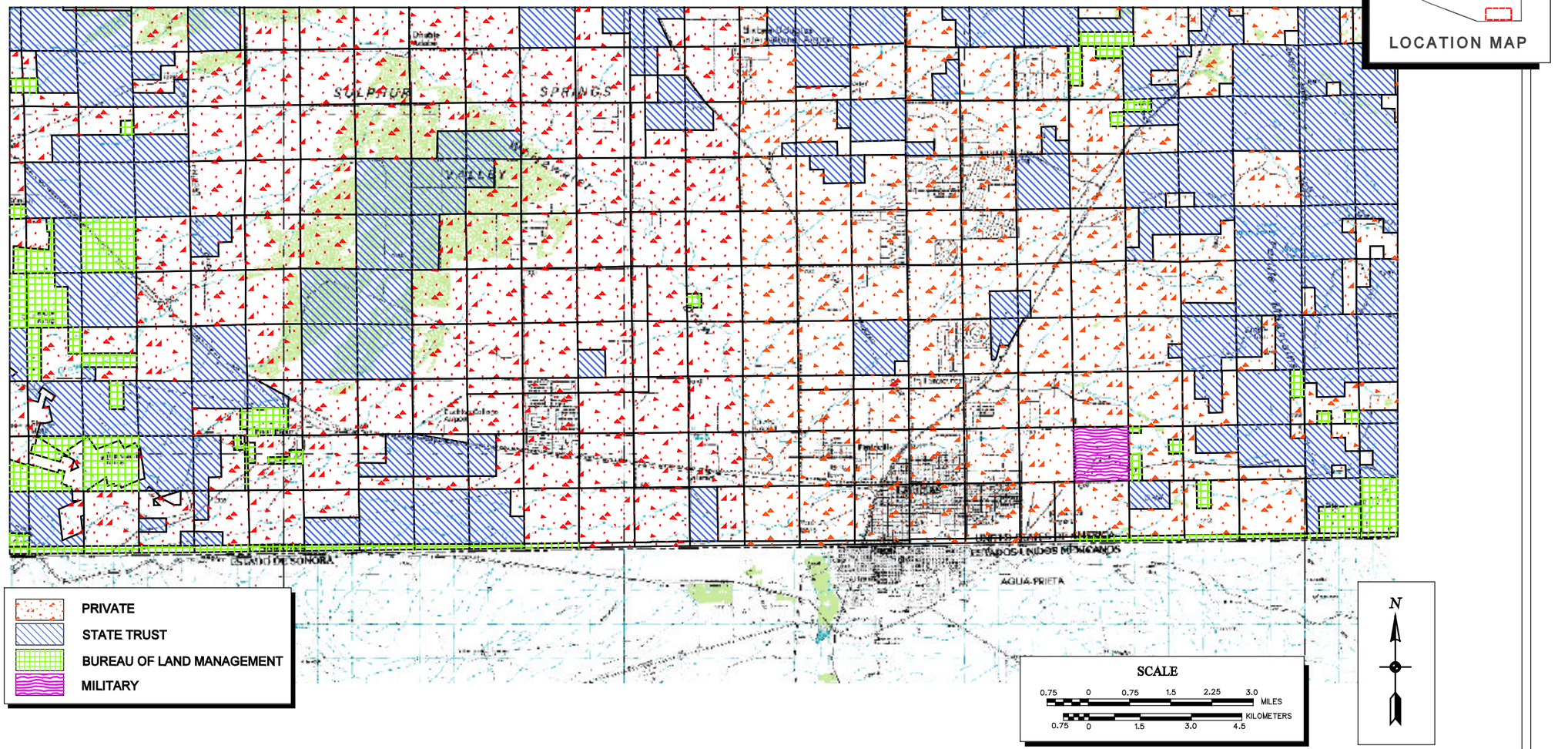


Figure 3-2: Douglas Corridor Land Use

gsrc GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

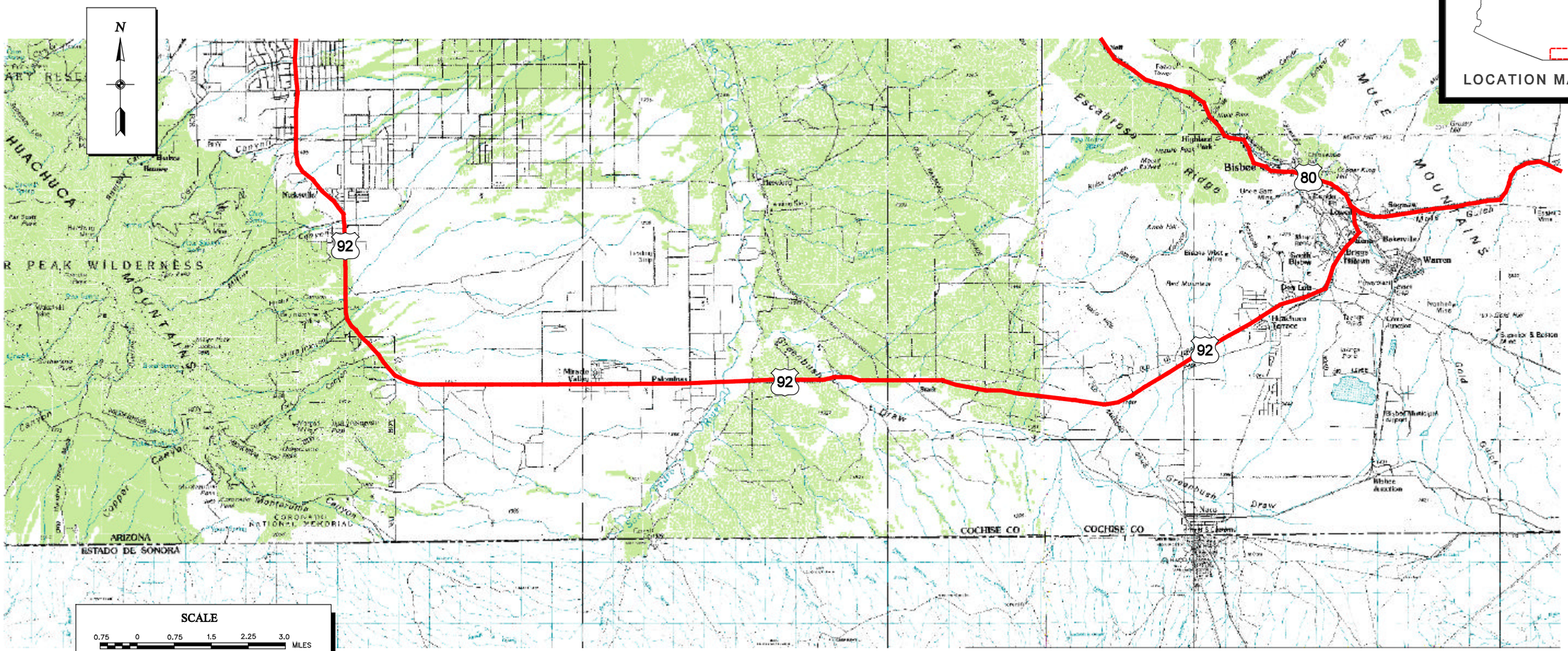


Figure 3-3: Naco Corridor Transportation Routes

GSRC / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

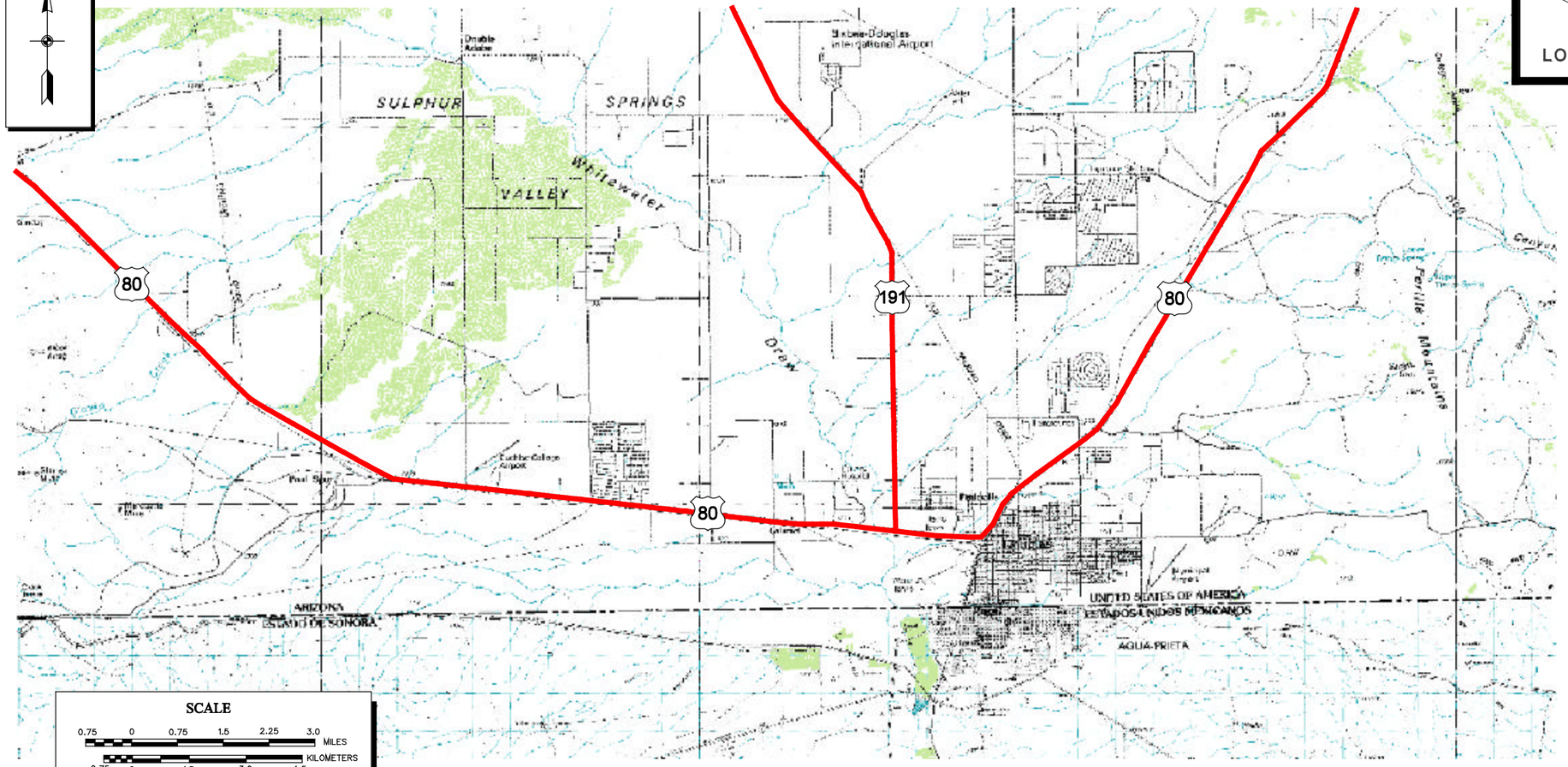


Figure 3-4: Douglas Corridor Transportation Routes

gsrc GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

3.1.2.2 Railroads

The Southern Pacific Railroad used to have operations in the area, but the company merged with Union Pacific Railroad in 1996 (Union Pacific 2000). There are currently no in-use rail lines that pass through the study area.

3.1.2.3 Airports

There are eight small commercial airports located within Cochise County (Table 3-1). Of these, four are in the study area. These small to medium sized airports do not conduct regularly scheduled commercial or commuter flights.

Table 3-1 Minor Commercial Airports in Cochise County.

Airport	Location
Benson Municipal Airport*	2 miles from Benson
Bisbee Municipal Airport	5 miles from Bisbee
Cochise College Airport	7 miles from Douglas
Cochise County Airport*	3 miles from Willcox
Douglas Municipal Airport	2 miles from Douglas
Douglas/Bisbee International Airport	8 miles from Douglas
Sierra Vista Municipal Airport*	3 miles from Sierra Vista
Thompson International Airport	1 mile from Hereford
Tombstone Municipal Airport*	3 miles from Tombstone

*Not located in study area

3.1.3 Mining Operations

Copper mining is an important industry in Arizona. In 1999, the Arizona copper industry used 187,900 acres of the state's more than 72,960,000 acres (Arizona Mining Association 2000). There are no mines presently being operated in Cochise County. However, Bisbee operates several tourist industries based on past mining in the area, such as Bisbee Mining and Historical Museum and Queen Mine Tours.

3.2 SOILS AND PRIME FARMLAND

3.2.1 Soils

Arizona has a diverse assortment of soil types throughout the state with variations in depth, texture, chemical properties and appropriate land uses. This diversity is directly related to regional differences in climate, parent material, topography and erosion actions. The predominant soil associations found along the border in Cochise County are described below as defined by Hendricks (1985).

3.2.1.1 Soil Associations within the Naco Corridor

The dominant soil associations in the Naco Corridor are the Casto-Martinez-Canelo Association, Lithic Haplustolls-Lithic Argiustolls-Rock Outcrop Association, Lithic Torriorthents-Lithic Argiustolls-Rock Outcrop Association, Nickel-Latene-Pinaleno Association, Tubac-Sonoita-Grabe Association, and White House-Bernardino-Hathaway Association (Figure 3-5).

The Casto-Martinez-Canelo Association is found in the southwestern part of the Naco Station. It consists of deep, well-drained deep gravelly sandy loams on slopes ranging from 1% on the top of mesas to 40% on the sides. These soils are located on the sides and tops of narrow ridges and mesas at elevations from 5,000 to 6,500 feet. The Lithic Haplustolls-Argiustolls-Rock Outcrop Association is found in the western and northeastern portion of the Naco Station extensively. It consists of well-drained, dark colored, shallow and very shallow, gravelly and cobbly, and gently sloping to very steep soils. These soils are located on rock outcrops, hills and mountains at elevations of approximately 7,046 feet. The Lithic-Torriorthents-Lithic Argiustolls-Rock Outcrop Association is found in the eastern portion of the Naco Station. It consists of very shallow and shallow, well drained soils formed in alluvium at elevations from 3,200 to 5,000 feet. The Nickel-Latene-Cave Association is found in the central portion of the Naco Station is fairly extensive. It consists of well-drained, deep and shallow, limy and gravelly, and nearly level to very steep soils on dissected old alluvial fans and terrace escarpments. These soils are primarily located along the San Pedro River and San Simon Creek at elevations of 2,409 to 5,016 feet. The Tubac-Sonoita-Grabe Association is found in the north-central and northeastern area of the Naco Station. It consists of very deep, well-drained soils that formed in alluvium. It is found on flood plains and fan

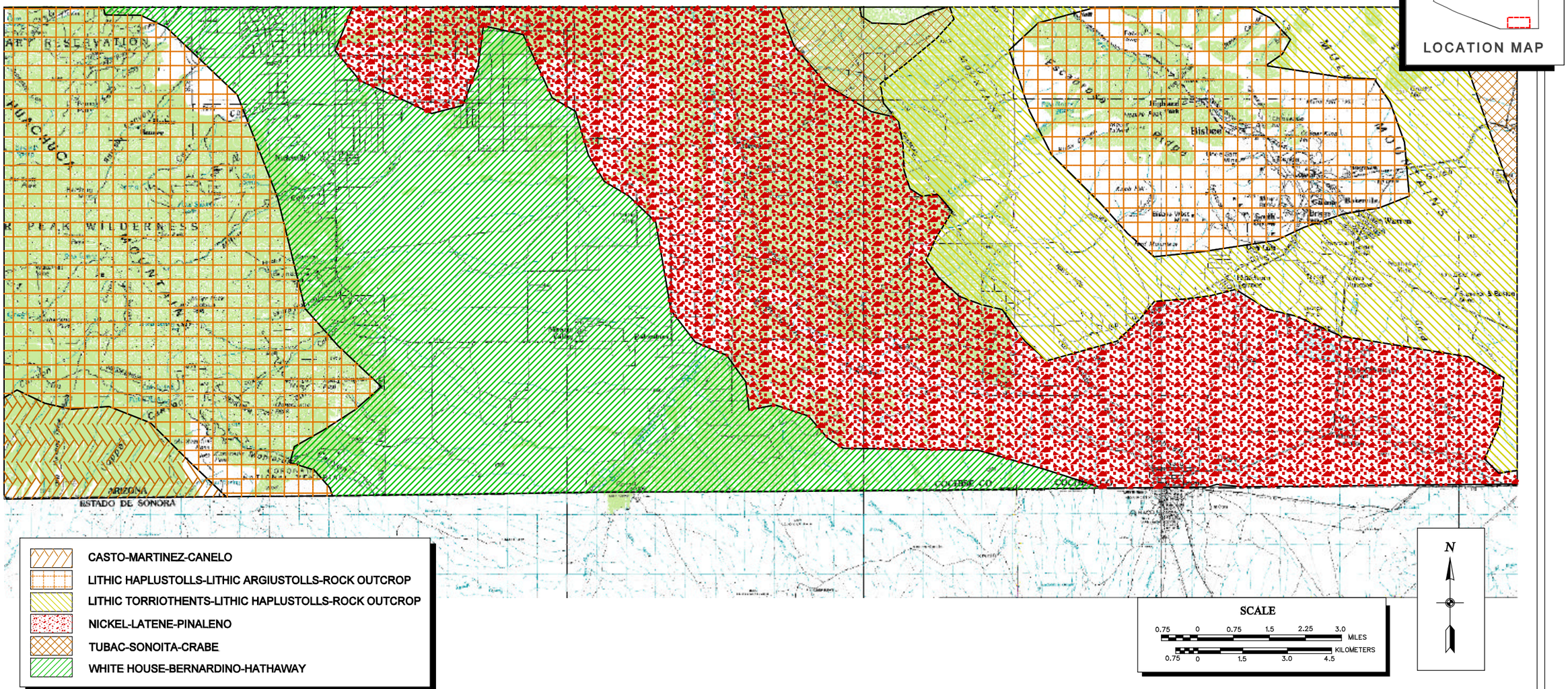


Figure 3-5: Naco Corridor Soils

GSRC / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

terraces at slopes of zero to 20% at elevations from 2,000 to 5,500 feet. The White House-Bernardino-Hathaway Association is extensively found in the central portion of the Naco Station. It consists of very deep, well-drained soils that formed in fan alluvium. It is deep gravelly clay loams found on fans or piedmont plains with slopes ranging from zero to 45%. Elevation ranges from 3,300 to 5,400 feet. The Bonita-Graham-Rimrock Association consists of well-drained, shallow to deep, and nearly level to steep soil. These soils are found on plains, hills and meadows in the southeast and south-central portions of Cochise County at elevations of 990 to 1,650 feet.

3.2.1.2 Soil Associations within the Douglas Corridor

The dominant soil associations in the Douglas Station are the Bonita-Graham-Rimrock Association, Karro-Gothard Association, Lithic Torriorthents-Lithic Haplustolls-Rock Outcrop Association, Nickel-Latene-Cave Association, and Tubac-Sonoita-Grabe Association (Figure 3-6).

The Bonita-Graham-Rimrock Association is found in the north central portion of the Douglas Station. It consists of well-drained, shallow to deep, and nearly level to steep soil. These soils are found on plains, hills and at elevations of 990 to 1,650 feet. The Karro-Gothard Association is found in the north central portion of the Douglas Station and is not very extensive. It consists of very deep, well drained soils that formed in mixed fan alluvium at elevations of 3,600 to 4,800 feet. The Lithic Torriorthents-Lithic Haplustolls-Rock Outcrop Association is found in the eastern and western edges of the Douglas Station. It consists of very shallow and shallow, well drained soils formed in alluvium at elevations from 3,200 to 5,000 feet. The Nickel-Latene-Cave Association is found on the very edge of the southwestern portion of the Douglas Station. This association is also found in the Naco Station. It consists of well-drained, deep and shallow, limy and gravelly, and nearly level to very steep soils on dissected old alluvial fans and terrace escarpments at elevations of 2,409 to 5,016 feet. The Tubac-Sonoita-Grabe Association is found throughout the Douglas Station and is also extensive in the Naco Station. It consists of very deep, well drained soils that formed in alluvium. It is found on flood plains and fan terraces at slopes of 0 to 20% at elevations from 2,000 to 5,500 feet.

(This page left intentionally blank)

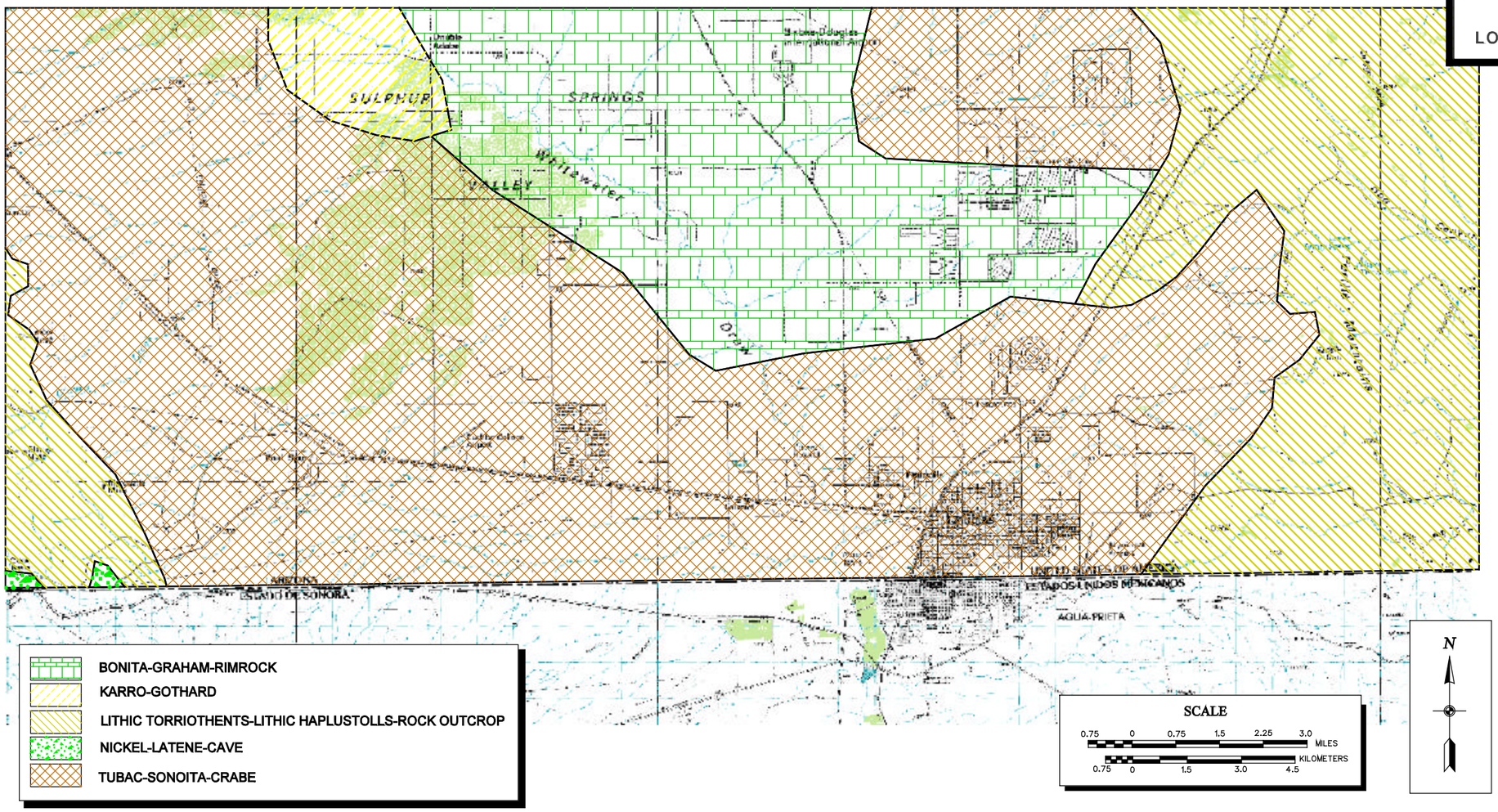


Figure 3-6: Douglas Corridor Soils

gsrc GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

3.2.1.3 Hydric Soils

There are no hydric soils located within the study area (Wilson 2000; Bemis 2000).

3.2.1.4 Prime Farmland

There are no unique farmlands located within the study area. Prime farmlands are classified as Category 1 soils that occur mainly within the San Pedro valley. These soils are not considered unique because they require irrigation to be arable (Bemis 2000).

3.3 VEGETATION

3.3.1 Apachian Biotic Province

The Apachian biotic province runs west from the New Mexico-Arizona state line through a large portion of Cochise County, Santa Cruz County, and parts of Pima County (Dice 1943). The province covers the grassy high plains and mountains of southeastern Arizona and consists of plant species adapted to semiarid conditions. There are six major vegetation communities in Arizona; however, only four (i.e., forest, woodland, grassland, and desert scrub) are located within Cochise County (Brown 1982; Brown and Lowe 1983) (Figures 3-7 and 3-8).

3.3.1.1 Grassland

Grasslands encompass the greatest portion (approximately 60%) of the total project area (Table 3-2). The grassland community of this province consists of the Semi-desert Grassland and the Plains Grassland. The Semi-desert Grassland is found in the valley areas of Cochise and eastern Pima counties. This vegetation is dominated by grama grasses (*Bouteloua* spp.), tobosa grass (*Hilaria mutica*), curly mesquite (*Hilaria belangeri*), sacaton (*Sporobolus wrightii*), and scrub-shrubs such as honey mesquite (*Prosopis glandulosa*), one-seed juniper (*Juniperus monosperma*), littleleaf sumac (*Rhus microphylla*), and desert hackberry (*Celtis pallida*).

(This page left intentionally blank)

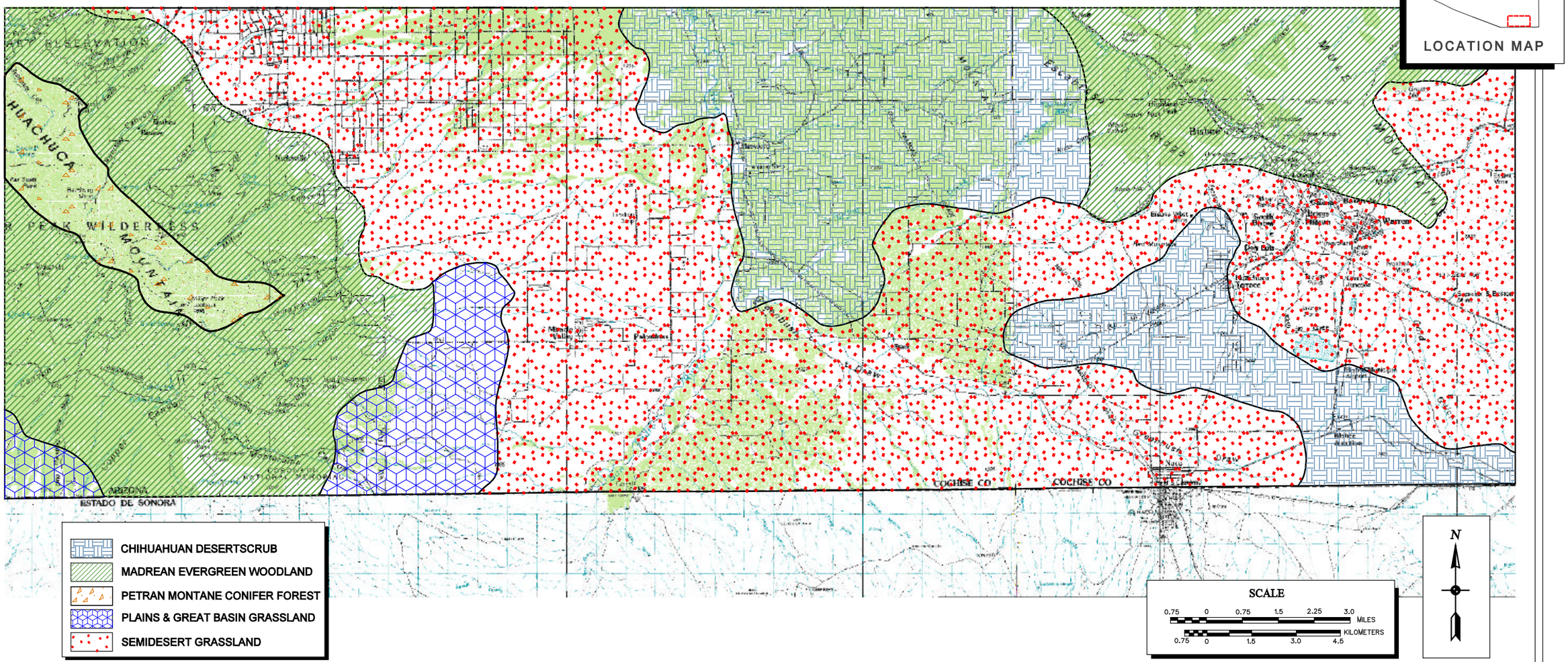


Figure 3-7: Naco Corridor Natural Vegetation

gsrc GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

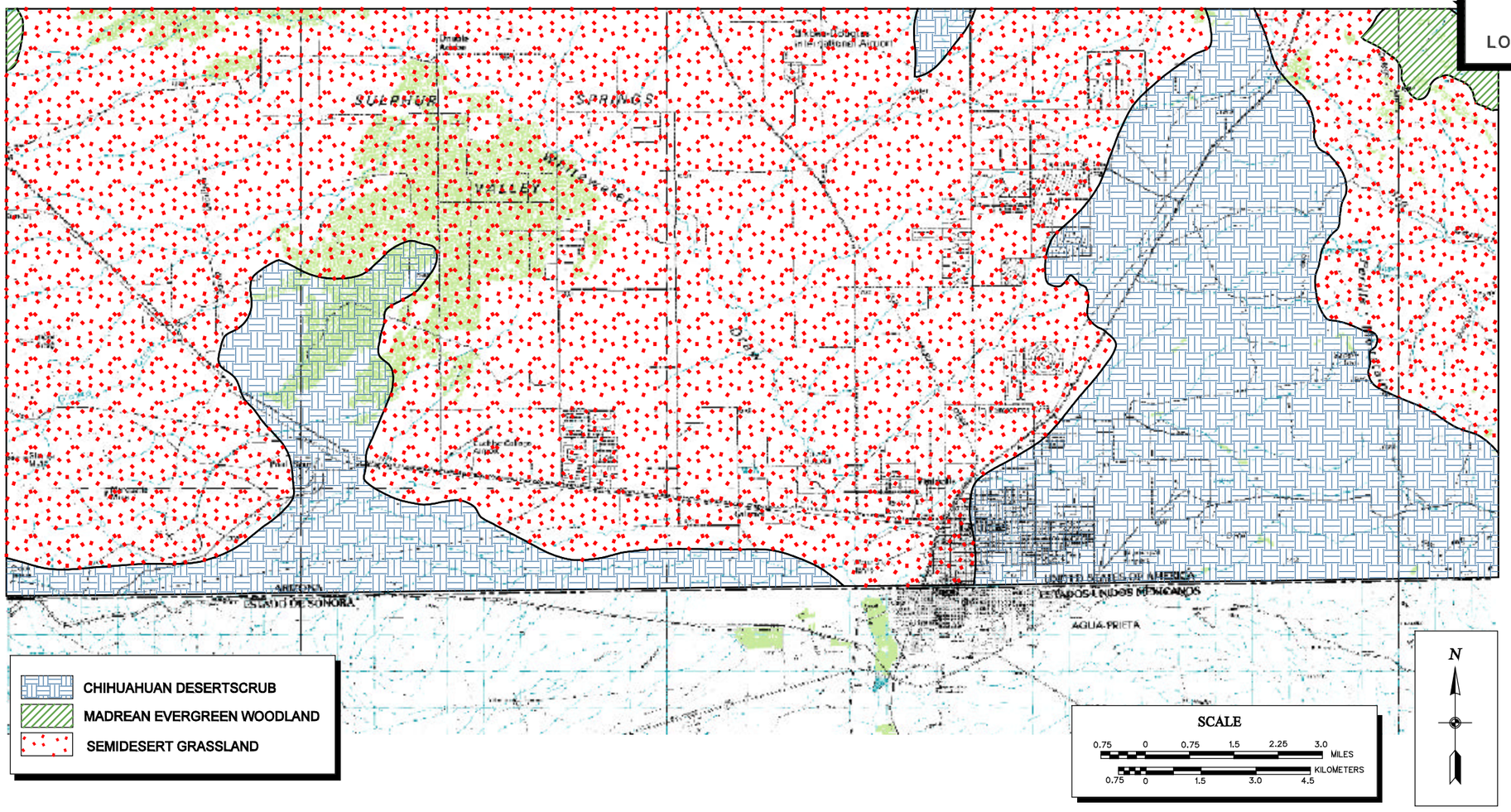


Figure 3-8: Douglas Corridor Natural Vegetation

GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

Table 3-2
Percentage of Vegetation Community Type within the Project Corridor

Vegetation Community Type	Douglas (acres)	Naco (acres)	Combined (acres)	Percent
Semi-desert Grassland	112,663	95,515	208,178	57
Chihuahuan Desert Scrub	45,399	39,679	85,078	23
Madrean Evergreen Woodland	1,754	54,387	56,141	15
Plains & Great Basin Grassland	0	9,139	9,139	3
Petran Montane Conifer Forest	0	6,598	6,598	2

The Plains Grassland community is located between 4,000 and 7,500 feet in elevation. Dominant species include grama grasses, buffalo grass (*Buchloe dactyloides*), Indian rice grass (*Oryzopsis hymenoides)*, galleta grass (*Hilaria jamesii*), prairie junegrass (*Koeleria cristata*), plains lovegrass (*Eragrostis intermedia*), vine mesquite (*Panicum obtusum*), wolftail (*Lycurus phleoides*), and alkali sacaton (*Sporobolus airoides*). Shrubs such as four-wing saltbush (*Atriplex canescens*), sagebrush (*Artemisia* sp.), and snakeweed (*Gutierrezia* spp.) are often scattered throughout.

3.3.1.2 Desert Scrub

The Desert Scrub community encompasses approximately 23% of the total project area (see Table 3-2). Chihuahuan desert scrub comprises the vast majority of the habitat within the project area. In Arizona, it is present only in Cochise and eastern Pima counties.

Dominant species include creosote bush (*Larrea tridentata*), tarbush (*Flourensia cernua*), whitethorn acacia (*Acacia neovernicosa*), ocotillo (*Fouquieria splendens*), and honey mesquite.

3.3.1.3 Woodland

The only woodland vegetation in the study area is the Madrean Evergreen Woodland. This community encompasses approximately 15% of the total project area (see Table 3-2). It is a warm-temperate woodland found throughout the mountains of Cochise and eastern Pima counties starting at an elevation of 1,200 feet. This community includes dominant tree species such as alligator juniper (*Juniperus deppeana*), one-seed juniper, Mexican pinyon pine (*Pinus cembroides*), Chihuahua pine (*Pinus leiophylla* var. *chihuahuana*), Apache pine *(Pinus engelmannii*), Arizona white oak (*Quercus arizonica*), and Mexican blue oak (*Quercus oblongifolia*).

3.3.1.4 Forest

The forest community of this province consists of the Petran Subalpine Conifer Forest and the Petran Montane Conifer Forest. This community type encompasses approximately 2% of the total project area (see Table 3-2). The Petran Subalpine Conifer Forest is a boreal forest found only in Cochise County in the Chiricahua Mountains at elevations above 2,450 feet. It consists of Engelmann spruce (*Picea engelmannii*)/alpine fir (*Abies lasiocarpa*) series and bristle-cone pine (*Pinus aristata*)/limber pine (*Pinus flexilis*) series. The Petran Montane Conifer Forest is a cold-temperate forest and occurs in Cochise County in the Chiricahua Mountains between 2,300 and 3,000 feet in elevation. The major tree series are Douglas fir (*Pseudotsuga menziesii*)/white fir (*Abies concolor*) series, pine series (*Pinus* spp.), and Gambel oak (*Quercus gambelii*) series.

3.4 WILDLIFE COMMUNITIES

Arizona contains an enormous diversity of environments for wildlife (751 vertebrate species) ranging from hot, dry deserts at low elevations through rich upland deserts, grasslands, and woodlands at mid-elevations to cold, moist montane/alpine habitats. The distribution of these environments is controlled generally by climatic conditions as well as locally, by topographic factors. Physiographic features such as scarps, plateaus, plains, mountains, and drainage systems along with soil types and pedogenic and biotic elements influence wildlife distribution (Hendrickson and McKinley 1984).

3.4.1 Terrestrial Communities

The native faunal components of southeastern Arizona, to include Cochise County, include 370 species of birds. The bird population is dominated by sparrows and towhees (35 species); wood warblers (32 species); swans, geese, and ducks (31 species); tyrant flycatchers (30 species); and sandpipers and phalaropes (26 species). The majority of these bird species occur in spring and fall when neotropical migrants (e.g., flycatchers and warblers) pass through on their way to summer breeding or wintering grounds and in the winter when summer resident birds (i.e., robins, kinglets, and sparrows) from the north arrive to spend the winter. The majority of the 109 mammalian species found in the area are bats and rodents (i.e., mice and rats, squirrels) with rodents (e.g., pocket mice and kangaroo rats) being the most commonly encountered mammals. Of the 23 amphibian

species which inhabit southeastern Arizona, spadefoot toads and true toads are dominant and the most widespread. A total of 72 species of reptiles can be found in the area with the iguanid lizards and colubrid snakes being the most prevalent along with whiptails. The types of wildlife commonly occurring in Cochise County are listed in Appendix A (Lowe 1964; Hoffmeister 1986; Lane 1988; USDOI 1989; USACE 1990; Davis and Russell 1991; Lowe and Holm 1992).

3.4.2 Aquatic Communities

Distribution patterns of freshwater fish in Arizona are controlled by climatic and geological factors. The San Pedro River is the only major body of water flowing through Cochise County. Historically, 13 native species of fish were present in the San Pedro River (Table 3-3). Of these species, only two remain in the streams, the longfin dace and desert sucker. Most of the fish (14 species) present in the San Pedro River system are non-native species.

Table 3-3
Fish Fauna of the San Pedro River, Cochise County, Arizona

Native Fish	Scientific Name	Non-Native Fish	Scientific Name
Colorado River squawfish	*Ptychocheilus lucius*	black bullhead	*Ameiurus melas*
desert pupfish	*Cyprinodon macularius*	bluegill	*Lepomis macrochirus*
desert sucker	*Catostomus clarki*	brook trout	*Salvelinus fontinalis*
flannel-mouth sucker	*Catostomus latipinnis*	channel catfish	*Ictalurus punctatus*
Gila chub	*Gila intermedia*	common carp	*Cyprinus carpio*
Gila topminnow	*Poeciliopsis occidentalis*	fathead minnow	*Pimephales promelas*
loach minnow	*Rhinichthys cobitis*	goldfish	*Carassius auratus*
longfin dace	*Agosia chrysogaster*	green sunfish	*Lepomis cyanellus*
razorback sucker	*Xyrauchen texanus*	largemouth bass	*Miropterus salmoides*
roundtail chub	*Gila robusta*	mosquitofish	*Gambusia affinis*
speckled dace	*Rhinichthys osculus*	rainbow trout	*Oncorhynchus mykiss*
spikedace	*Meda fulgida*	red shinner	*Cyprinella lutrensis*
Sonoran sucker	*Catostomus insignis*	threadfin shad	*Dorosoma petenense*
		yellow bullhead	*Ameiurus natalis*

Source: USDOI 1986.

3.5 UNIQUE OR SENSITIVE AREAS

Many unique natural areas that are found in relatively few places worldwide characterize the project region. Southeastern Arizona is an ecological crossroads, where habitats and species from the Sierra Madre of Mexico, the Rocky Mountains, and the Sonoran and Chihuahuan deserts converge. Ongoing efforts by many government agencies, as well as private entities, have set aside these areas (Figure 3-9) for preservation. These areas are intended for use by the public in hopes of better understanding of the myriad natural systems exhibited in their natural and near pristine state. Riparian (riverbank) areas, basin wetlands, scenic canyons, and vast wilderness represent these unique areas. Management of these areas is as diverse as the natural settings they display. The following section will describe some of the major sensitive areas and when applicable, management plans proposed by the respective agencies for future enhancement.

3.5.1 Miller Peak Wilderness Area

The centerpiece of this wilderness area of 20,190 acres is Miller Peak, reaching 9,466 feet at its summit. Cliffs many hundreds of feet high, overlooking panoramas that have been considered some of the best in the American southwest characterize the natural beauty encompassed by this area. This wilderness area was established in 1984 as a preserve of the Huachuca Mountains within the Coronado National Forest. Trails have been established to provide the public access to most of the areas finest vistas. Birding has become one of the leading attractions in the area due to the presence of over 170 bird species, which includes 14 species of hummingbirds. More than 60 species of reptiles and 78 species of mammals are found here as well (GORP 2000a).

3.5.2 Ramsey Canyon Preserve

Official designation of this unique area came in 1965, when Ramsey Canyon was registered as the first National Natural Landmark. The preserve encompasses 380 acres within the Huachuca Mountains, as part of the Coronado National Forest. The region is unique to the southwest as the abrupt rise of these mountains creates 11 “sky

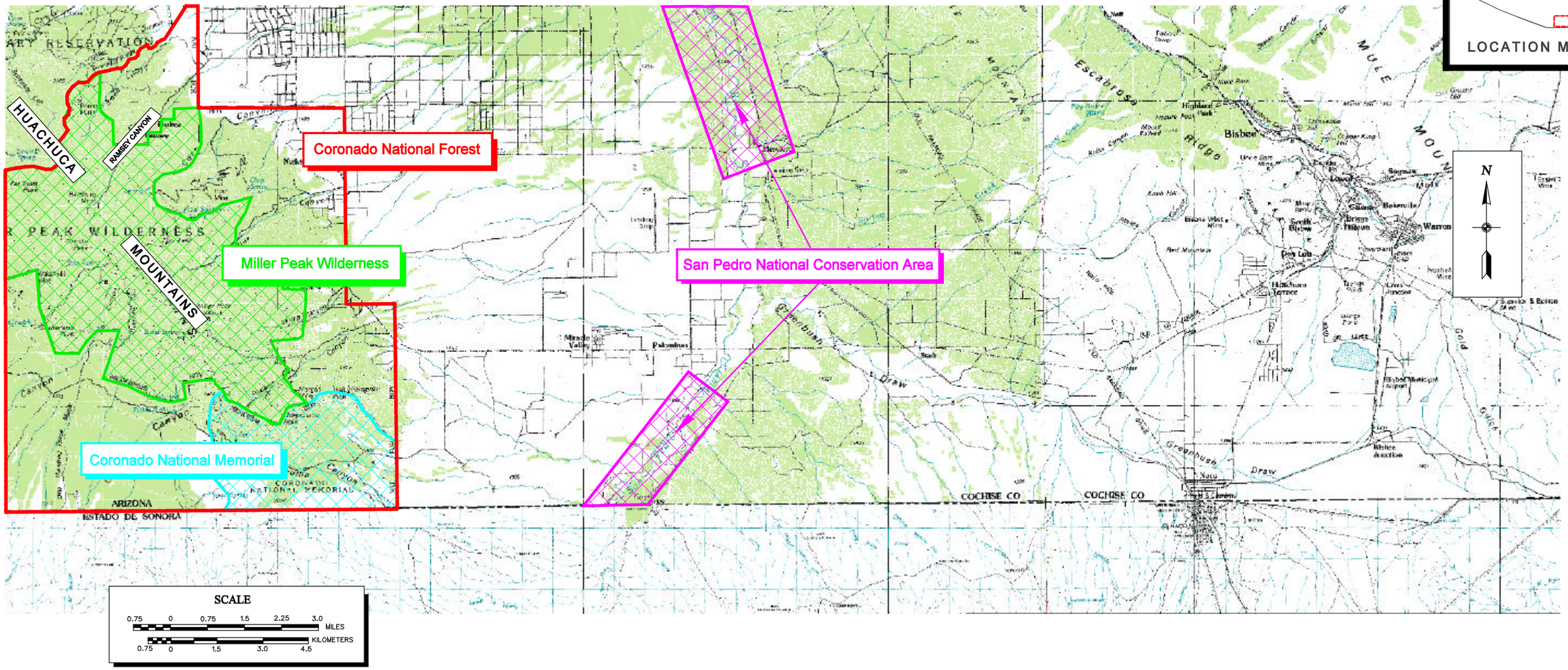


Figure 3-9: Ecological Sensitive and Unique Areas

gsrc / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

islands" harboring rare species and extraordinary habitats linked to the existence of equally rare plants and animals. A spring-fed stream which flows year-round, a favorable northeast orientation, and high canyon walls provide Ramsey Canyon with a moist, cool, and stable environment found in very few places in arid regions such as this. The canyon preserve is home to more than 400 species of plants, ranging from small mosses to towering firs. Elevations range from 5500 feet to 6300 feet (TNC 2000).

The Nature Conservancy (TNC) is the primary steward of this unique area, and as such, has taken on many responsibilities in preserving species present. One such species, the Ramsey Canyon leopard frog (*Rana subaquavocalis*) is in danger of becoming extinct. The species was only described in 1993 with a population of approximately 100 individuals. Less than 20 were known to exist in the wild by 1999. Captive rearing has been the only action capable of insuring the species' survival, and is seen as the most important management measure to insure future self-sustaining populations.

The Ramsey Canyon Leopard Frog Conservation Team was conceived to implement certain objectives and strategies contained within a conservation agreement developed in 1996. Signatories to this agreement include the USFS (Coronado National Forest), a local private rancher, TNC, USFWS, Fort Huachuca Army Post, Arizona Department of Fish and Game (ADFG), and BLM. The primary goal of the conservation agreement is to recover the species. Another goal is to keep the species from being Federally listed as threatened or endangered.

One of the management strategies identified in the conservation agreement was supplementation of existing populations and re-establishment at historic sites. Captive reared frogs would be used in this instance. The seriousness of the Ramsey Canyon leopard frog's plight is obvious in the fact that by 1999, only one breeding population was identified. This lone breeding pond has been the source of eggs for all conservation activities in recent years. This situation, along with the fact that although over 5,000 captive-reared frogs have been released in Ramsey Canyon in both 1995 and 1997, Miller Canyon in 1999, and Garden Canyon in 1996, gives testimony to the need of a more aggressive management plan.

In order to supplement the existing conservation agreement, and provide the best possible chances for the future survival of the Ramsey Canyon leopard frog, the ADFG has proposed a plan in which captive reared frogs will be released into the wilds in specific sites within the eastern regions of the Huachuca Mountains. The goal is to expedite self-sustaining populations in multiple sites. These actions will be used to supplement existing populations and re-establish others on lands managed by the USFS, Fort Huachuca, and willing private landowners. In some instances, slight modifications or construction efforts to sites will be made in order to increase habitat requirements. These actions will be processed and cleared environmentally by the ADFG or the appropriate agency (ADFG 2000).

3.5.3 San Pedro Riparian National Conservation Area

This conservation area encompasses over 56,500 acres of riparian habitat, which serves as the link between a perennial supply of water, and the terrestrial habitats of an astounding amount of species in the San Pedro River Basin. Over 40 miles of this riparian habitat has been set aside by BLM to preserve the last remnants of desert riparian ecosystem which was once quite vast in the southwest (GORP 2000b). In fact, the San Pedro River is one of the last free-flowing rivers in the southwest, and has the most extensive and ecologically valuable riparian ecosystems remaining. The diversity of birds, mammals, and reptiles along the San Pedro River is unequalled in the US, and therefore, TNC (2000) has named the river as one of the “Last Great Places” in the western hemisphere.

The San Pedro National Conservation Area (NCA) is under the management of the BLM, and the principal concern is to protect and enhance the riparian ecosystem along the San Pedro River. Protection and/or enhancement of wildlife, cultural, paleontological, vegetation and water resources are emphasized. Public use is allowed where natural resources are not significantly impacted.

The biological diversity in this NCA is vast, and is therefore its most important aspect. Studies have shown that half of the known breeding species within North America have been recorded at the San Pedro NCA. The NCA also supports over 350 species of birds, 80 species of mammals, and 40 species of amphibians and reptiles (GORP 2000b).

3.5.4 Coronado National Monument

This 4,976-acre national park commemorates the entry of the Spanish explorer Don Francisco Vasques de Coronado to southern Arizona from Mexico in 1540. His fabled expedition was an effort to explore the southwest, but more importantly, to discover the infamous Seven Golden Cities of Cibola. The park area offers several hiking trails with various levels of difficulty to accommodate any hiker. Visitors to the park are, however, afforded opportunities of sweeping views from atop 6,757-foot Montezuma Pass. This vista provides spectacular views of both the San Pedro River Valley and the San Rafael Valley. In addition, the 780-mile Arizona Trail, which bisects the entire state, south to north, begins here. Coronado Cave offers a rare chance to explore the subterranean expanses of the area as well (Coronado National Monument 2000).

3.6 PROTECTED SPECIES AND CRITICAL HABITATS

The Endangered Species Act (ESA) [16 U.S.C. 1531 et. seq.] of 1973, as amended, was enacted to provide a program for the preservation of endangered and threatened species and to provide protection for the ecosystems upon which these species depend for their survival. All Federal agencies are required to implement protection programs for designated species and to use their authorities to further the purposes of the act. Responsibility for the identification of a threatened or endangered species and development of any potential recovery plan lies with the Secretary of the Interior and the Secretary of Commerce.

The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) are the primary agencies responsible for implementing the ESA. The USFWS is responsible for birds and terrestrial and freshwater species, while the NMFS is responsible non-bird marine species. The USFWS responsibilities under the ESA include: (1) the identification of threatened and endangered species; (2) the identification of critical habitats for listed species; (3) implementation of research on, and recovery efforts for, these species; and (4) consultation with other Federal agencies concerning measures to avoid harm to listed species.

An endangered species is a species in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Proposed species are those which have been formally submitted to Congress for official listing as threatened or endangered. Species may be considered endangered or threatened when any of the five following criteria occurs: (1) The current/imminent destruction, modification, or curtailment of their habitat or range; (2) Overuse of the species for commercial, recreational, scientific, or educational purposes; (3) Disease or predation; (4) The inadequacy of existing regulatory mechanisms; and (5) Other natural or human-induced factors affect continued existence.

In addition, the USFWS has identified species that are candidates for listing as a result of identified threats to their continued existence. The candidate (C) designation includes those species for which the USFWS has sufficient information on hand to support proposals to list as endangered or threatened under ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.

The ESA also calls for the conservation of what is termed Critical Habitat - the areas of land, water, and air space that an endangered species needs for survival. Critical habitat also includes such things as food and water, breeding sites, cover or shelter, and sufficient habitat area to provide for normal population growth and behavior. One of the primary threats to many species is the destruction or modification of essential habitat by uncontrolled land and water development.

3.6.1 Federal

A total of 23 Federally endangered, threatened, proposed threatened, and candidate species occur within Cochise County, Arizona (USFWS 2000; ADFG 2000). A total of 12 species are listed as endangered, seven as threatened, one as proposed threatened, and three as candidate. Information pertaining to these Federally protected species is included in Table 3-4.

Table 3-4
Federally Listed, Proposed, and Candidate Species Potentially Occurring within Cochise County

Common/Scientific Name	Status	Date Listed	Designated Critical Habitat	Habitat Requirements
FISHES				
Beautiful shiner *Cyprinella formosa*	T	8/31/84	50 CFR 17.95(e)	Deep pools in creeks, scoured areas of cienegas, and other stream-associated quiet waters
Gila chub *Gila intermedia*	C	NA	NA	Pools, springs, cienegas, and streams
Gila topminnow *Poeciliopsis occidentalis occidentalis*	E	3/11/67	NA	Streams, springs, and cienegas between 4,000 - 5,000 feet elevation, primarily in shallow areas
Loach minnow *Tiaroga cobitis*	T	10/28/86	50 CFR 17.95(e)	Lower San Pedro River has been designated as critical habitat by USFWS
Spikedace *Meda fulgida*	T	7/1/86	50 CFR 17.95(e)	Lower San Pedro River has been designated as critical habitat by USFWS
Yaqui catfish *Ictalurus pricei*	T	8/31/84	50 CFR 17.95(e)	Moderate to large streams with slow current over sand and rock bottoms
Yaqui chub *Gila purpurea*	E	8/31/84	50 CFR 17.95(e)	Deep pools of small streams, pools, or ponds near undercut banks
Yaqui topminnow *Poeciliopsis occidentalis sonoriensis*	E	3/11/67	NA	Vegetated springs, brooks, and margins of backwaters. Found generally in the shallows
REPTILES				
New Mexico ridge-nosed rattlesnake *Crotalus willardi obscurus*	T	4/4/78	50 CFR 17.95(c)	Presumably canyon bottoms in pine-oak and pin-fir communities

Legend:
E= Endangered
T= Threatened
P= Proposed Endangered or Threatened
C= Candidate
NA= Not Applicable

Sources: USFWS 2000; AGFD 2000

Table 3-4
Federally Listed, Proposed, and Candidate Species Potentially Occurring within Cochise County

PLANTS				
Canelo Hills ladies' tresses *Spiranthes delitescens*	E	1/6/97	NA	Finely grained, highly organic, saturated soils of cienegas
Cochise pincushion cactus *Coryphantha robbinsorum*	T	1/9/86	NA	Semidesert grassland with small shrubs, agave, other cacti, and grama grass
Huachuca water umbel *Lilaeopsis schaffneriana* var. *recurva*	E	1/6/97	50 CFR 17.96(a)	Cienegas, perennial low gradient streams, wetlands
Lemmon fleabane *Erigeron lemmonii*	C	NA	NA	Crevices, ledges, and boulders in canyon bottoms in pine-oak woodlands
BIRDS				
Mexican spotted owl *Strix occidentalis lucida*	T	3/15/93	NA	Old growth forest associated with steep canyons
Northern aplomado falcon *Falco femoralis septentrionalis*	E	1/25/86	NA	Desert grasslands
Southwestern willow flycatcher *Empidonax traillii extimus*	E	2/27/95	50 CFR 17.95(b)	Dense riparian vegetation
INVERTEBRATES				
Huachuca springsnail *Pyrgulopsis thompsoni*	C	NA	NA	Aquatic areas, small springs with vegetation slow to moderate flow

Legend:
E= Endangered
T= Threatened
P= Proposed Endangered or Threatened
C= Candidate
NA= Not Applicable

Sources: USFWS 2000; AGFD 2000

Table 3-4
Federally Listed, Proposed, and Candidate Species Potentially Occurring within Cochise County

MAMMALS				
Jaguar *Panthera onca*	E	7/22/97	NA	Variety of habitats including lowland wet habitats and typically swampy savannas
Jaguarundi *Felis yagouaroundi cacomitli*	E	6/14/76	NA	Dense thorny thickets of mesquite and acacia
Lesser long-nosed bat *Leptonycteris curasoae yerbabuenae*	E	9/30/88	NA	Desert scrub habitat with agave and columnar cacti present as food plants
Ocelot *Felis pardalis*	E	7/21/82	NA	Humid tropical and sub-tropical forests, savannas, and semi-arid thornscrub
AMPHIBIANS				
Chiricahua leopard frog *Rana chiricahuensis*	PT	NA	NA	Streams, rivers, backwaters, ponds, and stock tanks
Sonora tiger salamander *Ambystoma tigrinum stebbinsi*	E	1/6/97	NA	Stock tanks and impounded cienegas in San Rafael Valley, Huachuca Mountains

Legend:
E= Endangered
T= Threatened
P= Proposed Endangered or Threatened
C= Candidate
NA= Not Applicable

Sources: USFWS 2000; ADFG 2000

(This page left intentionally blank)

Protected species in the project area are generally concentrated near the San Pedro River and the Huachuca Mountains (Figure 3-10). The loach minnow, spikedace, Huachuca water umbel, and southwestern willow flycatcher have all been documented in or near the San Pedro River area. The Gila chub has not been documented, but is likely to occur, in the San Pedro River. Additionally, the densely vegetated riparian areas associated with the San Pedro River are preferred habitats for the jaguarundi and ocelot. The lesser long-nosed bat, lemon fleabane, Sonoran tiger salamander, and Mexican spotted owl have all been documented within the Huachuca Mountains.

The U.S. Forest Service (USFS) and the U.S. Bureau of Land Management (BLM) both maintain a list of Sensitive (S) species located in the National Forests or on the BLM lands of Arizona. A list of USFS and BLM sensitive species is presented in the AGFD letter included in the Appendix B.

3.6.1.1 Critical Habitat

Critical habitat has been designated for eight species identified as potentially occurring in Cochise County, Arizona (USFWS 2000; ADFG 2000). Although critical habitat has been designated for the New Mexico ridge-nosed rattlesnake, Yaqui chub, Yaqui catfish, and beautiful shiner, none of their designated critical habitats are present within the project area. The remaining four species with designated critical habitat includes two fish, one bird, and one plant.

The USFWS has designated seven areas (complexes) as critical habitat for the spikedace and loach minnow in Arizona and New Mexico [50 CFR 17.95(e)]. Of these, only Complex 5, is located within the project area. Complex 5 includes that portion of the San Pedro River beginning at the U.S. border with Mexico and extending upstream approximately 37.2 miles (Figure 3-11).

Seven areas in Arizona have been designated as critical habitat for the southwestern willow flycatcher [50 CFR 17.95(b)]. Only a portion of Area 1 is located within the project area and includes reaches of the San Pedro River from the Hereford Bridge upstream to the project area boundary (Figure 3-11).

(This page left intentionally blank)

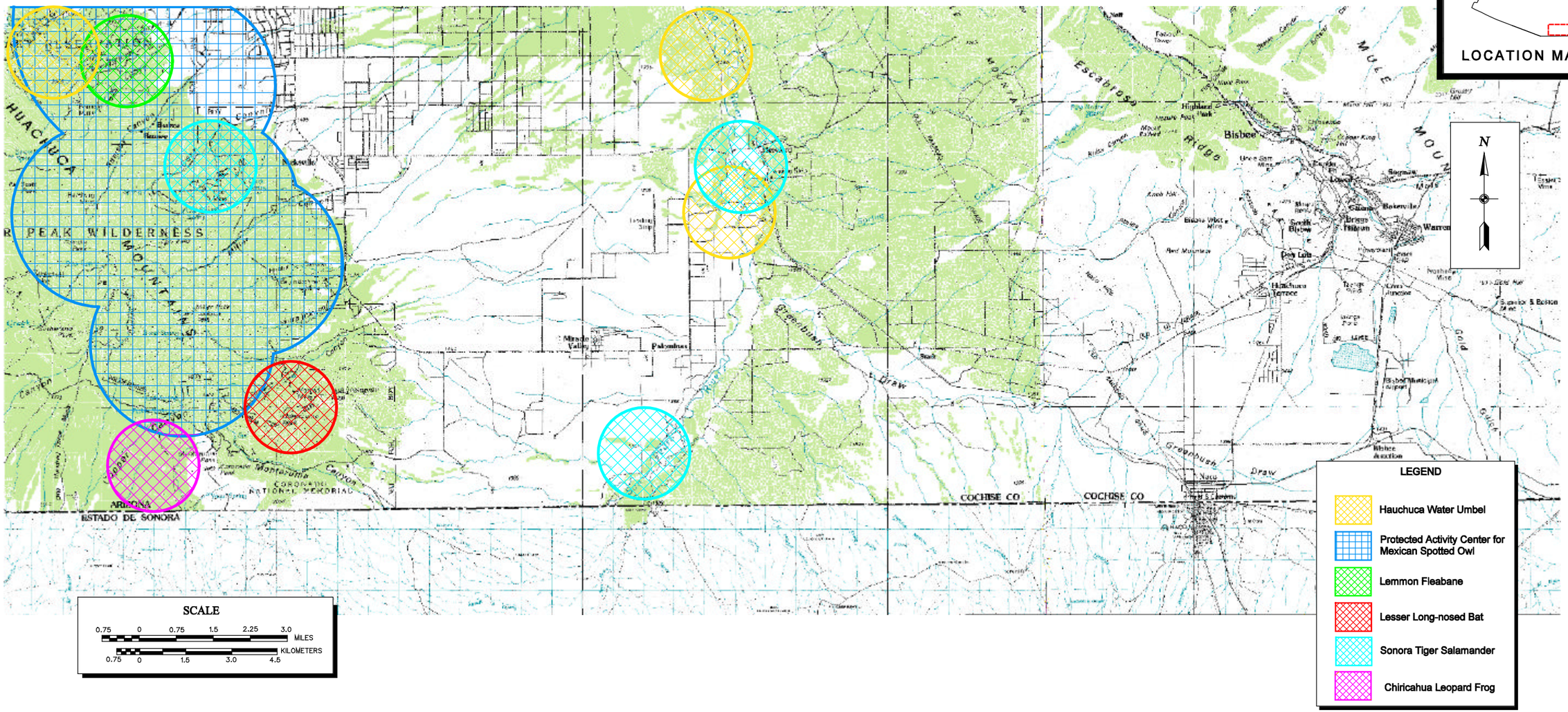


Figure 3-10: Known Locations of Threatened and Endangered Species within Naco-Douglas Corridor

gsrc / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

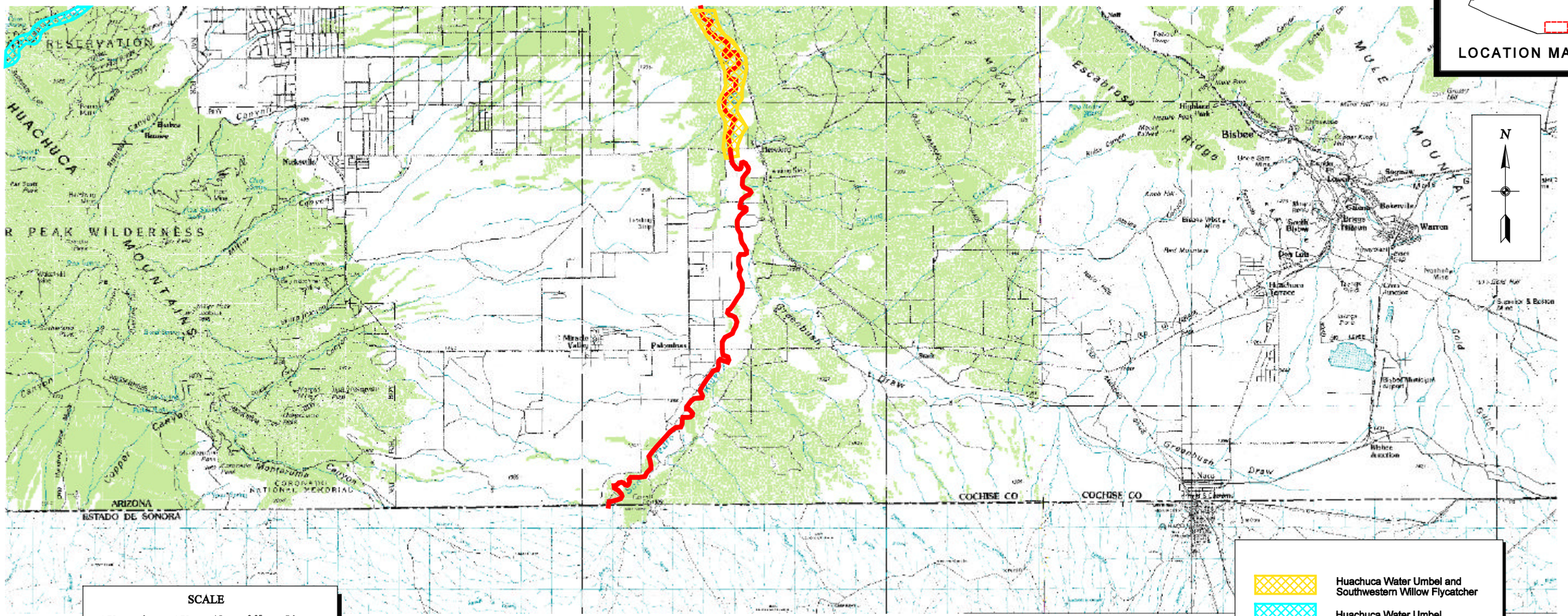


Figure 3-11: Designated Critical Habitat Areas

gsrc / GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

The USFWS has designated seven areas (units) as critical habitat for the Huachuca water umbel in Arizona [50 CFR 17.96(a)]. Three of these units (units 5, 6, and 7) are partially located within the project area (see Figure 3-11). A portion of Unit 5 is located in the northwestern corner of the project area on the Fort Huachuca Military Reservation. A portion of Unit 6 is located on the western boundary of the project area and includes portions of Bear, Lone Mountain, and Rattlesnake Canyons. A portion of Unit 7 includes a small section of the San Pedro River near the northern boundary of the study area.

3.6.2 State

The Arizona Department of Fish and Game (ADFG) maintains lists of Wildlife of Special Concern (WC). This list includes species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines (ADFG 2000). These species are not necessarily the same as those protected by the Federal government under the ESA. Information pertaining to Wildlife of Special Concern potentially occurring in Cochise, County is presented in the AGFD letter included in Appendix B.

The Arizona Department of Agriculture maintains a list of protected plant species within Arizona. The Arizona Native Plant Law (1993) defined five categories of protection within the state. These include: Highly Safeguarded (HS), no collection allowed; Salvage Restricted (SR), collection only with permit; Export Restricted (ER), transport out of state prohibited; Salvage Assessed (SA), permit required to remove live trees; and Harvest Restricted (HR), permits required to remove plant by-products (AGFD 2000). Information pertaining to state protected species potentially occurring in Cochise, County is presented in the AGFD letter included in Appendix B.

3.6.3 Navajo Nation

The Navajo Endangered Species List (1997) provides special status for species located on any portion of the Navajo Nation, which includes parts of Arizona. A list of special status species whose distribution includes part, or all, of the Arizona portion of the Navajo Nation is presented in the AGFD letter included in Appendix B.

3.7 CULTURAL RESOURCES

3.7.1 Cultural Resources Overview

The archeology of southern Arizona is quite detailed, and relatively complex considering the various geographic and related cultural features. For purposes of clarity, the following text will present the broad overview of southern Arizona prehistory before outlining the various previous investigations that are important to the understanding of the study area.

The cultural chronology of southern Arizona is composed of five periods, namely:

Paleo-Indian	10,000—7,500 B.C.
Archaic	7,500—400 B.C.
Formative	A.D. 100—1450
Protohistoric	A.D. 1450—1539
Historic	A.D. 1539—Present

These periods are commonly subdivided into smaller temporal phases based on particular characteristics of the artifact assemblages encountered in each of three archeological regions within southern Arizona. The prehistoric periods and corresponding phases are defined by the presence of particular diagnostic artifacts such as projectile points, certain types of pottery, and occasionally, particular site locations. For the Historic period, documentary information more often is used to distinguish certain phases; nevertheless, particular artifacts also can be used to recognize certain historic affiliations.

3.7.1.1 Paleo-Indian (10,000-7500 B.C.)

The nature and temporal position of the first people in southern Arizona is a subject of debate. Most researchers contend that successive migrations occurred throughout the latter part of the Pleistocene, coinciding with global temperature drops that resulted in massive quantities of water being frozen. As the ice caps increased in size, sea levels dropped, exposing land bridges in the areas where the sea was the most shallow. One of these land bridges connected Alaska with Siberia across the Bering Strait. This land bridge has successively appeared and disappeared over the last 100,000 years as temperatures fluctuated.

"Early man sites" in the New World, those defined as being occupied prior to 12,000 years ago, are most frequently reported in the southwestern deserts. Early man sites have been reported for ancient Lake Mannix, China Lake, Calico, and the Yuha Desert in California (Schuiling 1972; Davis 1978; Davis et al. 1981), and the Sierra Pinacate region of nearby Sonora, Mexico (Hayden 1976; Moratto 1984). No claims for humans in southern Arizona predating 12,000 years ago have met the scrutiny of the entire scientific community.

A majority of the best-known Paleo-Indian sites in the Southwest are in southern Arizona. The earliest occupations at these sites are named after a site near Clovis, New Mexico and are recognized by a particular fluted projectile point type (i.e., the Clovis Point) that is thought to have been used for hunting big game such as mammoth, mastodon, and camel. To a certain extent, this view is probably biased because most Clovis sites that have been excavated are kill sites. Plant gathering and processing was, no doubt, an important aspect in the lives of early Paleo-Indians.

Central to any review of the Paleo-Indian period are the sites in the San Pedro and Sulphur Springs valleys in southeastern Arizona. Currently, there are four well-documented sites (Naco, Murray Springs, Leikam, and Navarette) where extinct mammal bones are in association with human artifacts (Haynes 1984). Each of these sites overlays an erosional surface dated to 10,900 B.P. by 23 charcoal samples. The occupational surface, in turn, is buried by a black mat composed of clayey-silt that dates to 10,800 B.P. In five other areas in the San Pedro Valley, the remains of extinct fauna have been found beneath the black mat, but without human remains (Haynes 1984).

3.7.1.2 Archaic (7500-400 B.C.)

The cultural remains of Archaic people, post-Pleistocene foragers, are more common manifestations than those of Paleo-Indian populations. The cultural affiliation and age of Archaic materials in southern Arizona are not well understood. Two Archaic traditions have been proposed for southern Arizona: the Desert culture (also called San Dieguito II and III) and the Cochise culture. Haury (1950) and Ezell (1954) have argued that the Papagueria was the zone of contact between the Cochise culture, located primarily within southeastern and south-central Arizona and New Mexico, and the Desert culture, recorded in southern California (Rogers 1939; Hester 1973; King 1976) and southwestern Arizona

(Rogers 1941; Haury 1950; Hayden 1970; Rosenthal et al. 1978). Other researchers disagree with Haury and Ezell, arguing instead that the Desert culture is a pan-southwestern occurrence extending from California to the Trans-Pecos Region of Texas.

The Cochise culture was defined originally by Sayles and Antevs (1941) following the excavations of aceramic sites along major southeastern Arizona stream channels, such as Whitewater Draw, the San Pedro River, and San Simon Creek. These and other investigations (Sayles et al. 1958; Cattanach 1966) demonstrated that Cochise groups utilized the floodplain environmental zone (See also Whalen 1971, 1975).

The three Cochise culture stages generally recognized include the Sulphur Springs, Chiricahua, and San Pedro (Sayles and Antevs 1941). The Sulphur Springs stage, considered to be a specialized, Paleo-Indian adaptation, is known only from a few sites near Double Adobe in southeastern Arizona (Whalen 1971). Sayles and Antevs (1941) described the phase as consisting of groundstone and a limited amount of chipped stone associated with extinct Pleistocene fauna. On the basis of nine radiocarbon dates (Whalen 1971), this phase has been dated from approximately 7500 B.C. to 3500 B.C.

The Chiricahua stage, dated by Whalen (1975) from 3500 B.C. to 1500 B.C., marks another aspect of the Archaic period in southern Arizona. Chiricahua tools consist of a groundstone assemblage of small, shaped and unshaped handstones, shallow basin metates, mortars and "proto-pestles." Chipped stone includes unofficial handaxes, knives, scrapers, spokeshaves, and utilized flakes (Sayles et al. 1958). The chipped stone is predominantly percussion flaked with some pressure flaking, particularly among projectile points. Three types of projectile points are identified: triangular side-notched with indented base, stemmed, and leaf-shaped (Sayles et al. 1958). Several researchers believe that maize and squash were introduced during the Chiricahua stage (Dick 1951; Martin and Schoenwetter 1960).

The San Pedro stage tentatively dates from 1500 B.C. to 100 A.D. (Whalen 1975). Listed among the material cultural inventory are deep basin metates, shaped pestles, mortars, two-hand manos, and an increase in the type and number of pressure flaked tools (Sayles et al. 1958). Pithouses and storage features, agriculture (beans, maize, and squash), and

pottery appear at the end of the San Pedro stage (Sayles 1945; Martin et al. 1949; Eddy 1958; Dick 1965).

Due to the nature of the local vegetal material, radiocarbon dates are available only for the later part of the Archaic period, namely, to the time immediately preceding the rise of sedentism and agriculture in southern Arizona. These dates suggest that the Archaic persisted into the first millennium A.D.

3.7.1.3 Formative (A.D. 100-1450)

Following the Archaic, the Formative period refers to the prehistoric ceramic-making agriculturists. In southern Arizona, some researchers date the beginning of the Formative as early as 300 B.C. (Haury 1976), and others as late as A.D. 500 (Schiffer 1982). In south central Arizona, the principal inhabitants are called Hohokam, a Piman word meaning "all used up" (Haury 1976). Peripheral cultures are the Trincheras in northern Sonora (Bowen n.d.; Sauer and Brand 1931; Hinton 1955; Johnson 1960, 1963; McGuire and Villalpando 1991), the Mogollon in eastern Arizona (Douglas and Brown 1984, 1985), and the Patayan in western Arizona (Rogers 1945; Waters 1982).

The Mogollon culture evolved from the Cochise culture; in fact, early Mogollon villages appear to be little more than late Archaic villages with pottery (Sayles 1945). The hallmarks of this stage are agriculture, red-on-brown pottery, and pithouses. Southeastern Arizona has been included in the San Simon Branch of the Mogollon (Sayles 1945), which has been divided into three periods and six phases. The Early period consists only of the Penasco phase, which was derived from the San Pedro stage of the Cochise culture. In essence, the only difference appears to be the addition of plainware and red slipped pottery. Following this is an Intermediate period composed of the Dos Cabezas, Pinaleno, and Galiuro phases, which are defined by the introduction of decorated ceramics. The Late period is composed of the Cerros and Encinas phases, which exhibit considerable influence from the Hohokam to the northwest and Mimbres to the east (Sayles 1945). Although dates for these phases are not clear, the whole sequence likely ranges from about A.D. 200 to 1200.

The appearance of rock and adobe pueblos in the southeastern part of Arizona has been identified with three traditions. One of these traditions is the Ringo phase that, unfortunately, is known only from a single excavation in the Sulphur Springs Valley. The

Ringo site consists of two small adobe compounds with 27 rooms with a variety of ceramic trade wares. The ceramic assemblage suggests contact with four areas; (1) Chihuahua (over 25% of the decorated wares), (2) the White Mountain area, (3) the Tonto Basin (these ceramics could have been made locally), and (4) the Tucson Basin (Johnson and Thompson 1963). The suggested dates for them fall between 1250 and 1325 (Johnson and Thompson 1963). The Ringo phase, although interpreted as basically Mogollon, reflects outside influences likely from the Anasazzi to the north or possibly the Chihuahuan area to the south (Johnson and Thompson 1963).

The Animas phase, best known from Hidalgo County, New Mexico, is represented at the Pendleton Ruin (Kidder et al. 1949). This phase generally has been interpreted very differently from the Ringo phase even though the two overlap temporally. The dating of the Animas phase (ca. A.D. 1175-1350) and the presence of Ramos Polychrome and other Casas Grandes pottery types implies an association with Casas Grandes at its zenith. Unlike the Ringo site, a number of Animas sites fall in the 100 to 300 room category. The nature of the association between the Animas phase and Casas Grandes has been debated for the last 30 years. Kidder et al. (1949) argued that the traits found at the Pendleton Ruin were quite distinct from those at Casas Grandes. More recent researchers have accepted the Animas phase as peripheral to Casas Grandes, but directly interacting with the core area (LeBlanc 1980; DeAtley and Findlow 1980). These authors viewed the Animas phase as non-Mogollon. In fact, LeBlanc (1980) specifically suggests a population movement from the south into the Mimbres Valley that absorbed the remaining indigenous population. Others remain unconvinced of a Casas Grandes expansion into southwestern New Mexico, pointing out that the five excavated Animas phase sites, the few available dates, and the published survey data collected by DeAtley and Findlow (1980) do not present enough data for such a conclusion.

The term Animas phase has not been generally applied in southeastern Arizona. Nevertheless, the great similarities in ceramic types and their frequencies, architectural features, burial patterns, and projectile point styles between most of the pueblo sites in southeastern Arizona and the Animas phase sites in southwestern New Mexico suggest that they are part of the same cultural tradition (Amsden 1928; Sauer and Brand 1930; Kidder et al. 1949; Neily and Beckwith 1985; LeBlanc 1980; DeAtley and Findlow 1980; Klein et al. 1982).

3.7.1.4 Protohistoric Period (A.D. 1450-1539)

The abandonment of the large, aggregated pueblos in the southwest around A.D. 1450 marks the beginning of the Protohistoric period, which is another time period that is poorly understood. Based on cross-dating with Hohokam and Salado ceramics, Di Peso (1951) concluded that the inhabitants of Babocomari Village in the San Pedro Valley moved into that vicinity at a time roughly contemporaneous with the Tucson phase, ca. A.D. 1200-1450. It is possible that abandonment occurred quite late, perhaps during Apache times (Di Peso 1951). If this is the case, then Babocomari Village represents the only large Protohistoric site excavated to date.

3.7.1.5 Historic Period (1539-present)

The Historic period in southern Arizona began with the Spanish explorations by Fray Marcos de Niza in 1539 and Francisco Vasquez de Coronado, Melachor Diaz, and Alarcon in 1540. When the Spanish arrived, the majority of native populations in southern Arizona were living in rancherias dispersed beside the major watercourses. It is difficult to assess what cultural groups were in southeastern Arizona. The Opata, a Uto-Aztecan speaking group occupying much of northeastern Sonora, are known to have inhabited the southern part of the valleys; however, the Spanish did not record any of their villages north of the International Border. The Janos and Jocome Indians lived in nomadic bands in the area where Sonora, Chihuahua, and the International Border meet. In general, the Opata, Janos, and Jocome suffered such a rapid population decline and assimilation after Spanish contact that few data are available to indicate how these cultures could be identified.

After the Spanish entrada, sporadic contact continued until 1687, when Eusebio Kino, a Jesuit priest, traveled through the Santa Cruz Valley and the adjacent Papagueria. Until his death 24 years later, Padre Kino embarked upon at least 50 major journeys in Pimeria Alta visiting many Papago and Pima villages. He established a chain of missions and branch missions, or visitas, including San Xavier del Bac, Guevavi, Tubac, San Cayetano de Tumacacori, and others. Following Kino was an influx of Spanish missionaries, explorers, miners, ranchers, and settlers.

Between 1736 and 1741, a silver strike occurred near the rancheria of Arissona bringing more Spanish prospectors into the territory. These events had a tremendous impact on the natives and contributed to the antagonism that was already developing among the

Indians, miners, and frontiersmen. Events finally culminated in a revolt by the Pima and Papago in 1751, which resulted in the destruction of many of their own villages. Ultimately, the revolt, along with a series of epidemics in 1773 and constant Apache attacks, had a disastrous effect on the Pima and Papago, causing populations to decline.

In 1830, at a time when Apache raids had lessened, Lieutenant Perez, a member of one of the most prominent land-holding families in Sonora, petitioned the government for a land grant between the existing settlements in Sonora and the Apache Indians. His petition was approved and he was permitted to purchase almost 100,000 acres for 90 pesos plus fees. He named his hacienda El Rancho de San Bernardino. Apache raiding began again in the late 1830s forcing the abandonment of the rancho.

In the mid-1800s El Camino del Diablo, a route linking Sonoita, Mexico with Yuma, Arizona became popular with travelers attempting to get to the gold fields in California. The conditions along the route were harsh and the loss of life along the route was heavy (Sykes 1937).

The Gadsden Purchase occurred in 1854, but it was not until 1856 that the land left Mexican domain and came under the domain of the United States. Border surveys were initiated immediately. Lieutenant Michler of Major Emory's Border Survey traveled the International Border along the southern periphery of the present day Papago (Tohono O'odham) Indian Reservation in 1855. Aside from placing iron and stone border monuments, Emory reported on the topography and people he encountered (Wagoner 1975). Much of the land acquired in the Gadsden Purchase was held through Mexican and Spanish land grants and promptly fell into contention. One of the contested land grants was the Los Nogales de Elias Grant of 1843 in the area of present day Nogales, Arizona. This land grant was denied by the United States Supreme Court in 1897, thus leaving ownership to the settlers and residents of the area.

The Maria Santisima del Carmen (Buena Vista) Grant, dated 1826, survived the land disputes and remained a Spanish stock ranch. It was located in the Santa Cruz River Valley on both sides of the International Border and contained 45,687 acres. The portion on the Arizona side, 5,733 acres, was acquired in 1881 and stayed intact until 1934 when the owners divided it.

"Gold," in the form of mineral and grasslands, was discovered in the Arizona Territory and California in the mid and late 1800s. This brought an influx of settlers and a need for military protection from Indian raids. Several forts were established in southern Arizona and troops were stationed in the San Bernardino Valley at Silver Creek, Guadalupe Canyon, and, briefly in 1878, at Camp Supply (Wells 1927).

Miners and cattlemen moved into the legally unclaimed Papagueria after the Civil War. As a rule, the mining towns established at ore-bearing localities like Vekol, Comobabi, and Quijotoa were typical western mining boomtowns. Lively, ramshackle, crowded, and above all ephemeral, "Quijotoa in 1884 was a town of ten thousand with the usual quota of blacksmith shops, stores, and saloons....Within a few years it was a ghost town" (Spicer 1962). Although the individual Papago occasionally found wage-work in such towns, most avoided the communities, preferring instead to live in their traditional villages tending gardens and raising cattle.

By 1884 El Rancho de San Bernardino, the Old Spanish land grant, had been deserted for almost 50 years. At that time it consisted of approximately 65,000 acres of grasslands watered by a number of streams and springs. By then the once large, fortified hacienda was a crumbling ruin just south of the unfenced International Border. The property was purchased by John Slaughter, a former Cochise County Sheriff, and his wife Viola. Slaughter built two adobe houses on the site, one for his in-laws and the other for himself. He and Viola also maintained a Tombstone home so that their children could attend school.

The Apaches continued to raid the San Pedro Valley until 1884 when Colonel George Crook forced them onto the San Carlos Reservation. However, peace was short-lived. In 1885, a large number of Apaches led by Geronimo fled the reservation, crisscrossing southeastern Arizona and southwestern New Mexico. However, in 1886 they surrendered to General Crook at Canon de los Embudos in the mountains 30 miles south of the San Bernardino Ranch headquarters.

The San Pedro River Valley became a profitable cattle ranching area after the turn of the century. In 1899, it was little more than an uninhabited cattle holding ground; ten years

later it had more than 10,000 people. Douglas, a smelter city on the border, was also founded at this time. Its beginning, planning, and development were due primarily to Dr. James Douglas (Hadley 1987). In 1881, the Phelps Dodge Company assigned Dr. Douglas to its Copper Queen mine and smelter in Bisbee, Arizona. There he expanded the Phelps Dodge operation and purchased the Pilares mine at Nacozari, 75 miles south of the border in Sonora, Mexico. It became evident that the increased production in the Bisbee mine and the addition of the Nacozari mine necessitated a larger smelter than the one at Bisbee. Since smelters require large amounts of water, it was decided to locate the new smelter at Whitewater Draw, the former cattle holding ground 25 miles southeast of Bisbee. In 1890, the Phelps Dodge Company acquired land under scrip and from the International Land and Improvement Company for the smelter.

Whitewater Draw also provided an ideal connecting point for the Nacozari and Bisbee railroads, since ore trains from both mines would be traveling downgrade. By 1900, the southeastward railroad extension from Bisbee had reached Douglas and in 1904 it had been extended to Nacozari (Hadley 1987). Railroad construction workers initiated small settlements in the area where Douglas and Agua Prieta now stand.

Soon after Dr. Douglas selected the Whitewater Draw site for the new smelter, investors and speculators became eager to share in the enormous profits to be made from the town's construction. While the Phelps Dodge Company owned a substantial amount of property, the intention was not to make Douglas a "company town;" rather, many homes and most of the businesses were to be privately owned. The International Land and Improvement Company, which Dr. Douglas and his friends incorporated, added non-company directors who planned and laid out the Douglas town site, set the real estate prices, built large commercial projects, and provided the town with utilities (Hadley 1987).

In 1901, workers arrived from Bisbee and began construction of the smelters. In 1902, the Calumet & Arizona smelter began production, and in 1904, the Copper Queen Mining Company introduced furnace number one. The boom was on, and after only three years, Douglas ranked fourth in population in the territory and was called the "Wonder City of the West" (Hadley 1987). Aside from mining, the most important commercial interest of Douglas was the railroad, which supplied the surrounding rural area of ranches and farms and the border trade. By 1903, 19 freight trains and 12 passenger trains offered daily

service to Douglas. The economic high point for Douglas occurred during World War I. Copper bars, indispensable to the war effort, poured out of both smelters. However, as soon as the war ended, the demand for copper dropped and by 1929 the boom was over.

The U.S.- Mexican Border became a focal point during the Mexican Revolution in 1910. For the first time in U.S. history, Nogales, Naco, and Douglas had American soldiers stationed along their borders. Approximately 100 men were assigned the task of patrolling the border between Douglas and the San Pedro River. Fifty men camped near the stockyards in Douglas and another 50 camped at Naco (Christiansen 1974). In 1911, ten soldiers from the camp at Douglas established an outpost on the Slaughter Ranch. Troop strength varied from 10-men detachments to units of 600 men and three machine guns during the Pancho Villa uprising in 1915-1916 (Christiansen 1974). In 1916, the camp at Douglas was named Camp Harry J. Jones after a soldier who had been killed. This camp, as well as the one at the Slaughter Ranch, was closed in 1933, as was the one at Slaughter Ranch.

In March 1911, the U.S. Cavalry was deployed to prevent American spectators from crossing into Mexico (Christiansen 1974). Instead, the spectators stood on the streets and rooftops in Douglas to watch the action. There was so much shooting in Agua Prieta that the U.S. Cavalry warned the Mexican Federales and the rebels to stop firing into the United States. The armies were, of course, not able to comply and many buildings were struck and several U.S. citizens were killed.

In 1916, airplanes were used to patrol the border between El Paso and Douglas, and Douglas became the site of the first operational military airfield. The border was quiet by 1921 and the airfield was abandoned in 1926. Then, in 1929, the Escobar rebellion again created the need for air patrol along the border. The Mexican Government enlisted U.S. aid. The U.S. provided two armed planes that flew dawn-to-dusk patrols. No incidents occurred until a careless insurgent pilot dropped two homemade bombs near Naco, Arizona, and a third on the town. The latter broke windows and injured several bystanders. Seven days later an American pilot flying for the Escobaristas attempted to drop a bomb on the Federal trenches. His bomb, however, fell on the American side, inflicting no damage.

3.7.2 Past Investigations

Southeastern Arizona was explored by A. F. Bandeleir between 1880 and 1885. He states that:

> I could not find any trace of antiquities in the narrow gorges that cleave the seirra, but on its northern base, around Fort Wallen, and on the Babocomari, traces of ruin are visible. While mounds were almost obliterated, foundations of small houses and large enclosures formed by stones set on edge, may be distinguished, no clear conception can be obtained of the general plan and purpose of the structures. The artificial objects differ from those found along the San Pedro only in respect of the pottery, among which I found the ancient white and black, and red and black varieties, so abundant in more northern ruins (Bandelier 1892).

Animas phase sites were examined in the San Bernardino Valley in the late 1920s by Monroe Amsden as part of a reconnaissance survey of Sonora, Mexico. In his initial publication, Amsden (1928) discussed a site on the Sonoran side of the San Bernardino Valley. He later recorded four sites on both sides of the border for Gila Pueblo a private research institution founded by Henry Gladwin (Gladwin and Gladwin 1935). Due to ceramic differences, Amsden (1928) divided Sonoran sites into two groups, one a peripheral development of the Casas Grandes culture and the other of the Chihuahua culture.

In 1928, Sauer and Brand conducted a survey of pueblo sites in southeastern Arizona. During their explorations of the area, they documented the Ramsey Canyon Ruin that contained Chihuahua Polychrome pottery. From this and other observations, they concluded that sites along the International Border in the San Pedro Valley were on the periphery of the Chihuahuan culture.

The Cochise culture was recognized in 1926 from the excavations at the Double Adobe Ruin on Whitewater Draw in southeastern Arizona (Sayles and Antevs 1941). The excavations yielded the remains of late Pleistocene fauna in geological strata above artifacts. This confirmed the existence of humans in the New World during the Pleistocene and prompted the research institute of Gila Pueblo to initiate further investigations in an attempt to locate similar types of sites. The resulting surveys in the Sulphur Springs and

San Pedro Valleys were conducted by Emil Haury, E. B. Sayles, and E. Antevs, and significant sites were excavated. From these investigations, they named the culture after the county in which the sites were located which, in turn, was named after the famous Apache chieftain (Sayles and Antevs 1941).

Based on results from the excavations at Snaketown (Gladwin et al. 1937), and particularly the finding of Mogollon polished redware sherds, Gila Pueblo carried out extensive surveys and some excavations to amplify the knowledge of southeastern Arizona prehistory (Sayles 1945). In order to address the problem of the polished redwares, researchers at Gila Pueblo proposed to examine sites that contained only plainware and redware pottery; that is, no sites with decorated wares. From these efforts, Sayles (1945) concluded that the culture-historic sequence in the San Simon Valley was very closely related to early phases in the San Francisco and Mimbres Valleys. However, there were differences that led Sayles to refer to the culture in southeastern Arizona as the San Simon Branch.

In the late 1930s and 1940s, the Amerind Foundation initiated a number of surveys and excavations in and around the San Pedro Valley. The motive behind these efforts was to counter Gila Pueblo's contention that the earliest ceramic-bearing group in the area was Mogollon with limited Hohokam influence. Investigators at the Amerind Foundation believed that the cultural entity early in the sequence was Hohokam with minimal Mogollon influence. To support their hypothesis, the Amerind Foundation undertook several excavations at the Gleeson site in the Sulphur Springs Valley and at Babocomari Village located on a tributary of the San Pedro River (Di Peso 1951; Fulton and Tuthill 1940). Tuthill (1947) also excavated the village site of Tres Alamos between 1940 and 1945.

Based on excavations at the Gleeson and Tres Alamos Sites, Tuthill (1947) concluded that the earliest phases (Cascabel and Tres Alamos) were times of considerable Mogollon influence, whereas the final two phases (Tanque Verde and Tucson) were almost entirely Tucson Basin Hohokam. In response to contradictions with previous research in the area, Tuthill (1947) states that Dragoon and Tres Alamos Red-on-brown "apparently...flourished side by side in the same general area at the same time, and yet did not mix".

The Arizona State Museum and the University of Arizona undertook investigations in the San Pedro River Valley during the 1950s. The studies involved two late Pleistocene mammoth sites. The Naco Mammoth site, excavated in 1952 by the Arizona State Museum and University of Arizona is located on Greenbush Draw, a tributary of the San Pedro River. While this excavation was in progress, Edward Lehner, a local rancher, found bones eight feet below the present ground surface in an arroyo channel of the San Pedro River near Hereford, Arizona. Researchers from the Arizona State Museum identified them as mammoth tooth plates and subsequently excavated the Lehner Ranch site. Based on 13 (predominantly Clovis) projectile points, eight butchering tools, and charcoal from two fire pits located in association with the remains of nine immature mammoths, the site was interpreted to be a mammoth kill locale (Haury et al. 1959).

No further work in the San Pedro River Valley took place until the 1970s. An amateur archeologist, Herbert Reay, discovered the S-O Ranch site (AZ EE:12:37) in 1970 where he dug into a cairn composed of metates and uncovered a burial. Additional excavations by Jeffery Adams (1974), a graduate student at Northern Arizona University, failed to locate other features. However, based on the types of artifacts recovered by Reay and Adams, Edward Sayles of the Arizona State Museum dated the site to the early Chiricahua stage of the Cochise culture.

Three systematic surveys also were conducted during the 1970s and 1980s in the San Bernardino Land Grant area. Stacy (1974) undertook the first survey on the property and recorded 14 sites. An intensive survey of a 131-acre parcel of land surrounding the Slaughter Ranch House was undertaken by Stone and Ayres (1982). In 1984 and 1985, the Arizona State Museum surveyed 2,000 acres of the San Bernardino Land Grant, now a U.S. Fish and Wildlife Refuge, recording 33 sites ranging from the Archaic through the Historic periods (Neily and Beckwith 1985).

The San Bernardino Valley Survey, which systematically examined 6.6 square miles, was undertaken in the early 1980s by the Anthropological Resource Center at Cochise College (Douglas and Brown 1984, 1985). While both Archaic and Formative period sites were recorded, a majority exhibit evidence of occupation during the Encinas phase (A.D. 900-1175) of the Formative period (Douglas and Brown 1985).

Between 1978 and 1985, the Cochise County Historical society tested the Christiansen Border Village (Kurdeka 1985). The site is located midway between the Sulphur Springs and San Pedro valleys within the study area. The 10% sample revealed a total of ten features, including four secondary cremations. Ceramic-bearing deposits were found to be restricted to the upper four inches; lithics, however, continued to a subsurface depth of 12 inches. Kurdeka (1985) concluded that subsistence practices conducted at this village were focused primarily on wild resources. The presence of large, Archaic period projectile points along with decorated pottery suggests that the site was utilized between A.D. 700-1100 and A.D. 1350-1450.

Limited numbers of sites have been excavated in the San Bernardino Valley, and the results of only one excavation have been published. The Bernardino site, excavated in the early 1970s, is a medium-sized adobe pueblo. A report of this excavation is currently being prepared by the Principal Investigator, Richard Myers. The Boss Ranch site, a medium-sized pueblo close to the Bernardino site, is presently being excavated as part of the Cochise College excavation course.

In the fall of 1991, a 48.5-mile survey was conducted for a proposed Joint Task Force Six (JTF-6) project in the vicinity of Douglas and Naco, along the International Border (Martynec and Peter 1992). As a result of the Douglas-Naco survey, 41 archeological sites and 19 isolates were documented. Of these, five were previously recorded (including the Christiansen Border Village) and 36 were newly recorded. Sixteen of the sites are historic, 22 sites are prehistoric, two are multicomponent, and one, a rock alignment is undateable. The prehistoric site types included lithic reduction sites (n=10), resource processing (n=9), and villages (n=3). Historic sites included homesteads (n=3), commercial (n=2), defensive/military training (n=1), activity loci (n=2), trash (n= 8). The study indicated a range of prehistoric occupation(s) from Archaic through Formative elements and historic sites dated from 1910 through the 1940s.

In 1996 an archeological record search and intensive archeological survey was conducted as part of another JTF-6 EA (USACE, Fort Worth District 1996). The project involved the repair and maintenance of 52 miles of road, two new miles of road, and a 2.5-mile rail barrier along the border between Naco and Douglas. The survey resulted in three prehistoric archeological sites, one historic site, and five isolated occurrences. Two of the

sites were determined eligible and two were of unknown eligibility for inclusion on the National Register of Historic Places (NRHP).

In February of 1998 another EA was completed for the installation of several stadium style lights on light poles (USACE, Fort Worth District 1998a). An archeological record search and intensive survey was completed for this project, which required three previously recorded archeological sites to be revisited and resulted in the discovery of two new isolated locations. Of the three previous archeological sites evaluated, two were found to have limited potential and were recommended ineligible and one was determined eligible for inclusion on the NRHP.

3.8 AIR QUALITY

The State of Arizona has adopted the National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) as the state's air quality criteria (Table 3-5). Primary standards are established to protect public health while secondary standards provide protection for the public's welfare including wildlife, climate, recreation, transportation, and economic values. States are required to adopt ambient air quality standards that are at least as stringent as the Federal NAAQS; however, the state standards may be more stringent.

3.8.1 Potential Sources of Air Pollutants

The majority of the Arizona segment of the U.S.-Mexico border area is sparsely settled desert or semi-desert. A number of anthropogenic (man-made) sources of air contaminants affect the air quality of the border region. These include industrial emissions, mobile (vehicular) emissions, area emissions (e.g., emissions from numerous residences and small commercial establishments in an urban setting), dust resulting from wind erosion of agriculturally disturbed lands, smoke from forestry burns, and pollutants transported into the study area on winds blowing from major urban/industrial areas outside the study area (USEPA 1992a).

Table 3-5
National Ambient Air Quality Standards

POLLUTANT	STANDARD VALUE	STANDARD TYPE
Carbon Monoxide (CO)		
8-hour average	9ppm (10mg/m^3)**	Primary
1-hour average	35ppm (40mg/m^3)**	Primary
Nitrogen Dioxide (NO_2)		
Annual arithmetic mean	0.053ppm (100μ/m^3)**	Primary and Secondary
Ozone (O_3)		
1-hour average*	0.12ppm (235μg/m^3)**	Primary and Secondary
8-hour average*	0.08ppm (157μg/m^3)**	Primary and Secondary
Lead (Pb)		
Quarterly average	1.5μg/m^3	Primary and Secondary
Particulate<10 micrometers (PM-10)		
Annual arithmetic mean	50μg/m^3	Primary and Secondary
24-hour average	150μg/m^3	Primary and Secondary
Particulate<2.5 micrometers (PM-2.5)		
Annual arithmetic mean	15μg/m^3	Primary and Secondary
24-hour Average	65μg/m^3	Primary and Secondary
Sulfur Dioxide (SO_2)		
Annual arithmetic mean	0.03ppm (80μg/m^3)**	Primary
24-hour average	0.14ppm (365μg/m^3)**	Primary
3-hour average	0.50ppm (1300μg/m^3)**	Secondary

Source: USEPA 1995.

Legend: ppm = parts per million
mg/m^3 = milligrams per cubic meter of air
μg/m^3 = micrograms per cubic meter of air

*The ozone 1-hour standard applies only to areas that were designated non-attainment when the ozone 8-hour standard was adopted in July 1997.

**Parenthetical value is an approximate equivalent concentration.

Airborne particulates are a special problem in the border area. Construction activity and windblown dust from disturbed desert are significant sources of fugitive dust. In agricultural areas, farming activity is an additional source of fugitive dust. In Douglas, Arizona, old tailings piles, quarries, material handling and storage, and haul roads are major sources of particulate matter (ADEQ 1990). Transport of pollutants from maquiladoras (manufacturing plants), especially fine particulates, into the study area also contributes periodically to air quality degradation. Additionally, several indigenous industries located in the Mexican border area are highly polluting. These include oil and gas, metallurgy, iron and steel, electric power generation, cement manufacturing, and brick manufacturing (USEPA 1992b). Many residences in the Mexican border area burn non-traditional fuels such as wood scraps, cardboard, and tires to provide warmth in the winter. The resulting particulate loading can also adversely affect air quality in the Arizona border counties.

In addition to airborne particulates, high concentrations of sulfur dioxide in the study area are of concern. Sulfur dioxide is the primary contributor to acid deposition, which causes acidification of lakes and streams and can damage trees, crops, historic buildings, and statues. In addition, sulfur dioxide compounds in the air contribute to visibility impairment and may affect breathing and aggravate existing respiratory and cardiovascular disease (USEPA 2000a). Ambient sulfur dioxide in the study area results largely from stationary sources such as coal and oil combustion, steel mills, refineries, pulp and paper mills, and from nonferrous smelters. Pollutant emissions estimates from point sources for Cochise County are listed in Table 3-6.

Table 3-6

Cochise County Emissions Summary for Selected Air Pollutants
Primary Pollutant Emissions (tons/year)

Sulfur Dioxide	Total Suspended Particulates	Nitrous Oxide	Carbon Monoxide	Volatile Organic Compounds
4,663	1,190	6,519	689	45

Source: USEPA 2000a.

Under Federal NAAQS, Douglas is classified as non-attainment for PM_{10} (particulate matter less than 10 microns in diameter) and sulfur dioxide. In addition, Paul Spur is

classified as non-attainment for $PM_{10.}$ The remainder of Cochise County is considered in attainment for all Federal NAAQS. The Clean Air Act requires that for areas designated “non-attainment”, plans must be prepared and implemented to bring the area into attainment within a specified time. In addition, the U.S.-Mexico Border Environmental Agreement, which was signed in October 1989, details the primary objectives of common border environmental cooperation; establishes a mechanism for additional agreements, annexes, and technical actions; and provides for regular high level meetings and special technical meetings to further promote and encourage environmental cooperation between the two countries (USEPA 1992b; USEPA and Secretaria de Desarrollo y Ecologia [SEDUE] 1992a). As part of the Agreement efforts, an “Integrated Environmental Plan for the Mexican-U.S. Border Area” was completed in 1992 (USEPA and SEDUE 1992b). The air quality action plans in this document call for a number of actions that should have resulted in improved air quality along the border. Unfortunately, not many action plans have actually been implemented.

3.9 WATER RESOURCES

The following sub-sections describe surface and groundwater resources and relevant water quality in the general project region. This region consists of and is directly influenced by water resources of the southern-most area of Cochise County, Arizona. The hydrological cycle results in the transport of water into various media such as the air, the ground surface, and subsurface. The project area receives this water from surface runoff and groundwater via precipitation and snowmelt in the local mountains. Geologic forces have created a regional terrain that includes arroyos or washes (deep gullies), steep canyons, and somewhat flat basins. Due to the arid climate of the area, most of the drainage channels are dry most of the year. Rivers and streams that flow periodically due to fluctuations in precipitation are referred to as being ephemeral. Intermittent waterways (rivers, streams, etc.) are those which flow as a result of seasonal precipitation for the most part. Due to the flash flood tendency of the washes, sediment loads are high when water is present. Natural and human-induced factors determine the quality of these resources.

3.9.1 Surface and Groundwater Resources

Major surface water features of the study area include the San Pedro River, Whitewater Draw, and numerous smaller rivers and streams which are intermittent or ephemeral in nature. The San Pedro River is the major surface water drainage within the project area. The San Pedro River enters the project area at the International Boundary near Palominas, Arizona, and flows northwest for approximately 62 miles before leaving the basin north of Benson at "the Narrows". The San Pedro River is mostly ephemeral and is controlled by variations in water table depth, precipitation, and spring flow. The river does have a perennial stretch of about 18 miles between Hereford and a point just south of Fairbank. The perennial reach is created by impermeable bedrock that forces groundwater to the surface. Stream segments with protective status within the project area are listed below in Table 3-7.

Table 3-7
Stream Segments with Protective Status within the Proposed Project Area

River	Stream Segment	Management Agency
San Pedro	Bear Creek	USFS
	Carr Canyon Creek	USFS
	Miller Canyon Creek	USFS
	Ramsey Canyon	TNC
	San Pedro River	BLM

Source: Arizona State Parks 1989

Within the region, alluvial and bedrock aquifers are prevalent; however, the alluvial fill aquifers provide most of the usable groundwater. About 92% of all groundwater withdrawn per day comes from alluvial aquifers. One Federally designated sole source aquifer; the Bisbee-Naco aquifer is located within the study area. Groundwater assessments indicate that the most common sources of aquifer contamination include: (1) high nitrate and ammonia levels from sewage treatment plants, (2) bacteria from septic tanks and raw sewage from Mexico, (3) trace compounds from mining activities, (4) leachates from commercial and industrial sites, (5) underground storage tanks, and (6) hazardous waste sites.

Groundwater is found in two major units in this region: 1) the streambed alluvium that forms the San Pedro River's channel and floodplain, and 2) the alluvial basin-fill sediments that fill the valley. The streambed alluvium is more permeable than the basin-fill, but the alluvium's limited areal extent only makes it an important local aquifer in the central valley along the San Pedro River's floodplain. The alluvial basin-fill sediments, consisting of the younger basin-fill, older basin-fill, band basal conglomerate, form the basin's principal aquifer. Consolidated bedrock found in the surrounding mountains yields only small amounts of water from localized aquifers.

According to the Arizona Department of Water Resources (ADWR), the hydrologic characteristics of the regional aquifer vary widely with the degree of compaction and the extent of fine-grained layers in the basin-fill. The younger and older basin-fill units are generally fair-to-good aquifers and provide the bulk of water pumped from the regional aquifer. Well yields of 100 to 2,800 gallons per minute have been reported from the basin-fill aquifer. The basal conglomerate unit generally is tightly cemented, but where weakly cemented or fractured by faults, well yields of several hundred gallons per minute have been reported.

Groundwater in the basin-fill is found in both unconfined (water table) and confined (artesian) conditions. Depth to water in unconfined areas of the basin-fill in 1978 ranged from 50 to 570 feet below land surface. Water levels are generally stable in the basin except in the Fort Huachuca-Sierra Vista area where groundwater pumpage has created a large cone of depression. Depth to groundwater in the artesian aquifer is encountered around 500 to 1,000 feet below land surface.

Groundwater movement in the basin is from the higher elevations in the mountains towards the valley and then northwest along the riverbed. Groundwater moves readily between the younger and older basin-fill units and between the streambed alluvium as the younger basin-fill unit. In the confined areas, water from the artesian aquifers may leak upwards into the water-table aquifer. According to information from the ADWR, the total amount of groundwater in storage in the Upper San Pedro basin is estimated to be approximately 59 million acre-feet.

Mountain-front recharge is the main source of recharge for the regional aquifer and streambed infiltration is the main source of recharge for the streambed alluvium in the San Pedro River floodplain. Groundwater recharge estimates are 29,000 acre-feet per year from streambed infiltration and mountain-front recharge, and 900 acre-feet per year from underflow into the basin from Mexico (ADWR 1998).

3.9.2 Waters of the U.S. and Wetlands

Section 404 of the Clean Water Act (CWA) of 1977 (P.L. 95-217) authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into waters of the United States, including wetlands. Waters of the United States (Section 328.3[2] of the CWA) are those waters used in interstate or foreign commerce, subject to ebb and flow of tide, and all interstate waters including interstate wetlands. Waters of the United States are further defined as all other waters such as intrastate lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, natural ponds, or impoundments of waters, tributaries of waters, and territorial seas. Wetlands are those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE 1987). Jurisdictional boundaries for these water resources are defined in the field as the ordinary high water mark (OHWM) which is that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural lines impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Activities that result in the dredging and/or filling of jurisdictional waters of the United States are regulated under Section 404 of the CWA. The USACE has established Nationwide Permits (NWPs) to efficiently authorize common activities, which do not significantly impact waters of the US. The NWPs were modified and reissued by the USACE in the Federal Register (Volume 61, Number 241) on 13 December 1996, with an effective date of 11 February 1997. The USACE has the responsibility to authorize permitting under a NWP, or to require an Individual Permit.

3.9.3 Water Quality

The Arizona Department of Environmental Quality (ADEQ) recognizes the geologic and hydrologic diversity of the state by delineating major river basins and reservoirs/lakes as classified segments. The ADEQ is responsible for adopting or removing the "designated uses" of each classified segment by formal ruling. Surface standards are designed to keep water free from pollutants in amounts or combinations that form bottom deposits, inhibit aquatic growth and recreational use, cause objectionable odor or taste of drinking water, cause off-flavor in aquatic organisms or waterfowl, promote excessive algae growth, violate aquifer water quality standards, change the color of the surface water, or are toxic to humans, plants, animals or other organisms.

Surface waters are also protected from oil, grease, and other pollutants that float as debris, foam, or scum; or that cause a film or iridescent appearance on the surface of the water; or that cause a deposit on a shoreline, bank, or aquatic vegetation.

Designated uses of surface water include: full body contact, partial body contact, domestic water source, fish consumption, aquatic and wildlife (cold water fishery), aquatic and wildlife (warm water fishery), aquatic and wildlife (ephemeral), aquatic and wildlife (effluent dependent water), agricultural irrigation, and agricultural livestock watering (ADEQ 1996).

The quality of groundwater (see Section 3.9.5 also) in the Upper San Pedro basin has been classified by the Arizona Department of Water Resources (ADWR) as suitable for most uses. Irrigation is the major water user in the basin with approximately 12,700 acres of land irrigated in the basin. Known groundwater-quality problems existing in the Upper San Pedro River basin include nitrate contamination of groundwater near St. David and sulfate contamination in the Bisbee-Naco area (ADWR 1998).

3.9.4 Potential Sources of Contamination

According to existing data, none of the assessed and monitored stream segments in the study area can fully support their designated uses. The major causes of stream/riverine non-attainment include metals, ammonia, low dissolved oxygen, turbidity, total dissolved solids, and fecal coliform bacteria. The potential sources contributing to non-attainment include municipal point sources, agriculture irrigation and recirculation, range management, mining, and non-point sources.

Groundwater assessments within the study area indicate that the most common sources for potential contamination of water resources include: (1) high nitrate and ammonia levels from sewage treatment plants, individual septic systems, and fertilizer use; (2) microorganisms from septic tanks and raw sewage from Mexico; (3) trace metals (i.e., lead, mercury, barium, copper, zinc, and cadmium) from mining and mineral milling; (4) increased pesticides (e.g., DBCP and EDB), total dissolved solids, and sulfate levels from agricultural irrigation; (5) natural and synthetic organic compounds from commercial and industrial sites; (6) petroleum products and fuel additives from service stations, highway spills, and leaky underground storage tanks; and (7) hazardous waste sites.

Rock formation with fractures and high porosity can be pathways for groundwater underflow. Consequently, the chemical nature of the minerals that compose the rocks will influence the quality of the water. Areas with large deposits of metallic ore may be natural sources of potentially toxic concentrations of heavy metals and associated compounds (ADWR 1998).

3.9.5 Effected Watershed Descriptions

3.9.5.1 Whitewater Draw

The Whitewater Draw watershed covers 1,183 square miles of southern Cochise County surrounding the town (154-mile perimeter) of Douglas, Arizona. There are four major rivers and streams within the watershed: Big Bend Creek, Gadwell Can, Leslie Creek, and Whitewater Draw. The approximate total river miles are 1,250, with only 84 of these listed as perennial. Forest habitat constitutes less than 25% of surrounding riparian habitat. Aquifer types are listed and described in Table 3-8. The Environmental Protection Agency (EPA) scores the watershed as a “3”, meaning “Less Serious Water Quality Problems”. The score also indicates the watershed is in a level of “Low Vulnerability” with respect to possible future water quality problems. Two portions of Whitewater Draw northwest and north of Douglas have shown problems with dissolved oxygen, lead, manganese, zinc, arsenic, beryllium, copper, and turbidity. Mining operations and grazing have attributed to these concerns. These parameters have all been listed pursuant to Section 303 (d) of the Clean Water Act (CWA) (EPA 2000b).

Table 3-8
Aquifer Types-Whitewater Draw

Aquifer	Square Miles	Rock Type
Basin and Range	849	Unconsolidated sand and gravel aquifers
No Principal Aquifer	318	N/A
Basin and Range Carbonate-rock aquifers	22	Carbonate-rock aquifers

Source: EPA, Watershed Profile, 6/2000b

3.9.5.2 San Pedro

The Upper San Pedro watershed covers 1,778 square miles of southern Cochise County between the towns of Benson and Bisbee, Arizona. There are five major rivers and streams within the watershed: Babocomari River, Dragoon Wash, Tres Alomos Wash, Walnut Gulch, and San Pedro River. The approximate total river miles are 2329, with 258 miles described as perennial. Forest habitat constitutes less than 25% of surrounding riparian habitat. Aquifer types are listed and described in Table 3-9. The EPA scores the watershed as a "3", meaning "Less Serious Water Quality Problems". The score also indicates the watershed is in a level of "Low Vulnerability" with respect to possible future water quality problems. Extensive sections of the San Pedro River have shown problems with Fecal Coliform, Nitrates, and Turbidity. Cattle production, sand mining, and crop production have attributed to these concerns. These parameters have all been listed pursuant to Section 303 (d) of the Clean Water Act (CWA) (EPA 2000c).

Table 3-9
Aquifer Types-San Pedro

Aquifer	Square Miles	Rock Type
Basin and Range	1339	Unconsolidated sand and gravel aquifers
No Principal Aquifer	385	N/A
Basin and Range Carbonate-rock aquifers	75	Carbonate-rock aquifers

Source: EPA, Watershed Profile, 6/2000c

3.10 SOCIOECONOMICS

3.10.1 Population

The Region of Influence (ROI) for the infrastructure is Cochise County. The 1999 population of Cochise County was estimated to be 112,564 which ranked eighth in the state of Arizona (U.S. Bureau of the Census 1998). This is an increase of 15% over the revised 1990 census population of 97,624. There are four major communities within the project study area, Huachuca City, Bisbee, Douglas, and Sierra Vista. The following table (Table 3-10) presents their populations for 1990 and 1998.

Table 3-10
Population of Selected Communities in the Project Area

Community	1990	1998	Percent Increase
Huachuca City	1,782	2,035	14
Bisbee	6,288	6,525	4
Douglas	12,822	15,150	18
Sierra Vista	32,983	39,995	21

Source: Arizona Department of Commerce, 2000

The racial mix of the Cochise County is mainly comprised of Caucasians (90%) and African-Americans (5%). The remaining 5% is split among Asian and Pacific Islanders, Native Americans and other races. Less than half of the total population (34%) claim to be of Hispanic origin. This has changed slightly from the 1990 racial mix mainly comprised of Caucasians (82%) and African-Americans (5%) with the remaining 13% split among Asian and Pacific Islanders, Native Americans, and other races (U.S. Bureau of the Census 1998).

3.10.2 Employment, Poverty Levels, and Income

The total number of jobs in the study area was 47,008 in 1997, which was an increase of 16% over the 1990 number of jobs of 40,666 (Regional Economic Information System 2000). The government sector provided the most jobs followed by the services industry and the retail trade industry. The January 1997 seasonally adjusted unemployment rate for Cochise County was 9.7%t. This is higher than the January unemployment rate for

the state of Arizona of 5.4% (Arizona Department of Economic Security, Research Administration, 2000).

The 1997 annual total personal income (TPI) for the ROI was $1,846,456 (in thousands of dollars). This TPI ranked eighth in the state of Arizona and accounted for 1.8% of the state total (Regional Economic Information System 2000). This was a 47% increase over the 1990 TPI of $1,259,406. Over the past ten years the average annual growth rate of TPI was 5.7%. This is lower than the annual growth rate for the state of 7.1% and only slightly lower than that for the nation of 5.8%. Per capita personal income (PCPI) for Cochise County was $16,532 in 1997. This PCPI ranked ninth in the state, and was 75% of the state average, $21,998, and 65 % of the national average, $25,288. This represents a 28% increase over the 1990 PCPI of $12,872. The average annual growth rate of PCPI over the past 10 years was 4.2%, which was the same as the state's growth rate of 4.2% and only slightly lower than the national growth rate of 4.7%. The estimated number of people of all ages in poverty for Cochise County was 22,229. This represented 20.7% of the County, which is higher than the estimated 16.3% of the state population that lives in poverty.

3.10.3 Housing

The total number of housing units in the ROI was 40,238 in 1990 (U.S. Bureau of the Census 1991). This represents two % of the total housing units reported for the state of Arizona. Of the housing units within Cochise County, 34,546 (86%) are occupied and the remaining 5,692 (14%) are vacant. Approximately 64% (21,983) of the occupied housing units are owner occupied, while 36% (12,563) are renter occupied (U.S. Bureau of the Census 1991). The number of households within Cochise County grew from 34,546 in 1990 to an estimated 42,309 in 1998. This represents an annual growth rate of 2.6% for the County (Arizona Housing Commission 1999). This is below the annual growth rate of 3.4% for the state of Arizona. New building permits for each of the four major communities within Cochise county is given in the table (Table 3-11) below for both 1990 and 1997.

Table 3-11
New Building Permits by Community

Community	1990	1997	Percent Change
Huachuca City	14	41	192
Bisbee	79	N/A	N/A
Douglas	150	118	-21
Sierra Vista	135	1,184	777

Source: Arizona Chamber of Commerce, Community Profiles

3.11 NOISE

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (community annoyance). Measurement and perception of sound involves two basic physical characteristics: amplitude and frequency. Amplitude is a measure of the strength of the sound and is directly measured in terms of the pressure of a sound wave. Because sound pressure varies in time, various types of pressure averages are usually used. Frequency, commonly perceived as pitch, is the number of times per second the sound causes air molecules to oscillate. Frequency is measured in units of cycles per second, or Hertz (Hz).

Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as a sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Because of the logarithmic nature of the decibel scale, sound levels do not add and subtract directly. If a sound's intensity is doubled, the sound level generally increases by 3 dB, regardless of the initial sound level. For instance:

60.0 dB + 60.0 dB = 63 dB and 80.0 dB + 80.0 dB = 83 dB

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB

The normal human ear can hear frequencies from about 20 Hz to about 20,000 Hz. It is most sensitive to sounds in the 1,000 to 4,000 Hz ranges. When measuring community response to noise, it is common to adjust the frequency content of the measured sound to correspond to the frequency sensitivity of the human ear. This adjustment is called A-weighting (American National Standards Institute [ANSI] 1988). Sound levels that have been so adjusted are referred to an A-weighted sound levels. The amplitude of A-weighted sound levels is measured in dB. It is common to denote the unit of A-weighted sounds by dBA or dB(A).

Figure 3-12 is a chart of A-weighted sound levels of typical sounds. Some (air conditioner, vacuum cleaner) are continuous sounds whose levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle passby. Some (urban daytime, urban nighttime) are averages over some extended period.

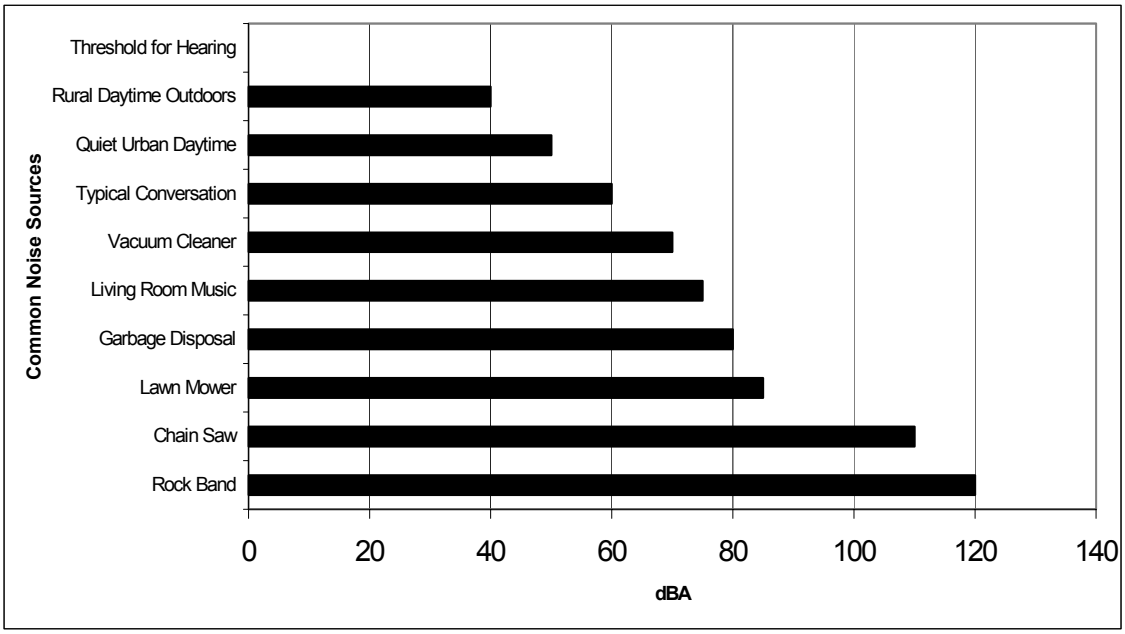


Figure 3-12. Typical Sound Levels of Common Noise Sources

Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). DNL is the community noise metric recommended by the U.S. Environmental Protection Agency (U.S. Environmental Protection Agency [USEPA] 1972) and has been adopted by most Federal agencies (Federal Interagency Committee on Noise [FICON] 1992).

A DNL of 65 dB is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction which do cause noise. Areas exposed to DNL above 65 dB are generally not considered suitable for residential use. A DNL of 55 dB was identified by EPA as a level below which there is effectively no adverse impact (USEPA 1972). This is the lowest level at which adverse health effects could be credible in a DNL of 75 dB (USEPA 1972). The very high annoyance levels make such areas unsuitable for residential land use.

SECTION 4.0
ENVIRONMENTAL CONSEQUENCES

CHAPTER 4—ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This section of the EA addresses potential impacts to the affected environment within the Naco-Douglas Corridor area for all three alternatives outlined in Section 2.0. For the purposes of this impact analysis, several assumptions were made by the NEPA Team regarding the area of potential impact for each type of infrastructure project. Road upgrade and maintenance activities were considered to widen the road bed by 16 feet, from eight to 24 feet. New road construction, however, was defined as a 12-foot wide right-of-way (ROW). Construction ROWs for fences and vehicle barriers were estimated to be 10 feet wide, although much of this ROW would probably be only temporarily altered. Installation or placement of stadium-style and portable lights were estimated to affect 400 square feet (ft^2) and 100 ft^2, respectively. The area affected by illumination from stadium-style and portable lights, however, was 400 feet and 200 feet, respectively, from the light source in any direction. It should be emphasized that all of these estimates should be considered worst case scenarios. For example, most road upgrade or improvement project actually widened the road ROW by less than six feet. Also, portable lighting effects are considered to occur along the entire corridor where they could be placed. In reality, only part(s) of the corridor would be illuminated at a given time since portable lights would be periodically relocated to provide the most effective deterrent and enforcement strategy. Given these assumptions, impacts from past activities, current activities, and potential impacts from future activities within the Naco-Douglas Corridor are quantified in Table 4-1.

The potential effects of all three alternatives are addressed in this chapter. Again, the three alternatives are the No Action alternative (which involves only past and completed projects), the Current Action alternative (which includes past/completed projects and currently approved or funded projects) and the Future Action alternative (which includes all projects of the previous two alternatives plus any other proposed project that has not yet been approved or funded).

Table 4-1

Past, Current, and Future Potential Impacts to the Natural Environment for Each Alternative

Item*	PROJECT DESCRIPTION	AREA IMPACTED (square feet)	AREA IMPACTED (acres)
NO ACTION ALTERNATIVE			
N-1	Border Road Improvements (32 miles X 16 feet)	2,703,360	62.06
N-2	Stadium Light Installation (8 poles X 400 ft^2)	3,200	0.07
N-2(a)	Stadium Light Area of Illumination (2 miles X 400 feet)	4,224,000	96.97
N-3	Retrofit of RVS (1 site)	0.0	0.0
D-1	Border Road Improvements (25 miles X 16 feet)	2,112,000	48.48
D-2	Fence Replacement (5 miles X 10 feet)	264,000	6.06
D-3	New Road Construction (0.5 miles X 12 feet)	31,680	0.73
D-4	Stadium Light Installation (20 poles X 400 ft^2)	8,000	0.18
D-4(a)	Stadium Light Area of Illumination (5 miles X 400 feet)	10,560,000	242.42
D-5	Light Pole ROW Upgrade (5 miles X 8 feet)	211,200	4.85
D-6	RVS Installation (8 sites X 400 ft^2)	3,200	0.07
D-7	Portable Generator Lighting (73 lights X 100 ft^2)	7,300	0.17
D-7(a)	Portable Lighting Area of Illumination (11.5 miles X 200 feet)	12,144,000	288.79
D-8	New Road Construction (2 miles X 12 feet)	126,720	2.91
	No Action Alternative Total		**753.76**
CURRENT ACTION ALTERNATIVE			
N-1	Fence Construction (9 miles X 10 feet)	475,200	10.91
N-2	Vehicle Barrier Construction (6.25 miles X 10 feet)	330,000	7.58
N-3	Road Improvements (8 miles X 16 feet)	675,840	15.52
N-4	Stadium Light Installation (20 poles X 400 ft^2)	8,000	0.18
N-4(a)	Stadium Light Area of Illumination (5 miles X 400 feet)	10,560,000	242.42
N-5	RVS Installation (8 sites X 400 ft^2)	3,200	0.07
N-6	Low Water Crossings (2 locations X 1000 ft^2)	2,000	0.05
D-1	RVS Installation (5 sites X 400 ft^2)	2,000	0.05
D-2	Portable Generator Lighting (73 lights X 100 ft^2)	7,300	0.17
D-2(a)	Portable Lighting Area of Illumination (11.5 miles X 200 feet)	12,144,000	278.79
	Current Action Alternative Total		**555.72**
	No Action and Current Action Alternative Total		**1,309.48**
FUTURE INFRASTRUCTURE ALTERNATIVE			
N-1	Portable Generator Lighting (73 lights X 100 ft^2)	7,300	0.17
N-1(a)	Portable Lighting Area of Illumination (11.5 miles X 200 feet)	12,144,000	288.79
N-2	USBP Station Construction	130,680	3.00
N-3	RVS Installation (12 sites X 400 ft^2)	4,800	0.11
D-1	Fence Construction – Bollard (30 feet x 10 feet)	300	>0.01
D-2	Fence Construction – Landing Mat (7.5 miles X 10 feet)	396,000	9.09
D-3	Stadium Light Installation (32 poles X 400 ft^2)	12,800	0.29
D-3(a)	Stadium Light Area of Illumination (8 miles X 400 feet)	16,896,000	387.88
D-4	RVS Installation (5 sites X 400 ft^2)	2,000	0.05
D-5	Road Upgrades (25 miles X 16 feet)	2,112,000	48.48
D-6	USBP Station Construction	130,680	3.00
	Future Infrastructure Action Total		**740.87**
	No Action, Current Action and Future Infrastructure Total		**2,050.35**

* Item number corresponds with item number for each alternative in Section 2.0

4.1 LAND USE

4.1.1 No Action Alternative

Implementation of the No Action alternative would not affect current land use within the Naco-Douglas Corridor because no further construction would occur. Maintenance of 32 miles of roads within the Naco Corridor occurred on existing roads; therefore, land use did not change. Similarly, land use was not affected by construction within the last five years in the Douglas Corridor because all construction was completed within the immediate area of Douglas, classified as an urban use. In addition, road, fence and most of the lights construction along the border in the entire corridor was completed within the 60-foot buffer zone along the border, which is regulated by the Federal government as specified under a Presidential Proclamation on May 27, 1907.

4.1.2 Current Action Alternative

Land use would not be affected by implementation of the Current Action alternative within the Naco-Douglas Corridor. Current infrastructure within the Naco-Douglas Corridor is located within the urban areas of Naco or Douglas, on existing roads, or within the 60-foot buffer zone along the border.

4.1.3 Future Infrastructure Alternative

Land use within the Naco-Douglas Corridor would not be significantly affected by implementation of the Future Infrastructure Alternative. Construction of new Border Patrol Stations in the USBP Naco would not affect land use because the site is proposed on lands already classified as urban. The proposed site for the Douglas Station, however, is at an old ranch site; land use, therefore, at this site would change from rangeland to developed. Less than 10 acres of land would be affected by this proposed project. Proposed construction (e.g., lights and fences) along the border in the Naco-Douglas Corridor would occur within the 60-foot buffer zone, although some temporary effects might occur within 150 feet of the US/Mexico border. Maintenance and/or improvements to roads within the Naco-Douglas Corridor would occur on existing roads. If road improvements are implemented within or near the San Pedro National

Conservation Area, which would require coordination and approval from BLM, construction would probably be restricted to existing roads. Therefore, no changes to land use in this area would occur. Recreational opportunities may be temporarily affected, however.

The only action that would affect land use to some extent is the installation of RVS sites in the Naco-Douglas Corridor. Most of these proposed sites will take place on land used privately, primarily for rangeland or grazing. Installation of RVS sites would require the surface disturbance of approximately 400 ft^2 at each pole location. With the exception of the physical pole locations, other areas disturbed by construction activities would be insignificant, and would return to their original state over time. The proposed operation of the permanent or portable lights would not have impacts to grazing and rangeland. Therefore, under the Future Infrastructure alternative, the overall land use of the project areas adjacent to each pole site would not significantly change.

4.2 SOILS AND PRIME FARMLAND

4.2.1 No Action Alternative

Implementation of the No Action alternative would eliminate direct disturbances to soils from further construction activities. Under the No Action alternative there was approximately 126 acres of soils impacted from prior construction and maintenance activities (Table 4-2). However, extant erosion problems would continue, since the USBP would continue to use the roads for patrol activities and no improvement actions would be implemented to control erosion. Soils found within the Naco Corridor have slight to medium erosion hazards, depending on the slope. Thus, improvements to the 32 miles of the border road must continue, particularly in areas of higher slopes. These improvements had a high impact on the Nickel-Latene-Cave Association (17.16 acres), the Casto-Martinez-Canelo Association (8.94 acres), and the White House-Bernardino-Hathaway Association (31.64 acres). However, these improvements occurred on the existing road adjacent to the border, so the soils were previously disturbed. The Tubac-Sonoita-Grabe Association is extensive throughout the Douglas Corridor and was the most impacted under the No Action alternative (46.16 acres). However, most of this

Table 4-2

Summary of Direct Impacts of Soils (Acres)

Project	Soil Associations (Acres)							Total
	KG	TSG	NLC/P	LTLH	CMC	WHBH	LHLA	
No Action								
N-1	0	0	17.16	0	8.94	31.64	4.32	62.06
N-2	0	0	0.07	0	0	0	0	0.07
N-3	0	0	0	0	0	0	0	0.00
D-1	0	32.18	2.45	13.86	0	0	0	48.48
D-2	0	5.18	0	0.88	0	0	0	6.06
D-3	0	0.73	0	0	0	0	0	0.73
D-4	0	0.18	0	0	0	0	0	0.18
D-5	0	4.85	0	0	0	0	0	4.85
D-6	0	0.06	0	0.01	0	0	0	0.07
D-7	0	0.07	0	0.10	0	0	0	0.17
D-8	0	2.91	0	0	0	0	0	2.91
No Action Total	**0**	**46.16**	**19.68**	**14.85**	**8.94**	**31.64**	**4.32**	**125.58**
Current Action								
N-1	0	0	2.05	0	0	8.86	0	10.91
N-2	0	0	2.73	0	0.43	1.73	2.69	7.58
N-3	0	0	2.66	0	0	12.86	0	15.52
N-4	0	0	0.14	0	0	0.03	0	0.18
N-5	0	0	0.07	0	0	0	0	0.07
N-6	0	0	0.05	0	0	0	0	0.05
D-1	0	0.04	0	0.01	0	0	0	0.05
D-2	0.04	0.11	0.01	0.01	0	0	0	0.17
Current Action Total	**0.04**	**0.15**	**7.71**	**0.02**	**0.43**	**23.48**	**2.69**	**34.52**
No Action and Current Action Total	**0.04**	**46.31**	**27.39**	**14.87**	**9.37**	**55.09**	**7.01**	**160.10**
Future Infrastructure								
N-1	0	0	0.07	0	0	0.10	0	0.17
N-2	0	0	3.00	0	0	0	0	3.00
N-3	0	0	0.06	0	0	0.06	0	0.12
D-1	0	0.01	0	0	0	0	0	0.01
D-2	0	6.16	0	2.93	0	0	0	9.09
D-3	0	0.21	0	0.08	0	0	0	0.29
D-4	0	0.05	0	0	0	0	0	0.05
D-5	0	31.84	2.45	14.20	0	0	0	48.48
D-6	0	3.00	0	0	0	0	0	3.00
Future Infrastructure Total	**0**	**41.27**	**5.58**	**17.21**	**0**	**0.16**	**0**	**64.21**
No Action, Current Action, and Future Infrastructure Total	**0.04**	**87.58**	**32.97**	**32.08**	**9.37**	**55.25**	**7.01**	**224.32**

Legend

KG = Karro-Gothard
TSG = Tubac-Sonoita-Grabe
NLC/P = Nickel-Latene-Cave/Pinaleno
LTLH = Lithic Torriorthents-Lithic Haplustolls-Rock Outcrop
CMC = Casto-Martinez-Canelo
WHBH = White House-Bernardino-Hathaway
LHLA = Lithic Haplustolls-Lithic Argiustolls-Rock Outcrop

construction occurred within the immediate area of Douglas, so these soils have been previously disturbed.

Implementation of the No Action alternative would have no effect on prime farmland in the study area because there are no prime farmlands.

4.2.2 Current Action Alternative

Implementation of this alternative would require approximately 35 acres of soils to be disturbed in addition to the 126 acres impacted under the No Action alternative (see Table 4-2). The two soil associations most impacted in the Naco Corridor would be the Nickel-Latene-Pinaleno (7.71 acres) and White House-Bernardino-Hathaway (23.48 acres) which have erosion hazards of slight to medium depending on the slope, so construction and maintenance activities on areas with high slopes must consider the potential for increased erosion. Installation of lights and RVS sites requires the surface disturbance of approximately 400 ft^2 at each location. The illumination of the stadium lights would not have impacts to soils.

In addition to direct disturbance impacts, installation of stadium lights and RVS sites, as well as use of portable light generators, have the potential for soil contamination due to accidental spills of fuels and lubricants. Use of secondary containment during installation and regular maintenance of the generators would aid in preventing this type of incident. However, most of the construction under the Current Action alternative in the Naco-Douglas Corridor would occur immediately adjacent to the border where soils are previously disturbed by urban development and associated activities (e.g., vehicular traffic). Thus, soils would not be significantly impacted under the Current Action alternative.

4.2.3 Future Infrastructure Alternative

Implementation of the Future Infrastructure alternative would require approximately 64 acres of soils to be disturbed in addition to the 160 acres impacted under the No Action and Current Action alternatives (see Table 4-2). Two soil associations that would be impacted in the Naco Corridor are Nickel-Latene-Pinaleno (5.58 acres) and White

House-Bernardino-Hathaway (0.16 acres). These soils have erosion hazards of slight to medium (depending on the slope) so construction on areas with high slopes must use Best Management Practices to avoid increased erosion. The two soil associations that would be impacted in the Douglas Corridor are Tubac-Sonoita-Grabe (41.27 acres) and Lithic Torriorthents-Lithic Haplustolls-Rock Outcrop (17.21 acres), primarily due to road maintenance and upgrades (to all-weather surface). Both associations have slight erosion hazards so construction would not be expected to increase erosion; however, both contain a high rock content, so construction must be planned accordingly.

Installation of stadium lights and RVS sites requires the surface disturbance of approximately 400 ft^2 at each location. Use of portable generator lights requires the surface disturbance of approximately 100 ft^2 at each location. The illumination of the stadium and portable lights would not have impacts to soils. Construction of new Border Patrol Stations in Douglas and Naco would require three acres of soils each to be disturbed. However, these new stations would be erected in areas of urban development, so the soils have been previously disturbed.

In addition to direct disturbance impacts, installation of stadium lights and RVS sites, as well as use of portable light generators, have the potential for soil contamination due to accidental spills of fuels or lubricants. Use of secondary containment during installation and regular maintenance of the generators would aid in minimizing the potential for soil contamination.

As in the other alternatives, the majority of the construction under the Future Infrastructure alternative would occur in proximity to the border, where soils have been previously disturbed by urban development or prior USBP activities (e.g., roads). Any construction activity conducted must evaluate the erosion potential of the project area soils and incorporate erosion control designs, to the construction plan. A Stormwater Pollution Prevention Plan (SWPPP) would be required for all construction sites greater than five acres. Prime and unique farmlands are not found within the Naco-Douglas Corridor (Wilson 2000; Bemis 2000).

4.3 VEGETATION

Types and magnitude of impacts to vegetation communities from USBP projects are varied. Where practicable, the agency attempts to avoid impacts to native vegetation by utilizing existing or previously disturbed areas or by implementing actions with less potential for ground disturbances. Disturbed lands include those that have been graded, paved, plowed, or replanted with non-native vegetation. Some concerns exist that improved roads could increase opportunities for trespassing and poaching, especially for sensitive species that are valued by collectors. However, enhanced patrol efforts allowed by improved infrastructure would reduce illegal traffic and the potential for poaching activities. Some USBP stations have experienced such reductions, as indicated by significant decreases in apprehensions in areas where road improvement projects were completed (USBP 1998).

Indirect effects have occurred to vegetation by illegal entrants diverting around fences or away from areas that are heavily patrolled. Improvements in the infrastructure and increases in patrol activities have resulted in some illegal entrants redirecting their efforts into other more remote areas. Increases in illegal foot and vehicle traffic would result in damages to vegetation. These damages would be expected to be offset, however, by the reduced damages from illegal traffic in other areas that the illegal entrants were avoiding. The use of artificial lighting may also negatively affect vegetation by altering the natural rate of photosynthesis and respiration (Kaufman and Christensen 1987). The magnitude of these effects would depend upon the frequency and magnitude of lighting use.

4.3.1 No Action Alternative

Infrastructure completed in the last five years included new road construction, road improvements, fence construction and replacement, ROW upgrade, and lighting and RVS system installation. Based on the information previously presented in Table 4-1, approximately 126 acres of vegetation have been directly impacted by projects completed in the last five years. An additional 677 acres of vegetation has been indirectly affected by artificial lighting (Table 4-3). As indicated in Table 4-4, the majority of the direct and indirect impacts occurred in the semi-desert grassland Chihuahuan desertscrub community type (see also Figure 3-7 and Figure 3-8).

Table 4-3
Summary of Direct and Indirect Impacts to Vegetation

Alternatives	Direct Impacts (acres)	Indirect Impacts (acres)
No Action Alternative		
Road upgrades, new road construction, fence replacement, light pole installation, and ROW upgrade	126	
Lighting - area of illumination		628
Current Action Alternative		
Fence construction, vehicle barrier construction, road improvements, RVS and portable lighting installation, low water crossings.	35	
Lighting - area of illumination		521
Future Infrastructure Alternative		
Portable lighting and RVS installation, road improvements, fence construction, and USBP station construction	64	
Lighting – area of illumination		677
Total	**225**	**1,826**

Table 4-4
Summary of Direct Impacts by Vegetation Community Type (Acres)

Project	Vegetation Community Type (Acres)					Total
	CDS	MEW	PMCF	PG	SDG	
No Action						
N-1	10.85	10.85	0	5.42	34.95	62.06
N-2	0	0	0	0	0.07	0.07
N-3	0	0	0	0	0	0
D-1	44.11	0	0	0	4.37	48.48
D-2	1.54	0	0	0	4.52	6.06
D-3	0	0	0	0	0.73	0.73
D-4	0.09	0	0	0	0.09	0.18
D-5	2.72	0	0	0	2.13	4.85
D-6	0.03	0	0	0	0.04	0.07
D-7	0.17	0	0	0	0	0.17
D-8	2.10	0	0	0	0.81	2.91
No Action Total	**61.61**	**10.85**	**0**	**5.42**	**47.71**	**125.58**
Current Action						
N-1	0	0	0	0	10.91	10.91
N-2	1.37	2.30	0	3.58	0.33	7.58
N-3	0	0	0	0	15.52	15.52
N-4	0.09	0	0	0	0.09	0.18
N-5	0.01	0	0	0	0.06	0.07
N-6	0	0	0	0	0.05	0.05
D-1	0.05	0	0	0	0	0.05
D-2	0.15	0	0	0	0.02	0.17
Current Action Total	**1.67**	**2.30**	**0**	**3.58**	**26.98**	**35.52**
No Action and Current Action Total	**63.28**	**13.15**	**0**	**9.00**	**74.69**	**160.10**
Future Infrastructure						
N-1	0.01	0	0	0	0.16	0.17
N-2	3.00	0	0	0	0	3.00
N-3	0.01	0.02	0	0.01	0.07	0.11
D-1	0	0	0	0	0.01	0.01
D-2	8.88	0	0	0	0.21	9.09
D-3	0.24	0	0	0	0.05	0.29
D-4	0.05	0	0	0	0	0.05
D-5	44.20	0	0	0	4.28	48.48
D-6	0	0	0	0	3.00	3.00
Future Infrastructure Total	**56.39**	**0.02**	**0**	**0.01**	**7.78**	**64.21**
No Action, Current Action, and Future Infrastructure Total	**119.67**	**13.17**	**0**	**9.01**	**82.47**	**224.32**

Legend

CDS – Chihuahuan Desertscrub
MEW – Madrean Evergreen Woodland
PMCF – Petran Montane Conifer Forest
PG – Plains Grassland
SDG – Semi-desert Grassland

4.3.2 Current Action Alternative

Infrastructure that is currently being constructed by INS/USBP includes road improvements, vehicle barrier construction, fence construction, low water crossings, and lighting and RVS system installation. Based on the information presented in Table 4-1, approximately 35 acres of vegetation would be directly impacted by current construction activities. When combined with the 126 acres directly impacted in the No Action alternative the total amount of vegetation potentially lost for this alternative rises to approximately 160 acres. Lighting projects outlined in the Current Action alternative would indirectly affect approximately 521 acres. When combined with the acreage indirectly impacted in the No Action alternative, the total acreage of indirect impacts due to artificial lighting rises to 1,149 acres (see tables 4-3 and 4-4).

The majority of the direct and indirect impacts occurred in the Semi-desert Grassland community type and in the Chihuahuan desertscrub community type (see Figure 3-7 and Figure 3-8). However, a vehicle barrier, if constructed in the southwest portion of the Naco Station project area, would be within the plains grassland and Madrean evergreen woodland community types (see Figure 2-3). Plains grasslands account for only three percent and Madrean evergreen woodlands account for only 15 percent of the total project area. Approximately 3.6 acres of plains grassland and 2.3 acres of Madrean evergreen woodlands would be impacted during construction (see Table 4-4).

A site-specific survey of five RVS sites was recently performed as part of the Current Action alternative. Four of the sites had been disturbed and consisted primarily of Chihuahuan desert scrubbrush communities. One site, however, was a fairly pristine site that exhibited Sonoran desert flora. Using the assumptions presented in Section 4.0, construction activities would temporarily affect about 2000 ft^2 (5 x 400 ft^2) to vegetation would Permanent losses would most likely be less than 100 ft^2 each. Additional information regarding these proposed RVS sites are included in Appendix C.

4.3.3 Future Infrastructure Alternative

In addition to those projects currently being constructed and those completed during the past five years, this alternative would include several construction projects involving

roads, bridges, fences, and ISIS components. Based on the information presented in Table 4-1, approximately 64 acres of vegetation would be directly impacted with the implementation of the Future Infrastructure alternative. When combined with the acreage from the No Action and Current Action Alternatives the total amount of direct impacts to vegetation would be 224 acres. Additionally, indirect impacts from future projects due to lighting would be 677 acres. When combined with the acreage indirectly impacted from the No Action and Current Action Alternatives, the total acreage of indirect impacts due to artificial lighting rises to 1,826 acres (see tables 4-3 and 4-4).

Construction of border patrol stations at both Naco and Douglas has been proposed (see Table 3-7 and Table 3-8). The Naco Station would be constructed within the Chihuahuan desertscrub community type and would impact approximately three acres. The Douglas Station would be constructed within the semi-desert grassland community type and would also impact approximately three acres (see Table 4-4).

Road maintenance and improvements are proposed for the project area immediately adjacent to the border. These activities occur in semi-desert grasslands and Chihuahuan desertscrub communities. The addition of portable generator lights along the border has also been proposed. The lights could be placed anywhere along a 11.5-mile stretch of the corridor and could be placed in Semi-desert Grassland, Chihuahuan Desertscrub, and/or Plains Grasslands community types.

4.4 WILDLIFE

4.4.1 No Action Alternative

Based on the information presented in Table 4-1, approximately 126 acres of wildlife habitat have been impacted by the fence construction, new road construction, road improvements, and the installation of stadium lighting and RVS sites in the past five years. Of these 126 acres, 62 acres is located in Chihuahuan desertscrub, 48 acres are located in semi-desert grassland, 11 acres is located in Madrean Evergreen Woodland, 5 acres is located in plains grassland.

However, wildlife populations in the area were not significantly impacted by habitat loss due to the linear nature of the clearing for road construction, upgrade, and fence and

stadium lighting right-of-ways, and, more importantly, due to the highly degraded and disturbed nature of the majority of the project sites. In general, the No Action alternative did not result in a significant reduction in the number of animals whose home range is within or adjacent to the project area, and no change in the overall species composition of the area occurred due to these projects.

Wildlife movement in the project area has been impacted by the infrastructure construction and maintenance over the past five years. The greatest movement of small animals generally happens when a disturbance such as road grading, dozing, or fence construction occurs. Mobile animals escaped to areas of similar habitat, while other slow or sedentary animals such as reptiles, amphibians, and small mammals were potentially lost. This displacement and/or reduction in the number of animals did not significantly impact animal communities due to the presence of similar habitat adjacent to the project corridor. Larger terrestrial wildlife movements in the construction and maintenance areas were not affected due to the short duration of time for construction activities at each site. Additionally, construction activities were only conducted during daylight hours. No construction activities were conducted during the early morning hours or night time hours when wildlife species are most active.

Roads and fences resulted in other indirect impacts. Improved roads, by design, increased the speed at which vehicles travel and increased traffic as well. Higher vehicular speeds decreased the response time for wildlife to avoid the vehicles, thus, potentially increased the number of accidental wildlife deaths. Fences serve as a barrier to wildlife species; the magnitude of this effect depends upon the fence design and location. Fences that would impact a physical barrier to wildlife are generally constructed at or near POEs, which are located within very developed areas. Consequently, such fences do not to have a significant effect on wildlife movement. Vehicle barriers do not impede wildlife movement nor remove/alter significant amounts of wildlife habitat.

On the other hand, roads and fences have afforded protection to some wildlife species and other sensitive resources. Fences do significantly reduce illegal entries and, indirectly, reduce the amount of foot traffic within wildlife communities on the U.S. side of the border. Similarly, improved roads have increased the efficiency of USBP agents to apprehend illegal entrants. Less illegal traffic results in fewer off-road impacts to wildlife populations.

Impacts to wildlife resulting from operation of the high intensity lighting at night occurred. The adverse and/or beneficial affects of lighting on reptiles and amphibians is currently unknown; however, continual exposure to light has been proven to slightly alter circadian rhythms in mammals and birds. Studies have proven that under constant light, the time an animal is active, compared with the time it is at rest, increases in diurnal animals, but decreases in nocturnal animals (Carpenter and Grossberg 1984). Also, in diurnal animals, the total amount of active time increases with light intensity, while the reverse is true in nocturnal species (Carpenter and Grossberg 1984). The alteration of circadian rhythms by high intensity lighting is minimal, accounting for a maximum of two to three hours of increase or decrease in activity per day (Luce 1977). It has also been shown that within several weeks under constant lighting, mammals and birds will quickly stabilize and reset their circadian rhythms back to their original schedules. The long-term effect of an increased photoperiod on mobile wildlife species is expected to be insignificant. Given the vast open area within the project corridor, animals can easily relocate to adjacent areas of darkness. The lighting in the project area is not constant, and the position of the lights allow for some dark areas to still exist. Therefore, impacts of lighting to wildlife were probably short-term and minimal.

No surface waters with the capacity to contain fish were filled or dredged during the construction activities; therefore, no fish or other aquatic assemblages were impacted by the No Action alternative.

Table 4-5 presents estimates of individual wildlife that were potentially lost as a result of the No Action alternative. It should be emphasized however, that these are worst case estimates for the entire 5-year period (years 1995 to 1999).

Table 4-5
Potential Losses to Wildlife Populations
from Habitat Alterations Under the No Action Alternative

Project Type	Acres	Lizards		Birds		Mammals	
		Min.	Max.	Min.	Max.	Min.	Max.
Roads	119.03	238	1,666	6	107	32	68
Fences	6.06	12	85	0	5	2	3
Stadium lighting	0.5	1	7	0	0	0	0
RVS Installation	0.07	0	1	0	0	0	0
TOTAL	**125.58**	**251**	**1,759**	**6**	**112**	**34**	**71**

[1] Minimum lizard density 2 individuals/acre; Maximum lizard density 14 individuals/acre; Minimum bird density 0.05 individuals/acre; Maximum bird density 0.90 individuals/acre; Minimum small mammal density 0.27 individuals/acre; Maximum small mammal density 0.57 individuals/acre

Source: U.S. Army, 1994 and GSRC

4.4.2 Current Action Alternative

Infrastructure that is currently approved in the Naco-Douglas corridor includes fence construction, vehicle barricade construction, road improvements, low water crossing construction, stadium lighting and RVS system installation, and the use of portable generator lights. Approximately 35 acres of wildlife habitat would be impacted by the current projects (see Table 4-1). This 35 acres consists of approximately two acres of Chihuahuan desertscrub, two acres of Madrean evergreen woodland, four acres of plains grassland, and 27 of semi-desert grassland. When combined with the 126 acres impacted during the last five years, the total amount of wildlife habitat potentially impacted for this alternative rises to about 160 acres.

Impacts under the Current Action alternative are similar in nature as stated under the No Action alternative in Section 4.4.1; however, there is an increase in the area of impact, resulting in an increase in wildlife loss. Wildlife populations in the area would not be significantly impacted by habitat loss as a result of past and current infrastructure construction because displacement and disturbance of wildlife is temporary and insignificant. In addition, impacts of lighting to wildlife are short-term and minimal.

Table 4-6 presents estimates of individual wildlife that would potentially be lost as a result of the Current Action alternative. It should be emphasized however, that these are worst case estimates for the entire 6-year period (from 1995 to 2000), including completed projects and projects currently planned or approved.

Table 4-6
Potential Losses to Wildlife Populations
from Habitat Alterations Under the Current Action Alternative

Project Type	Acres	Lizards		Birds		Mammals	
		Min.	Max.	Min.	Max.	Min.	Max
Roads	15.52	31	217	1	14	5	9
Fences	10.91	22	153	1	10	3	6
Vehicle Barriers	7.58	15	106	0	7	2	4
Stadium lighting	0.17	0	2	0	0	0	0
Other Projects	0.34	1	5	0	0	0	0
No Action Alternative Total	125.58	251	1,759	6	112	34	71
TOTAL	**160.10**	**320**	**2,242**	**8**	**143**	**44**	**90**

[1] Minimum lizard density 2 individuals/acre; Maximum lizard density 14 individuals/acre; Minimum bird density 0.05 individuals/acre; Maximum bird density 0.90 individuals/acre; Minimum small mammal density 0.27 individuals/acre; Maximum small mammal density 0.57 individuals/acre

Source: U.S. Army, 1994 and GSRC

4.4.3 Future Infrastructure Alternative

Based on the information presented in Table 4-1, approximately 64 acres of wildlife habitat would be lost due to future projects, which include fence construction, vehicle barrier construction, road improvements, and stadium lighting and RVS installation. This impact area consists of approximately 56 acres of Chihuahuan desertscrub, eight acres of semi-desert grassland, and less than one acre each of Madrean evergreen woodland and plains grassland. When combined with the 126 acres from the No Action alternative and the 35 acres from the Current Action alternative, the total amount of wildlife habitat potentially impacted would be about 224 acres.

Although the kinds of impacts to wildlife are similar, the magnitude of the effects under the Future Action alternative would be greater due the increased habitat losses. Displacement and disturbance of wildlife under this alternative would be considered

temporary and insignificant. In addition, impacts of lighting to wildlife would be short-term and minimal. Table 4-7 presents estimates of individual wildlife lost as a result of the Future Infrastructure alternative. It should be emphasized however, that these are worst case estimates for completed, current and future proposed projects.

Table 4-7
Potential Losses to Wildlife Populations
from Habitat Alterations Under the Future Infrastructure Alternative

Project Type	Acres	Lizards		Birds		Mammals	
		Min.	Max.	Min.	Max.	Min.	Max
Roads	48.48	97	679	2	44	13	28
Fences	9.10	16	110	0	7	2	5
Stadium lighting	0.29	1	4	0	0	0	0
RVS Installation	0.16	0	2	0	0	0	0
Other Projects	6.17	12	86	0	6	2	4
No Action Alternative Total	160.10	320	2,242	8	143	44	90
TOTAL	**232.47**	**446**	**3,123**	**10**	**200**	**61**	**127**

[1] Minimum lizard density 2 individuals/acre; Maximum lizard density 14 individuals/acre; Minimum bird density 0.05 individuals/acre; Maximum bird density 0.90 individuals/acre; Minimum small mammal density 0.27 individuals/acre; Maximum small mammal density 0.57 individuals/acre

Source: U.S. Army, 1994 and GSRC

4.5 UNIQUE OR SENSITIVE AREAS

There are several areas classified as unique natural areas found within this the proposed project area. These areas of concern are described previously in Section 3.5, and represented in Figure 3-9, as well. These special areas consist of pristine or near-pristine areas in or adjacent to mountains or broad riparian areas, both of which provide rare ecological assemblages for this arid region. Although these areas are in the region of the proposed actions, the locations which may be impacted are already disturbed from pubic and private development such as, grazing, pedestrian and traffic use from tourists and associated impacts such as erosion and vegetation removal. Impacts to these wild and scenic areas may also include adverse effects to the intrinsic aesthetic values of the natural scenery (drag roads), lack of human contact (patrols) or presence (stadium and portable lights).

4.5.1 No Action Alternative

The projects that have occurred within the last five years have mainly consisted of road maintenance and construction, as well as various lighting improvement projects. Border road improvements have occurred as required by safety and or efficiency issues along the 32 miles of the Naco/Mexican border to enhance USBP patrol activities. Some of this maintenance occurred along the border shared by the Coronado National Memorial. These improvements have impacted approximately 10.2 acres of the Coronado National Memorial land. Such activities may have created situations of dust, noise, and visual impacts, which may be considered adverse to those using the park. These actions, however, are short in duration, and are a necessary part of ensuring adequate protection of the Memorial and its visitors through deterrence and apprehension of illegal entrants by USPB agents. These road improvements have also impacted the San Pedro National Forest. Approximately 6900 feet of roadside or 2.3 acres of area have been impacted due to the road improvements.

4.5.2 Current Action Alternative

The only current project within a unique and sensitive area is a 4-mile stretch of vehicle barriers located within the Coronado National Memorial. These barriers would impact approximately 211,200 square feet or 4.8 acres of roadside. The barriers are placed within 10 feet from the road ROW and typically within the 60-foot buffer zone along the International border. This Memorial is within the jurisdiction of the National Park Service, thus any deviation from the approved placement of these barriers would require close coordination and approval.

Impacts from the placement of these structures may be described as diminishing the aesthetic value of the natural beauty of the surrounding areas. However, security measures due to the proximity of the International border, justify these impacts in terms of safety to the Memorial's visitors and to protect the Memorial's other sensitive resources. The visual impacts of these barriers are far outweighed by the protection afforded to insure safer public use of this natural area. Therefore, no significant adverse impacts would be expected to occur as a result of these actions.

4.5.3 Future Infrastructure Alternative

Only one proposed project is located within a sensitive area, the proposed 11.5 miles of portable generator lights. This project is within or near the boundaries of the San Pedro National Conservation Area (NCA). These lights would be portable; therefore, they would not necessarily remain in the area for extended periods of time. Placement of any lights, however, that would illuminate lands within the San Pedro NCA would require close coordination with and permits from the BLM.

4.6 PROTECTED SPECIES AND CRITICAL HABITATS

Protected species in the project area are concentrated near the San Pedro River and the Huachuca Mountains (see Figure 3-10). The loach minnow, spikedace, Huachuca water umbel, Sonora tiger salamander, and southwestern willow flycatcher have all been documented in or near the San Pedro River area. The Gila chub has not been documented, but is likely to occur, in the San Pedro River. Additionally, the densely vegetated riparian areas associated with the San Pedro River are preferred habitats for the jaguarundi and ocelot. The Huachuca water umbel, lesser long-nosed bat, lemon fleabane, Sonora tiger salamander, Chiricahua leopard Frog, and Mexican spotted owl have all been documented within the Huachuca Mountains.

The USFWS has designated that portion of the San Pedro River beginning at the U.S. border with Mexico and extending upstream approximately 37.2 miles as critical habitat for the spikedace and loach minnow (see Figure 3-11).

4.6.1 No Action Alternative

Improvement activities were conducted on 32 miles of border road throughout the project area. No impacts to protected species occurred since the border road near the San Pedro River and Huachuca Mountains were not included. No other activities addressed in this alternative would have negatively affected protected species or critical habitats.

4.6.2 Current Action Alternative

No activities currently being implemented within the project area would be expected to adversely affect protected species or critical habitats. The five RVS sites discussed previously were recently surveyed to determine the presence of protected species. None of these sites supported Federally listed species. Two sites (Site A and Site E) contained species listed by the Arizona Department of Agriculture; approval from the Arizona Department of Agriculture shall be required prior to removal of vegetation at these sites. The species of concern include pencil cholla (*Cylindropuntia kleinia*), ocotillo (*Fouqueria splendens*), Palmer's agave (*Agave palmerii*), and various species of pincushion (*Mammalaria* spp.) and beehive (*Coryphantha* spp.) cacti. The RVS tower at Site A was also relocated to avoid disturbance to two soaptree yucca (*Yucca elata*) specimens. More detailed descriptions of these sites are contained in Appendix C.

4.6.3 Future Infrastructure Alternative

The installation of two RVS sites is proposed on the southeastern edge of the Huachuca Mountains within the Coronado National Forest (see Figure 2-5). Both sites would be located near the vicinity of a confirmed lesser long-nosed bat roost. If approved for construction at these locations, coordination with the USFWS would be initiated to determine the best time of year to install the towers and to determine any avoidance or mitigation measures required.

The proposed location of an RVS site within the Naco project area is near the San Pedro River (see Figure 2-5). If this location is approved, coordination with the USFWS would be initiated to determine potential impacts to the spikedace and loach minnow critical habitat area. A Biological Assessment may also be required, prior to construction, to determine any potential impacts to the southwestern willow flycatcher, Gila chub, jaguarundi, and ocelot.

A total of 11.5 miles of the border is proposed to be lit by portable generator lights (see Figure 2-5). An assessment would be made, prior to placement of the lights, to determine the potential impacts to lesser long-nosed bats and their feeding areas. A Biological Assessment may also be required for these actions as well.

4.7 CULTURAL RESOURCES

Southeast Arizona is very diverse and rich with prehistoric and historic resources. Consequently, the potential presence of properties eligible for listing on the NRHP is high. A complete list of NRHP properties, State inventory Properties and projects and reports completed and on file with the Arizona SHPO is presented in Appendix D. USBP provides surveys of all construction sites (temporary and permanent) prior to commencement of construction activities to ensure that significant sites are avoided to the maximum extent practicable. If a site is unavoidable, other mitigation measures, such as data recovery or burial, are implemented with the concurrence of the Arizona SHPO, as well as Tribal Governments and Bureau of Indian Affairs (BIA), as applicable. Figures 4-1 and 4-2 illustrate the locations of NRHP properties which would be avoided. By instituting the process of avoidance as the primary procedure, combined with mitigation and monitors during construction activities, USBP actions have resulted in no impacts to cultural resources that are eligible or potentially eligible for NRHP within the study area. Cumulative impacts to these and other resources are discussed later in this chapter.

Some concerns have been raised that improved roads could lead to increased opportunities for looting or damage of archaeological sites. However, enhanced patrol efforts in these areas allowed by the improved roads and infrastructure would reduce illegal traffic in the area and subsequently have a reduction in the potential for looting and damage of significant cultural resources. In addition, the use of artificial lighting in the areas of archaeological sites would also reduce the opportunities for looting and damage of archaeological sites and historic properties.

The surveys and analysis performed by INS/USBP archeologists significantly add to the knowledge base of the history and prehistory of the southwest. Without these activities and the surveys required by INS/USBP, much of this information would never be obtained or would be improperly recovered by amateur archeologists. This is especially true on private lands where there are no requirements for the landowner to conduct routine surveys.

(This page left intentionally blank)

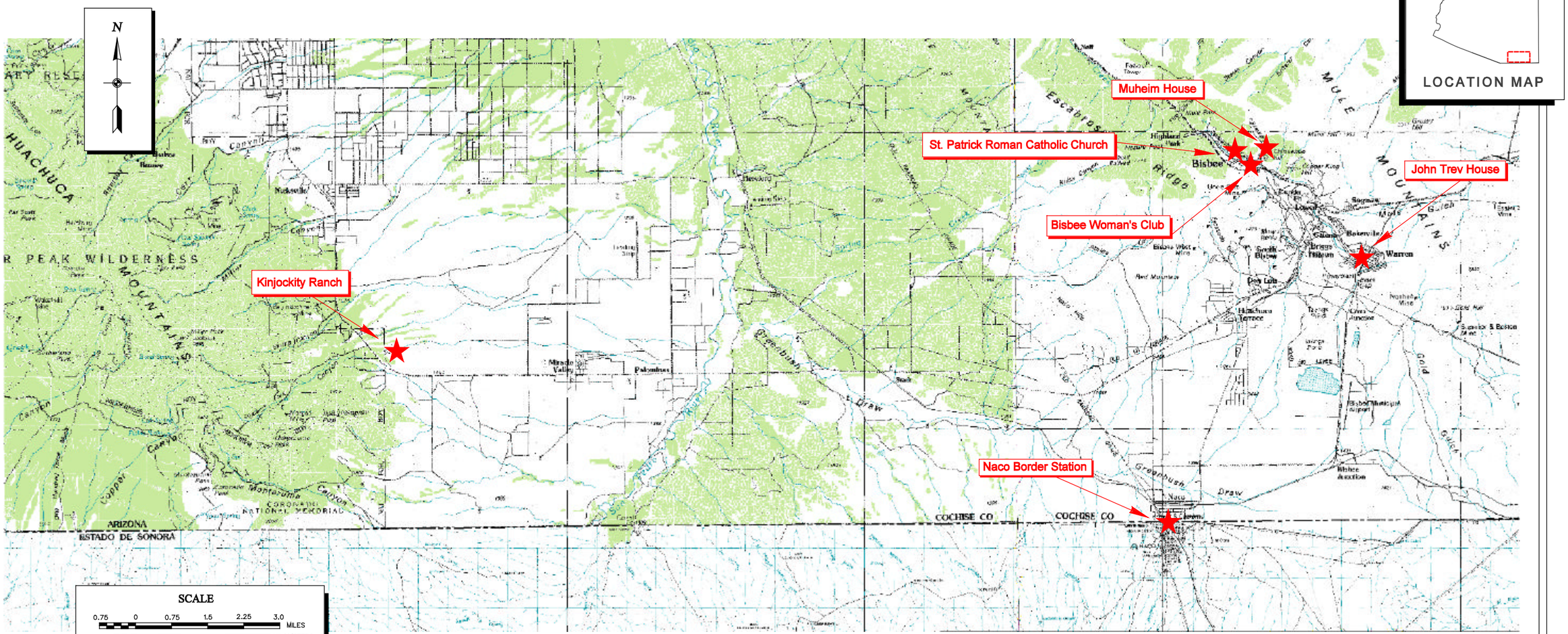


Figure 4-1: Naco Corridor National Register Properties

GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

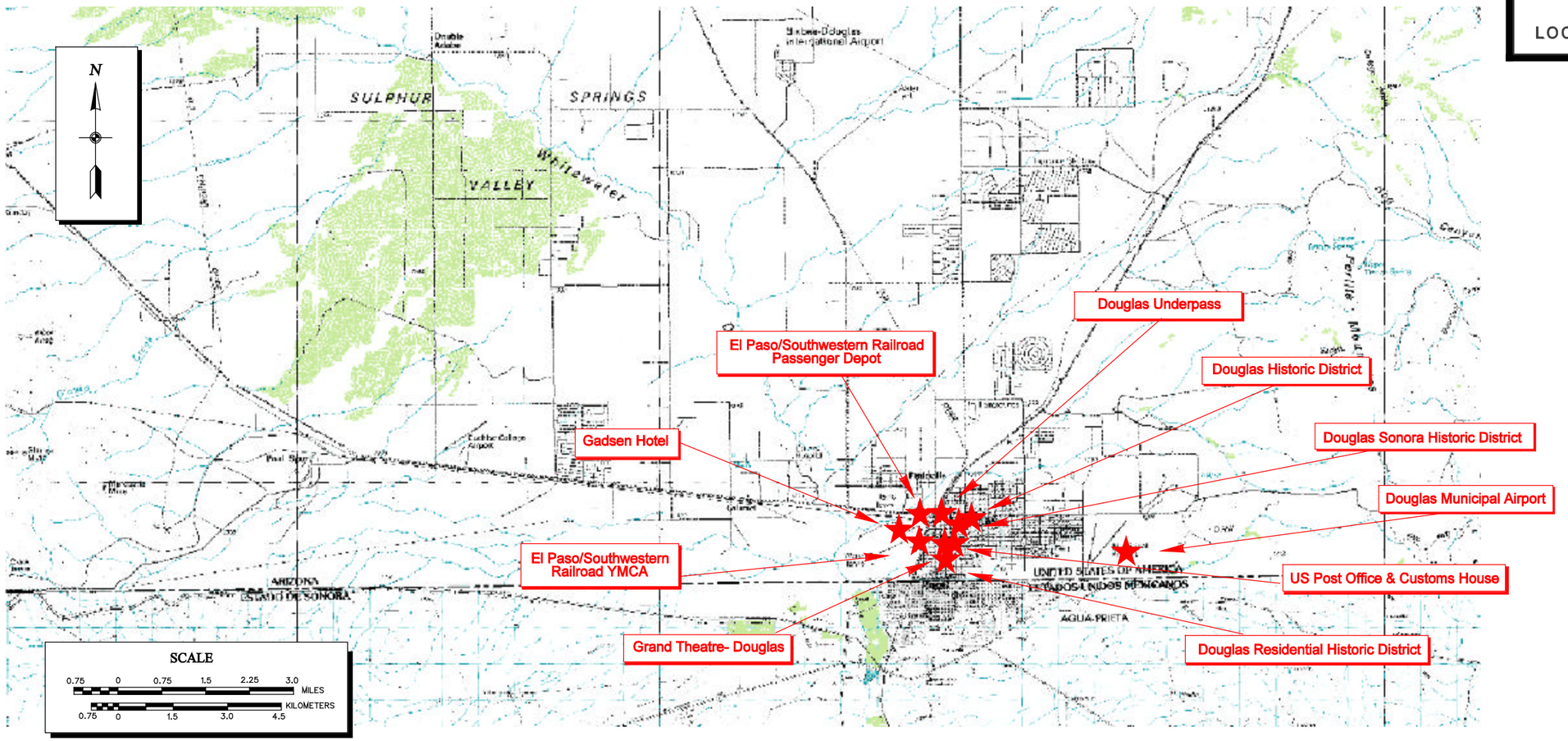


Figure 4-2: Douglas Corridor National Register Properties

gsrc GULF SOUTH RESEARCH CORPORATION

DATE: JULY 2000

SCALE: ON MAP

4.7.1 No-Action Alternative

Under the No Action alternative, a total of 126 acres were potentially directly impacted. Although consideration for the aesthetics of historic properties must be taken into account during the placement of light sources, the illumination of about 628 acres probably had no adverse effect on any cultural resources within the project area. On the contrary, this lighting has the potential to deter looting and damage to sites within the corridor.

Prior to any ground disturbing activity a full literature and records check for known archaeological sites and historic properties and a full survey of the project area was conducted to record any unknown archaeological sites. All archaeological sites that were determined either potentially eligible or eligible for the NRHP within the project areas were avoided resulting in no adverse affects to any known significant cultural resources due to the No Action alternative.

4.7.2 Current Action Alternative

Under the Current Action alternative, approximately 35 acres would be disturbed and could potentially impact cultural resources. Less than one acre would be used for the portable lights. This lighting would have no impacts on any archaeological sites if they were kept within the bounds of the current road right-of-way. Placement of lights near structures listed on the NRHP need to be coordinated with the Arizona SHPO to ensure that the visual qualities of the historic structures are not impaired.

Prior to construction, an archaeological records check is conducted on all sections of the project area where ground disturbance is planned. Archaeological records check would include, but not limited to, site and project records on file with the Arizona State Museum and Arizona SHPO office, and any historical maps on file with the BLM that could show potential locations for historic structures. In addition, an intensive archaeological survey would be conducted on areas that have not been previously surveyed and where ground disturbance activities are to take place. All archaeological sites found during those surveys would be recorded and enough information collected to make a determination on whether they meet the criteria for inclusion on the NRHP. All sites that meet the criteria for inclusion on the NRHP and those that do not have enough information to make a

successful NRHP eligibility determination would be avoided. If these can not be avoided, mitigation of these sites is necessary. Monitoring in the vicinity of these sites during ground disturbance activities would provide an additional safeguard in avoidance of any adverse impacts to these sites. It should be emphasized that most of the road and fence projects performed by INS/USBP are repair and upgrade projects. Therefore, most of the sites that would be encountered have been previously disturbed.

There is a total of 521 acres of illumination as a result of the Current Action alternative for a total of 1,149 acres when combined with the 628 acres under the No Action alternative. Consideration for the aesthetics of historic properties would be taken into account during the placement of both stadium and portable lights. Illumination would not be expected to have adverse effects on any cultural resources within the project corridor provided the lights are placed at an adequate distance from known historic sites (see Appendix D) and properly coordinated through the Arizona SHPO. Lighting has the potential beneficial effect of deterring looting and damage to these sites through intentional and unintentional illegal activity.

Density of sites vary greatly throughout southeast Arizona depending upon topography, available water sources, available sources for tool-making, and suitable habitat/wildlife populations. However, for comparison purposes, if it is assumed that the average site density is 0.07 sites per acre (based on previous survey results within the corridor), therefore the ground disturbing activities that would occur as a result of these actions would be expected to encounter one additional site.

A 4-mile section of vehicle barrier construction is planned in and around the Coronado National Memorial, most of which traverses the NRHP-listed property. In order to avoid adverse impacts to this NRHP property, there would be close consultation with the National Park Service, the SHPO office, and other interested parties.

As part of current activities, a Class III archaeological survey was conducted for five additional proposed RVS towers within the project corridor. A 400 square meter area for each of the towers was surveyed. A single artifact was found within the tower C area consisting of a tertiary micorcrystalline flake exhibiting retouching and use-wear along one edge. No other cultural resources were found. No historic properties (i.e., cultural

resources eligible for inclusion on the NRHP) where found during the archaeological inventory of the five proposed tower locations, therefore it is recommended that no further archaeological investigations be conducted for the proposed RVS towers. An assessment of the cultural resources of the five planned RVS towers are included in Appendix C.

4.7.3 Future Infrastructure Alternative

Under the Future Infrastructure alternative, additional ground disturbing activities within 64 acres have the potential to directly impact cultural resources, for a total of 224 acres under the No Action, Current Action, and Future Infrastructure Alternatives. Less than one acre of the 64acres would entail the use of portable generator lighting. This lighting would have no impacts on any archaeological sites if they are kept within the bounds of the current road right-of-way.

Prior to construction, an archaeological records check would be conducted on all sections of the project area where ground disturbance is going to take place. The same level of consultation, survey efforts, determination, and monitoring discussed in Section 4.7.2 would be required under this alternative. It should be emphasized again that most of the road and fence projects performed by INS/USBP are repair and upgrade projects. Particularly, about 58 acres of road maintenance that is described in Table 4-1 fall into this category. Therefore, most of the sites that would be encountered have been previously disturbed.

Density of sites vary greatly throughout southeast Arizona depending upon topography, available water sources, available sources for tool-making, and suitable habitat/wildlife populations. However, for comparison purposes, if it is assumed that the average site density is 0.07 sites per acre, then the proposed ground disturbing activities under the Future Action alternative would be expected to encounter eight additional sites.

There is a potential to illuminate an additional 677 acres from stadium and portable generator lighting. When added to the total illumination for No Action and Current Action Alternatives, a total of about 1,826 acres would be impacted by illumination. The same consideration discussed under the previous alternative regarding visual and aesthetic effects on historic structures would need to be provided.

4.8 AIR QUALITY

Total pollutant emissions estimates for existing stationary industrial sources operating within the Naco-Douglas corridor are substantial, and represent only a portion of the total pollutant emissions. Air pollutant emissions from mobile sources (e.g. automobiles, aircraft, construction equipment) and other widely dispersed activities (e.g. open burning) are also substantial in these areas. Many sources are not controlled, particularly in Mexico, but nevertheless have impacts on U.S. populations. Proposed actions must be evaluated on a site-specific basis prior to commencement. Coordination with state and local regulatory agencies will be imperative to ensure proper notification, permitting, and documentation of potential impacts to air quality.

Equipment used for transporting materials and personnel, construction, and surveillance support operations utilize hydrocarbon fuels and internal combustion engines that emit air pollutants. Conveyance along unpaved roads and construction activities that disturb soil particles also result in the release of airborne particulate matter. Equipment and vehicles to be used for all proposed actions would be configured and maintained to conform with state and local air quality requirements. EPA Region 9 requires specific notification of proposed actions and issue permits to operators of equipment and vehicles in accordance with air quality regulations.

The Naco-Douglas corridor is included within EPA Region 9. Douglas and Paul Spur are currently classified as non-attainment for particulates (PM_{10}), and Douglas is currently classified as non-attainment for sulphur dioxide (SO_2). Douglas and Paul Spur were classified as non-attainment for Total Suspended Particulates on March 3, 1978 (43FR8964). They were reclassified on November 11, 1990 (43FR8964) as non-attainment for particulates less than 10 micrometers (PM_{10}) as a result of EPA establishing new particulate matter standards. Douglas has been classified as non-attainment for sulphur dioxide since March 3, 1978 (43FR8964).

4.8.1 No Action Alternative

The short duration of construction and maintenance activities, the type of equipment used, and the good dispersal patterns of the region, indicate that air emissions have not been created that adversely affected air quality in the project area over the past five years. No long-term impacts to air quality are anticipated from the completed projects within the

Naco-Douglas corridor. The No Action alternative would eliminate all potential emission sources associated with future construction and maintenance projects. No further impacts, beneficial or adverse, are expected to occur under the No Action alternative.

4.8.2 Current Action Alternative

As stated in the No Action alternative, Section 4.8.1, air quality has not been adversely impacted in the project area over the past five years. However, under the Current Action alternative, roads, fences, vehicle barriers, and low water crossings are currently approved or funded, and stadium lights, RVS sites, and portable light generators are currently approved for installation. Many of the construction or maintenance projects are anticipated to be relatively short in duration and therefore are not expected to contribute to long-term degradation of the area's air quality.

Such increases or impacts on ambient air quality during construction and maintenance activities are expected to be short-term and can be reduced further through the use of standard dust control techniques, including roadway watering and chemical dust suppressants. Although some fugitive dust will be associated with road use, it would not be significantly greater than amounts currently produced. There would be no emissions associated with operation of the stadium lights or RVS sites

Low amounts of air emissions are caused by the generators necessary to run the portable lighting systems, which are in operation approximately 12 hours per day. The portable lighting unit utilized by the USBP in the Naco-Douglas corridor is a Model BC4000LL, which consists of a 6-kilowatt diesel generator which powers four 1000-watt lights on a 15-foot mast. It should be noted, that there are some gasoline powered generators used by USBP; however, all generators within the Naco-Douglas corridor are diesel powered. Table 4-8 illustrates the maximum air emissions expected from the portable light generators.

Table 4-8

Emission Factors for Diesel Powered Generators

Pollutant	Emission Factors (tons/year)
Exhaust hydrocarbons	0.0054
Carbon monoxide (CO)	0.0146
Nitrogen oxides (NO_x)	0.0679
Aldehydes	0.0010
Sulfur oxides (SO_x)	0.0045
Carbon dioxide (CO_2)	2.5404
Particulate matter (PM_{10})	0.0048

Source: USEPA 1995.

After completion of current projects within the Naco-Douglas corridor, no further impacts, beneficial or adverse, are expected to occur under the Current Action alternative.

4.8.3 Future Infrastructure Alternative

The effects to air quality under this alternative would be more than that described for the Current Action alternative. In addition to past and current projects, air emissions from proposed projects must be taken into consideration. Future impacts are expected due to implementation of new projects within the reasonably foreseeable future.

Air quality impacts from construction and maintenance activities (roads, fences, vehicle barriers, stadium lights, RVS sites, portable generator lights) include emissions due to fuel combustion from heavy equipment, and fugitive dust due to travel through the construction area. There would be no emissions associated with operation of the stadium lights or RVS sites, but low amounts of air emissions are caused by the generators necessary to run the portable lighting systems for approximately 12 hours per day. Even if the emissions were doubled, overall levels of generator emissions and fugitive dusts would be expected to be below *de minimis* thresholds and would be, thus, would not violate national standards.

Permits might be required for actions that would create any air emissions that would jeopardize the Federal attainment status of the Air Quality Region or cause an exceedance in the allowable Prevention of Significant Deterioration (PSD) increment for the region. All future projects would be required to determine if air quality violations could occur and if permits would be required prior to construction.

4.9 WATER RESOURCES

4.9.1 No Action Alternative

Placement of stadium style lighting within the town of Naco did not impact water resources within the project corridor. No water crossings or construction sites occurred near or adjacent to water bodies. Therefore, the projects completed under this alternative did not impact the water resources of the area. No additional impacts to water resources would be expected upon implementation of this alternative.

4.9.2 Current Action Alternative

Only one planned project impacts water resources within the Naco Corridor under this alternative. Th e low water crossings would consist of concrete pads place in the bottom of the drainages at existing road crossings. Temporary effects would be increased turbidity, sedimentation and vegetation removal. The streambed would be permanently impacted by concrete paving, although the flow of water would not be impaired or impeded. In addition, if the construction of these crossings were conducted during the dry season, only minimal erosion impacts would be expected to occur. Approximately 0.05 acres or 2000 ft^2 of area would be impacted.

This alternative also includes the installation of 73 portable lights with generators to be placed along the border road. To avoid impacts to water resources, these generators would be placed at least 0.25 miles from any water bodies, such as stock tanks, drainages, washes/arroyos, and springs. This would ensure that no impacts to water resources would result should an accidental spill of fuel or lubricants occur.

4.9.3 Future Infrastructure Alternative

The placement of 11.5 miles of portable generator lights and the proposed construction of two border patrol stations are included in this alternative. The locations of these improvements are not in proximity to any bodies of water; no impacts to the region's water resources would be expected.

Additionally, a bollard fence is proposed to be constructed in the Whitewater Draw area. The proposed site is located approximately 50 feet west of the end of the existing fence, near the Douglas POE. The bollard fence would consist of concrete poles (about 10-12 feet high) placed on top of a concrete footer (approximately 30 feet long). Spacing between the poles would be adequate to allow water to flow the fence. The construction of this structure would impact approximately 0.007 acres (300 ft^2) of potential jurisdictional wetlands or waters of the US. Because of the small amount of area involved, the proposed action could possibly be permitted under the USACE Nationwide Permit Program. Notification would be required prior to the construction and mitigation or compensation plan would need to be implemented to ensure no net loss of wetlands. The US Section of the International Boundary and Water Commission (IBWC) would also need to approve the design of the fence since Whitewater Draw is an international stream.

4.10 SOCIOECONOMICS

INS/USBP activities generally result in beneficial impacts to local, regional, and national economies. The diversity of projects performed by INS/USBP implies that socioeconomic impacts would vary considerably. Some projects have very small construction and operational impacts while others are more substantial (i.e., construction costs, impacts, and project magnitude). The actual construction activity impacts are usually very localized due to the temporary nature of the construction activities and the fact that the predominance of labor for these projects in the past has been provided by the Arizona National Guard or Active/Reserve military units. Consequently, the purchase of construction materials and supplies (increase in local sales and income) is typically the primary, direct economic effect in the project vicinity.

Although construction impacts are temporary in nature, the effects associated with implementation of INS/USBP projects are expected to continue for the economic life of the project. All actions provide socioeconomic benefits from increased detection, deterrence, and interdiction of illegal drug smuggling activities with concomitant benefits of reduced enforcement costs, losses to personal properties, violent crimes, and entitlement programs. These actions can also have direct positive benefits from increased economic activity.

In addition, construction activities would have short term, but positive impacts on local economies from sales of construction materials, other project expenditures, and temporary employment. Long term positive impacts would occur on local, regional and national levels by the reduction of illegal immigrants and drug trafficking and the associated social costs.

Effects to the aesthetics and/or quality of life could be incurred in certain regions that experience significant new construction actions or increases in patrolling activities. These effects can be either positive or negative, depending upon an individual's judgement. The magnitude of adverse effects, however, would be expected to increase in remote areas rather than in urban or developed areas. Increases in patrolling activities as well as construction activities near wilderness areas, parks, National monuments, and other such sensitive areas would cause the greatest adverse effects, although the impacts are difficult to quantify.

4.10.1 No-Action Alternative

Implementation of the No Action alternative resulted in a potential impacted area of about 754 acres. Most of the labor for these projects came from the either the Arizona National Guard or active/reserve military units resulting in only temporary increases in the population of the project area. Materials and other project expenditures for the construction activities were predominantly obtained through merchants in the local community further temporarily boosting the local economy. The added illumination deterred drug smuggling, illegal immigration and other illegal activity and is expected to have resulted in the reduction of the associated social costs of such activities.

4.10.2 Current Action Alternative

As mentioned previously, the Arizona National Guard or active/reserve military units have completed most of the INS/USBP infrastructure projects to date. With the exception of USBP Stations and some RVS towers, INS and USBP would be expected to continue to request these units since the labor is provided to INS and USBP at no cost to the agency. The relocation of the units would result in only temporary increases in the population of the project area. Materials and other project expenditures would likely be obtained through

merchants in the local community further temporarily boosting the local economy. The additional illumination is expected to assist in the deterrence of drug smuggling, illegal immigration and other illegal activity and subsequently result in the reduction of the associated social costs of such activities.

In addition to stadium lighting, 73 6-kilowatt diesel portable lighting units are scheduled for operation. Though these units will probably not be purchased locally, the fuel for their operation would be supplied by local distributors. Portable lighting generators would operate for 12 hours a day and use an average of six gallons of diesel per generator during each 12-hour shift. This would require a total of 438 gallons of diesel fuel used daily in the operation of portable lighting units. Fuel would be purchased locally and would provide ongoing economic benefits during operation.

4.10.3 Future Infrastructure Alternative

Similar socioeconomic effects, direct and indirect, would result upon implementation of this alternative as was discussed for the Current Action alternative. Materials and other project expenditures would predominantly be obtained through merchants in the local community further temporarily boosting the local economy. In addition, USBP station construction would probably be completed by local contractors and laborers which in turn will create a temporary boost in the local economy. Operation costs including the impacts of additional agents and their families would need to be covered in a separate EA for these stations.

The added illumination provided under this alternative would increase the potential to deter drug smuggling, illegal immigration and other illegal activity and subsequently result in the reduction of the associated social costs of such activities. The Future Infrastructure alternative also proposes the addition of 73 diesel powered, 6 kilowatt portable generator lighting units for a total of 146 portable lighting units for the all the alternatives combined. These portable lighting generators would operate for 12 hours a day and use an average of six gallons of diesel per shift. This would equate to a total of 876 gallons of diesel fuel used daily in the operation of these portable lighting units. Fuel would be purchased locally and would, thus, provide ongoing economic benefits during operation.

4.10.4 Environmental Justice

Executive Order 12898 of February 11, 1994, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" required each Federal agency to identify and address, as appropriate, disproportionate adverse effects of its proposed actions on minority populations and low-income communities.

As indicated earlier in Section 3.10 of this EA, the racial mix of Cochise County is about 90% caucasians, and less than half (34%) of the entire county population claim to be of Hispanic origin. The INS/USBP projects that have been completed and the current and future projects are sporadically located, based on strategic effectiveness, throughout the county. Furthermore, none of the projects proposed or completed to date would/has displace or residences or commercial structures in any community along the Naco-Douglas Corridor. Therefore, disproportionate effects to minority populations would not be expected.

Cochise County has about 21% of its total population living at or below poverty levels. The 1997 per capita personal income was estimated to be about $17,000, which indicated a 28% increase since 1990. It is likely, therefore, that some infrastructure has been completed or is proposed for construction within or near low-income neighborhoods. The location of these structures, however, are selected based on the frequency and intensity of illegal drug traffic and numbers of undocumented aliens (UDAs) and the need to protect these specific areas from illegal entry. As mentioned earlier, no homes or commercial structures have been displaced by INS infrastructure projects. Most projects occur along existing road ROWs that are on public lands. Consequently, no disproportionate adverse effects to low-income populations would be expected from the implementation of any of the alternatives.

On the other hand, implementation of any of the alternatives would enhance the probability of success for the INS/USBP although the levels of enhanced success would vary among alternative. This increased success in controlling illegal drug activity and the increasing flow of UDAs into the Naco-Douglas Corridor would benefit all populations, regardless of income, nationality or ethnicity. In addition, construction activities would have short term, but positive impacts on local economies from sales of construction materials, other project expenditures, and temporary employment. Long term positive impacts would occur on

local, regional and national levels by the reduction of illegal immigrants and drug trafficking and the associated social costs.

4.11 NOISE EFFECTS

Although health effects can occur from long-term exposure to excessive noise, the primary effect of noise that would be generated by any of the alternatives on exposed communities would be annoyance. Noise annoyance is defined by the U.S. Environmental Protection Agency as any negative subjective reaction on the part of an individual or group (USEPA 1972). As noted in Section 3.11, community annoyance is best measured by DNL. A DNL of 55 dB is commonly assumed to be the criterion for community noise analysis. Since the EPA (1972) defines this level as "…requisite to protect public health and welfare with an adequate margin of safety." However, since financial and technical resources are generally not available to achieve that goal, most agencies have identified DNL of 65 dB as a criterion which protects those most impacted by noise, and which can often be achieved on a practical basis (FICON 1992). Achieving a goal of DNL of 65 dB would correspond to about 12 percent of the exposed population being highly annoyed at times. Figure 4-3 indicates that an indoor sound level of 65 dB would probably cause less than five percent of the people exposed to be awaken. The percent of annoyed or disturbed population would of course vary greatly depending upon the type, duration level, and time of the noise as well as the distance and terrain between the receptors and the noise generation. Although DNL of 65 dB is widely used as a benchmark for significant noise impact, and is often as acceptable compromise, it is not a statutory limit and it is appropriate to consider other thresholds in particular cases. Animal responses to noises are also

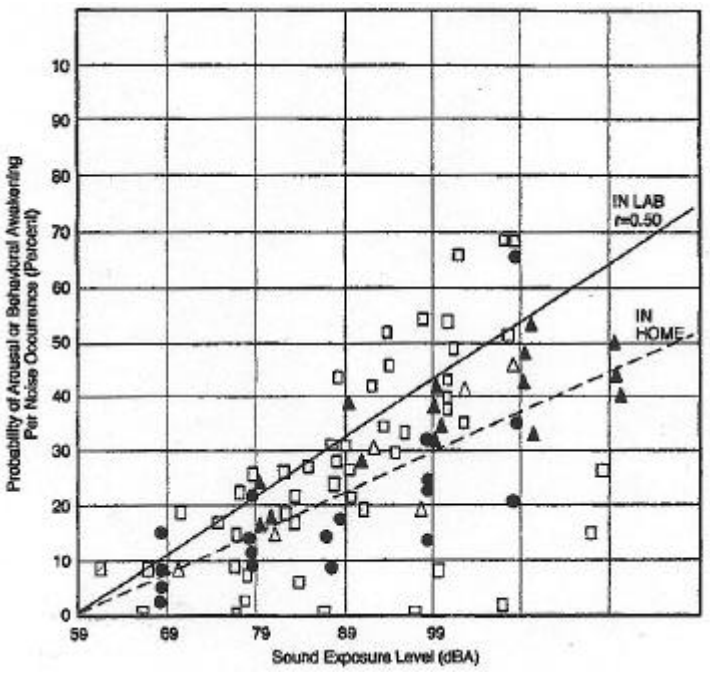


Figure 4-3. Probability of Arousal or Behavioral Awakening (adapted from Ogden 2000)

influenced by many types of variables including equipment generating the noise, season, time of day, proximity, the animal's motivational state and sudden bursts.

Noise effects to wildlife, in particular, are classified as primary, secondary, and tertiary effects. Primary effects are direct, physiological changes to the auditory system, (i.e., ear drum rupture, temporary and permanent hearing threshold shifts, and the masking of auditory signals). Secondary effects include non-auditory effects such as stress and associated physiological response (i.e. increased blood pressure, use of available glucose, and blood corticosteriod levels); behavior modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover or water. Tertiary effects are the direct result of primary and secondary effects, and include population declines, habitat loss and species extinction. Only secondary effects would be expected to occur with any of the alternatives as will be discussed in the following subsections.

Behavioral experiments have demonstrated that noise at high levels is mildly aversive in and of itself, apparently because the physiological effects stimulated by noise are aversive (e.g., muscular flinch, vasoconstriction, bradycardia) (Bowles 1997). However, noise is not aversive enough to be an effective conditioning stimulus over the long term. This explains the failure of most acoustic harassment devices to deter wildlife, such as deer or grackles, from favored areas (Bowles 1997).

4.11.1 No Action Alternative

Implementation of the No Action alternative would result in no further INS or USBP-related construction activities, and, thus, no increases in ambient noise levels. Noise generated during the construction of infrastructure listed under the No Action alternative has returned to the pre-project conditions.

4.11.2 Current Action Alternatives

If the Current Action alternative is selected, construction activities would occur mostly within or near the Naco and Douglas POEs. Heavy equipment such as graders, bulldozers and dump trucks would cause temporary increases in noise levels. The magnitude of these effects would depend upon the time of year, proximity to sensitive

receptors (e.g. schools, hospitals, churches, and residences), climatic conditions, type and number equipment pieces, and terrain. Based on past similar activities, the construction would occur only during daylight, thus reducing the DNLs and the chances of causing annoyances. No blasting would be expected.

Animals, particularly domesticated species, would be expected to quickly habituate to construction noise. Wildlife may at first be startled and flee the construction area; however, wildlife species, too, have demonstrated rapid habituation, even to loud and sudden noises which cause panic responses. Bowles (1997) reported that habituation can occur with fewer than five exposures. Several other recent studies (Workman et al. 1992; Kraussman et al. 1993, 1998; Weisenberger et al. 1996) have indicated that wildlife habituate through repeated exposure without long-term discernible negative effects.

Portable generators for lights would create more of a long-term exposure to increased noise. These increases would occur at night, thereby affecting the ambient DNL of the area. These lights would be used primarily in rural areas where access to electrical power sources is not readily available and, thus, away from most residential areas. Therefore, no significant adverse effects would be expected. As discussed above, wildlife would become habituated to these noises fairly quickly with no long adverse effects.

4.11.3 Future Infrastructure Action

The types of effects caused by implementation of this alternative would be similar to those described for the Current Action alternative. The magnitude would be slightly more than the current action, primarily due to the addition of 11.5 miles of portable generator lights in the Naco area. As demonstrated in Section 3.11, sound levels increase by only three decibels when a sound intensity is doubled. Therefore, adding more portable generator lights does not proportionately increase the corridor's ambient noise levels.

Construction of the proposed USBP station of Naco, and fences and roads near Douglas would temporarily increase noise levels within the immediate vicinity of the construction activity. Ambient noise levels would return upon completion of the proposed projects with no long-term, significant adverse impacts.

4.12 CUMULATIVE EFFECTS

This section of the EA addresses the cumulative impacts associated with the proposed INS infrastructure and other projects/programs that are planned for the region. Following a general discussion regarding cumulative effects that would be expected irrespective of the alternative selected, the various resources that would be impacted are addressed within each alternative discussion.

Site densities for cultural resources are relatively high in southeastern Arizona; consequently, there is a high potential to have cumulative impacts to these sensitive resources if adequate surveys and proper mitigation measures are not provided. Future proposed actions would follow a similar strategy of avoidance of NRHP-eligible properties so that the actions would result in no adverse impacts to historic properties. The proposed action would be coordinated with the Arizona SHPO through the Section 106 review process. INS would be responsible for any mitigation required for the initial performance of the project as well as that required for associated maintenance activities.

Cultural resources sites that remain within roadways could be impacted over the long term by the continual use of the road. Without proper design and construction of roadbeds and adjacent drainages, intact sites could be subject to increased erosional problems. Rerouting, burial, and buffer zones are measures that would be considered to reduce or eliminate potential effects to these resources. If these measures were deemed impractical, mitigation through data recovery would have to be performed. All mitigation measures would be coordinated through the appropriate SHPO, Tribal Government and land manager.

Other resources, such as soil, water supplies, and air quality, would be impacted for a short term during and immediately after completion of major construction projects. None of these resources would be expected to incur significant cumulative impacts. None of the

projects to date have indicated a potential excursion that could violate National air quality standards. No Federal Class I areas occur within the Naco-Douglas Corridor.

Soils that are denuded during construction activities would be vulnerable to erosion. However, the vast majority of the road projects are planned to alleviate soil erosion; thus, the cumulative effect to soils would be beneficial. A reduction in erosional rates would have consequent beneficial results to area surface water quality by reducing turbidity and biochemical oxygen demands.

Direct cumulative impacts on socioeconomics would be expected to be beneficial but insignificant. The magnitude of the effects would depend upon the project costs (i.e., local expenditures) and the economic multipliers in the region. Cumulative indirect effects to socioeconomic resources (e.g., purchase of 400+ gallons of fuel per day) would be beneficial, but insignificant. The implementation of the Future Action alternative would allow USBP to more efficiently and effectively detect, deter and apprehend illegal traffickers, thereby reducing social costs associated with property damages, violent crimes, drug treatment and rehabilitation, and entitlement programs.

Indirect increases in traffic and/or vehicular speeds could occur as a result of improvement to roads. The magnitude of these effects would depend upon current traffic conditions, proximity to population centers, and other available transportation corridors. However, based upon observations made after past road improvement projects, these effects, if any, are expected to be insignificant.

4.12.1 No Action Alternative

The No Action alternative would result in no additional direct effects to the area's resources. Impacts that have directly resulted from INS/USBP activities within the Naco-Douglas Corridor have been discussed in the previous sections. Briefly, these effects have included approximately 126 acres of land (soils and vegetation communities) being altered. No threatened or endangered species or critical habitat has been affected, nor have there been any adverse effects on cultural resources sites or historic structures that are listed or potentially eligible for listing on the NRHP. Air quality has been temporarily affected by construction activities, but due to good dispersion factors in the region and the

short duration of most construction activities, no long term adverse impacts to the region's airshed is expected to have occurred.

Long term indirect cumulative effects have occurred and would continue to occur. However, these effects, both beneficial and adverse, are difficult, if not impossible, to quantify. Reductions in habitat have undoubtedly created inter- and intra-species competition for available food and shelter and, eventually, slight reductions in some wildlife populations. Given the rural nature of the Naco-Douglas Corridor, 126 acres of altered habitat would be a negligible loss. The increase in lights along the border also could have produced some long-term cumulative effects, although the magnitude of these effects in some areas is not presently known. Some species, such as insectivorous bats, may benefit from the concentration of insects that would be attracted to the lights. Circadian rhythms of other diurnal species, however, may be disturbed enough that breeding or feeding patterns are skewed, causing synergistic physiological changes. Increased patrol activities would increase the potential for some wildlife specimens to be accidentally hit and killed. Such losses would not be expected to result in significant reductions to the populations.

Installation of stadium lights and ISIS towers was considered regarding the potential increase for raptors to be electrocuted or to become entangled in overhead powerlines. Although injuries and deaths to raptors due to collision with powerlines and support (guide) wires do occur, studies have indicated these structures do not present a major problem. The relative infrequency of collisions is due to the high visual acuity of raptors and the large size of transmission line conductors (Raptor Research Foundation 1996).

Positive cumulative benefits have resulted from INS activities as well. Additional knowledge regarding threatened or endangered species' locations, distribution, and life requisites has been obtained through surveys and monitoring efforts associated with INS construction projects. Erosion has been alleviated along some roads, and fences have precluded illegal foot and vehicular traffic through environmentally sensitive areas.

Plans by other agencies in the region which would also affect the region's natural and human environment include the road improvements by ADOT, the commercial truck US Highway 80 bypass and border crossings near Douglas, the Bisbee-Douglas International

Airport expansion, and the reactivation of the abandoned Southern Pacific rail line by SWKR, Inc. Each of these planned developments were described earlier in Section 2.5. With the exception of the proposed new bypass and border crossing near Douglas, all the rest of the projects would be along existing corridors and/or within previously disturbed sites (e.g., airport). Land use would change along the bypass, and additional wildlife habitat would be lost. The magnitude of these effects would depend upon the length and width of the bypass ROW and the extant conditions within and adjacent to the ROW.

Reactivation of the rail line and crossing near Naco would result in additional habitat losses, even though the rail would probably be constructed along the existing, but abandoned, line. The tracks were removed in 1975 and thus have had ample time to revegetate. Reactivation of the line would also increase noise in the immediate vicinity and increase potential health and safety risks due to transportation of hazardous cargo.

4.12.2 Current Action Alternative

Implementation of this alternative would have similar cumulative effects as the No Action alternative regarding past INS actions and future proposed actions by other agencies and companies. Disturbances to soils and habitats by INS activities would be increased by about 45% relative to the No Action alternative. Again, given the rural nature of the Naco-Douglas Corridor and the vast acres of wildlife habitat in the region, the total cumulative impact (160 acres) would still be considered minimal. Furthermore, this amount is considered worst case scenario and most of the disturbance would occur within areas that are already heavily disturbed by on-going or past activities.

Indirect effects due to lighting would be increased (almost doubled) under this alternative, however. The magnitude of the effects would depend upon the location, light intensity, type of lights used, and duration. Most, however, would be expected to be placed in or near urban areas, thus, reducing the chances of indirect effects, if any, to wildlife populations. Close coordination and approval from BLM or NPS would be required for any activity potentially affecting any of the unique or sensitive areas (e.g., Coronado National Forest, Coronado National Memorial, San Pedro NCA, etc.) to ensure adverse effects would be avoided or substantially reduced to insignificance.

4.12.3 Future Infrastructure Alternative

Implementation of the Future Infrastructure alternative would again double the acres of land and habitat that would be altered, bringing the total cumulative effect of INS projects about 224 acres. It should be emphasized that this is a worst case scenario. It is highly likely that road improvements and upgrades would not impact an additional 16-foot wide corridor. Most such projects, particularly within or near NFS and BLM lands would remain within the existing ROW and consist of grading and recapping; therefore, little if, any additional habitat would be altered under this scenario.

(This page left intentionally blank)

SECTION 5.0
ENVIRONMENTAL DESIGN MEASURES

CHAPTER 5 – ENVIRONMENTAL DESIGN FEATURES

5.0 ENVIRONMENTAL DESIGN MEASURES

This chapter describes those measures that could be implemented to reduce or eliminate potential adverse impacts to the human and natural environment. Many of these measures have been incorporated as standard operating procedures by INS and USBP on past projects. The mitigation measures are presented for each resource category that could be potentially affected. It should be emphasized that these are general mitigation measures; development of specific mitigation measures would be required for each current and future action once the specific location and project design is identified. The proposed mitigation measures would be coordinated through the appropriate agencies and land managers/administrators.

5.1 BIOLOGICAL RESOURCES

Professional biologists would be utilized to perform field surveys of major construction sites as early as possible in the planning and design stages in order to avoid environmentally sensitive resources. These surveys will be coordinated through the appropriate Federal and state agencies. All areas which are known to support threatened or endangered species would be considered off limits to avoid impacts to these resources. If possible, construction activities would be scheduled at times when they are least likely to disturb breeding and nesting activities. Additionally, USBP would minimize losses to vegetation by: (1) trimming vegetation along roadsides rather than removing entire plants, (2) require heavy equipment to utilize road pullouts or other such disturbed areas, and (3) through revegetative efforts. Disturbed sites or sites with low quality habitat would be utilized to the maximum extent practicable for construction and operational support activities.

To comply with Executive Order 13112 Invasive Species (64 Federal Register 6183, February 8, 1999), INS will minimize ground disturbance when possible. However, when disturbance in unavoidable, INS will revegetate with native species in order to decrease the potential of promoting the establishment and spread of invasive species.

The Migratory Bird Treaty Act (MBTA) requires that private contractors obtain a construction permit if the construction activity is scheduled during nesting seasons (March through August). Surveys would have to be performed to identify active nests, which would have to be avoided. Another mitigation measure that would be considered is to schedule all construction activities outside the nesting season (September through February).

Sensitive habitats such as caves, riparian communities, parks, refuges, wilderness areas, scenic streams, and native old-growth communities would be avoided to the maximum extent practicable. Any unavoidable effects to such communities shall be closely coordinated with the appropriate Federal and/or state agency(s) to ensure that impacts are kept to an absolute minimum and that restoration actions are considered and implemented, where plausible. Roadkill impacts may potentially increase due to the proposed infrastructure (i.e., road maintenance, vehicle barriers, fences). However, USBP is determined to avoid impacts to the greatest extent plausible through education and minimization of disturbance areas.

Environmental design features which would be considered, especially in areas that support protected species, include the development of vegetation corridors to avoid habitat fragmentation and the proper placement and size of culverts to adequately convey stormwater and allow wildlife to safely cross roads. Project specific mitigation plans would be required for projects with potential to cause substantial impacts to wildlife habitat or to impact protected species or other environmentally sensitive resources; these plans will be closely coordinated with, and approved by, the USFWS and appropriate state resource agency(s) prior to initiation of construction. It is policy, however, to mitigate adverse impacts through the sequence of avoidance, minimization, and finally, compensation. Compensation varies and includes activities such as restoration of habitat in other areas, acquisition of lands, etc. and is coordinated with the USFWS and appropriate state resource agencies.

5.2 UNIQUE AND SENSITIVE AREAS

The Coronado National Forest is within an area of a current project, the construction of the vehicle barriers. Coordination with the National Park Service prior to implementation of any actions within or near the National Forest is required to avoid effects to recreational opportunities and sensitive resources within the lands.

One project also has been identified along the border of the San Pedro National Conservation Area. The portable stadium lighting would affect the routine activities of the nocturnal species located in this area. Permits are required prior to initiation this project and avoidance of areas with known sensitive species, such as the reptiles and amphibians, are recommended. BLM would need to be notified of these proposed activities and their approval received.

5.3 CULTURAL RESOURCES

Potential adverse impacts to historic properties have been mitigated through a policy of site avoidance. The continuation of a program of archeological survey and monitoring for INS/USBP activities with the potential for ground disturbances would ensure that cultural resources that are deemed to be potentially eligible for NRHP listing would be avoided; consequently, such activities would have no effect on historic properties. Surveys and monitoring on Native American Nation properties would be performed in conjunction with and upon approval of the appropriate Indian Tribal Government. INS will be responsible for coordinating with the Arizona SHPO for maintenance activities involving earth moving operations in areas where historic properties have been previously identified. This coordination is necessary to ensure mitigation measures are implemented. Mitigation measures that could be used, when approved by the appropriate SHPO, to preclude impacts include, but are not limited to, data recovery, burial of the site with gravel or other aggregates, and use of professional archeologists as monitors during the maintenance operations.

All construction activities shall be at least two feet away from the international boundary to avoid impacts to historical boundary monuments and other demarcations. Near each permanent boundary monument, strict construction precautions would be implemented to

avoid potential damage to these items. Additionally, no construction materials would be placed adjacent to these monuments.

The revised 36 CFR part 800 has been broadened to emphasize more strongly the roles of tribes as consulting parties. According to Sec. 800.2(c)(3) of the revised regulations, federal agencies are required to consult not only with the SHPO and /or the Tribal Historic Preservation Officer (THPO), but also with relevant tribes that might claim cultural affinity in the area of the undertaking. Such consultation would take place on all federal undertakings subject to Section 106 review, regardless of whether or not the undertaking is on tribal lands. Such consultation would occur at all levels of the section 106 process. The following tribes claim cultural affinity to the Naco-Douglas Corridor, Ak-Chin Indian Community, Gila River Indian Community (GRIC), the Tohono O'odham Nation, the Hopi, and the Zuni Pueblo.

5.4 AIR QUALITY

Proper and routine maintenance of all vehicles, generators, aircraft and other equipment would be implemented to ensure that air emissions are within the design standards of the piece of equipment. Construction activities within non-attainment areas would be coordinated with the appropriate environmental agency(s) to ensure that the emissions would conform with regulations specified in the Clean Air Act. Construction sites within urban areas, along major transportation routes, or in biologically sensitive areas (e.g., wildlife refuges) would be kept wet, to the extent practicable, to reduce fugitive dust problems. If bivouac sites are required (in the event the National Guard or other military units are used for construction services), generators and other similar field equipment would be kept to the minimum required. Where practicable, drop lines from local electrical systems would be used as a substitute for generators.

Project-related particulate matter (PM_{10}) emissions would be minimized by the implementation of Best Management Practices (BMPs) in the form of a truck watering program for project area dirt surfaces, construction curtailed in winds exceeding 25 miles per hour, efficient utilization of equipment to minimize the amount of time engines are left idling, and upkeep of construction equipment to ensure that engines are properly tuned. Any necessary air quality operating permits are the responsibility of the contractor.

5.5 WATER RESOURCES

Each proposed construction project that affects greater than five acres will require a SWPPP as part of the National Discharge Elimination System (NPDES) permit process. Similarly, if wetlands or waters of the U.S. are expected to be affected, early coordination by INS with the appropriate the USACE Los Angeles District, Regulatory Branch and Arizona Department of Water Resources agencies will be conducted. Applicable Section 404 permit procedures shall be completed prior to initiation of the construction activities. Mitigation and compensation would be implemented to ensure no net loss of waters or the U.S. wetlands.

No action will be initiated that may affect wetlands and floodplains without performing the requisite analysis and findings specified by Executive Order 11990 and 11988 respectively, prior to taking any action. Construction storage or staging sites would be located at least 0.25 miles from wildlife and livestock tanks or other permanent surface water bodies to reduce potential effects of accidental spills. Conservation measures would be implemented to preclude unnecessary waste of water supplies. Discharges of gray water and other wastes to drainages or other water courses/bodies is prohibited. Portable latrines, provided and maintained by licensed contractors, would be used to the extent practicable during construction and operational support activities.

(This page left intentionally blank)

SECTION 6.0
PUBLIC INVOLVEMENT

6.0 PUBLIC INVOLVEMENT

6.1 AGENCY COORDINATION

This chapter discusses consultation and coordination that will occur during preparation of the draft and final versions of this document. This will include contacts that are made during the development and preparation of the EA. Continued formal and informal coordination will be conducted with the following agencies:

- U.S. Fish and Wildlife Service (USFWS)
- U.S. Forest Service (USFS)
- Bureau of Land Management (BLM)
- U.S. Environmental Protection Agency (USEPA)
- Natural Resource Conservation Service (NRCS)
- State Historic Preservation Office (SHPO)
- Fort Huachuca
- Arizona Department of Transportation (ADOT)
- Arizona Game and Fish Department (AGFD)
- Arizona Department of Agriculture
- Cities of Douglas, Naco, and Bisbee

6.2 PUBLIC REVIEW

The draft EA will be made available for public review, and the Notice of Availability (NOA) will be published in the local newspapers. Exhibit 6-1 is a copy of the NOA that was published. Comments received concerning the draft will be addressed, and where appropriate, changes will be incorporated into the final EA.

Exhibit 6-1

NOTICE OF AVAILABILITY

DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR INFRASTRUCTURE WITHIN U.S. BORDER PATROL NACO-DOUGLAS CORRIDOR, COCHISE COUNTY, ARIZONA

The public is invited to comment on the Draft Programmatic Environmental Assessment (PEA) for the Immigration and Naturalization Service and U.S. Border Patrol activities in the Naco-Douglas corridor, Arizona. This PEA evaluates the past, current and future INS and USBP infrastructure projects within the Naco-Douglas Corridor. The Draft PEA will be available for review at the following libraries: Cochise College, Charles De Peso Library, 4190 West Highway 80, Douglas, AZ 85607; Douglas Public Library, 560 10th Street, Douglas, AZ 85607; Copper Queen Library, P.O. Box 1857, Bisbee, AZ 85603; Fort Huachuca Library, Building 52065, Smith Avenue, Fort Huachuca, AZ 85613; University of Arizona, Main Library, P.O. Box 210055, Tucson, AZ 85721; and Northern Arizona University, Cline Library, P.O. Box 6022, Flagstaff, AZ 86011. Send written comments to Mr. Kevin Feeney, INS Headquarters, Facilities and Engineering Division, 425 I Street NW, Room 2030, Washington, D.C 20536, or call Mr. Feeney at 202-343-9412 for further information. Comments can also be faxed to Mr. Feeney at 202-353-8551.

SECTION 7.0
REFERENCES

Chapter 7 – REFERENCES

7.0 References

Adams, J. 1974. *The S-O Ranch Site: A Chiricahua Stage Multiple Activity Location.* Unpublished Master's thesis, Northern Arizona University, Flagstaff.

Amsden, M. 1928. *Archaeological Reconnaissance in Sonora.* Southwest Museum Papers, No. 1. Highland Park, California.

Arizona Department of Commerce. 2000. Internet website: http://www.commerce.state.az.us/

Arizona Department of Economic Security. 2000. Internet website: http://www.de.state.az.us/links/economic

Arizona Department of Environmental Quality (ADEQ). 1990. Air Quality Control for Arizona. Arizona Department of Environmental Quality, Phoenix, Arizona.

ADEQ. 1996. Arizona Water Quality. Arizona Department of Environmental Quality, Phoenix, Arizona.

Arizona Department of Transportation (ADOT). 1998a. Environmental Determination. Project Name: Lowell-Paul Spur, Project Number: F-061-1-537.

ADOT. 1998b. Environmental Determination. Project Name: Jct 80-Double Adobe, Project Number: STP-206(14).

ADOT. 1998c. Environmental Determination. Project Name: US 191 at Cochise Industrial Park, Project Number: S-206/191 CH 002 H4108 01C.

ADOT. 1998d. Environmental Determination. Project Name: Jct SR 92-Double Adobe Road, Project Number: F-016-1-534.

Arizona Department of Water Resources (ADWR). 1998. Arizona water resources assessment.

Arizona Department of Fish and Game (ADFG). 2000. List of Special Status Species for Cochise County, Arizona. Maintained by the AGFD-Heritage Data Management System. Compiled 19 June 2000.

Arizona Housing Commission. 1999. The State of Housing in Arizona.

Arizona Mining Association. 2000. Internet website: http://www.azcu.org/

Bandelier, A.F. 1892. *Final Report of Investigations Among the Indians of Southwestern United States, Part 2.* American Series, Vol. 4. Papers of the Archaeological Institute of America, Cambridge.

Bemis, R. Personal Communication. Soil Scientists for the United States Department of Agriculture, Natural Resources Conservation Service. June 23, 2000. www.epa.gov/surf3/hucs/15050202/

Bernard, S.R. and K.F. Brown. 1978. Distribution of Mammals, Reptiles, and Amphibians by BLM Physiographic Regions and A.W. Kuchler's Associations for the Eleven Western States. U.S. Department of the Interior, Bureau of Land Managment. Denver, Colorado. 169 p.

Bisbee-Douglas International Airport Comprehensive Airport Master Plan 1997-2016. 1997. Southwest Aviation Services Group.

Bisbee Strategic Plan for Community and Economic Development. 1999. Partners for Strategic Action.

Bowen, T.G. n.d. *A Survey and Re-evaluation of the Trincheras Culture, Sonora, Mexico.* M.S. thesis submitted to the University of Arizona Press, Tucson.

Bowles, A.E. 1997. Effects of Recreational Noise on Wildlife: An Update. Hubbs-Sea World Research Institute, San Diego, CA.

Brown, D.E. (ed.). 1982. Biotic Communities of the American Southwest-United States and Mexico. University of Arizona. Desert Plants 4(1-4):1-342.

Brown, D.E. and C.H. Lowe. 1983. Biotic Communities of the Southwest. U.S. Department of Agriculture Forest Service General Technical Report RM-78. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Carpenter, Gail A. and S. Grossberg. 1984. A Neural Theory of Circadian Rhythms: Aschoff's Rule in Diurnal and Nocturnal Animals. American Journal of Physiology. 16:R1067-R1082.

Cattanach, Jr., G.S. 1966. A San Pedro Stage Site Near Fairbank, Arizona. *The Kiva* 32(1):1-24.

Christiansen, L.D. 1974. Bullets Across the Border. *The Cochise Quarterly* 4(4). Cochise County Historical and Archaeological Society, Douglas.

Cochise County Comprehensive Plan. 1996.

Coronado National Monument. Updated January 20, 2000. Internet website: http://www.llbean.com/parksearch/parks/html/5739gd.htm

Davis, E.L. 1978. *The Ancient Californians: Rancholabrean Hunters of the Mojave Lakes County.* Science Series 29, Los Angeles County Museum of Natural History.

Davis, E.L, K.H. Brown, and J. Nichols. 1981. *Evaluation of Early Human Activities and Remains in the California Desert.* Bureau of Land Management, California Desert District, Riverside.

Davis, W.A. and S.M. Russell. 1991. Checklist of Birds of Southeastern Arizona. Tucson Audubon Society, Tucson, Arizona. 6 p.

DeAtley, S.P. and F.J. Findlow. 1980. Regional Integration of the Northern Casas Grandes Frontier. Pages 263-278 in *Mogollon Archaeology: Proceedings of the 1980 Mogollon Conference,* edited by P.H. Beckett and K. Silverbird.

Dice, L.R. 1943. The Biotic Provinces of North America. University of Michigan Press, Ann Arbor, Michigan. 78 p.

Dick, H.W. 1951. Evidences of Early Man in Bat Cave and on the Plains of San Augustine, New Mexico. In *Indian Tribes of Aboriginal America: Selected Papers of the 29th International Congress of Americanistas*, Part III:158-163. New York.

Dick, H.W. 1965. *Bat Cave.* Monographs of the School of American Research, No. 27. Santa Fe.

DiPeso, C.C. 1951. *The Babocomari Village Site on the Babocomari River, Southeastern Arizona.* The Amerind Foundation, No. 5. Dragoon, Arizona.

Douglas General Plan. 1993.

Douglas, J.E. and L.J. Brown. 1984. Archaeological Resources in the San Bernardino Valley, Southeastern Arizona. Cochise College, Douglas, Arizona.

Douglas, J.E. and L.J. Brown. 1985. Archaeological Resources in the San Bernardino Valley, Southeastern Arizona. Cochise College, Douglas, Arizona.

Eddy, F.W. 1958. *A Sequence of Culture and Alluvial Deposits in the Cienega Creek Basin, Southwestern Arizona.* Master's thesis, University of Arizona, Tucson.

Ezell, P. 1954. An Archaeological Survey of Northwestern Papagueria. *The Kiva* 19(2-4):1-26.

Federal Register. 50 CFR 17.95(b). Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the Southwestern Willow Flycatcher. 22 July 1997.

Federal Register. 50 CFR 17.96(a). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Huachuca Water Umbel, a Plant. 12 July 1999. Federal Register. 50 CFR Part 17.95(e). Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Spikedace and the Loach Minnow; Final Rule. 25 April 2000.

Federal Interagency Committee on Noise (FICON). 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. Federal Interagency Committee on Noise. August.

Fulton, W.S. and C. Tuthill. 1940. *An Archaeological Site Near Gleeson, Arizona.* The Amerind Foundation, No.1. Dragoon, Arizona.

General Accounting Office (GAO). 1997. Letter Report. Illegal Immigration: Southwest Border Strategy Results Inconclusive. 11 December 1997.

Gladwin, H. S., E.W. Haury, E.B. Sayles, and N. Gladwin. 1937. *Excavations at Snaketown, Material Culture*. Medallion Papers, No. 25. Gila Pueblo, Globe, Arizona.

Gladwin, W. and H.S. Gladwin. 1935. *The Eastern Range of the Red-on-buff Culture.* Medallion Papers, No. 16. Gila Pueblo, Globe.

Great Outdoor Recreation Pages (GORP). 2000a. Destinations: Miller Peak Wilderness.Updated June 5, 2000. Website:www.gorp.com/gorp/resource/US_Wildrness_Area/AZ_mille.htm

(GORP). 2000b. Destinations: San Pedro Riparian National Conservation Area. Updated June5, 2000. Website: www.gorp.com/gorp/resource/us_blm/az_san_p.htm

Hadley, D. 1987. Border Boom Town - Douglas, Arizona 1900-1920. *The Cochise Quarterly* 17(3):3-47. Cochise County Historical and Archaeological Society, Douglas.

Haury, E.W. 1945. *The Excavation of Los Muertos and Neighboring Ruins in the Salt River Valley, Southern Arizona.* Papers of the Peabody Museum of Archaeology and Ethnology, No. 24(1). Harvard University, Cambridge.

Haury, E.W. 1950. *The Stratigraphy and Archaeology of Ventana Cave, Arizona.* University of Arizona Press, Tucson.

Haury, E.W. 1976. *The Hohokam: Desert Farmers and Craftsmen.* The University of Arizona Press, Tucson.

Haury, E.W., E.B. Sayles, and W.W. Wasley. 1959. The Lehner Mammoth Site, Southeastern Arizona. *American Antiquity* 25(1):1-34

Hayden, J.D. 1970. Of Hohokam Origins and Other Matters. *American Antiquity* 35(1): 87-91.

Hayden, J.D. 1976. Pre-Altithermal Archaeology in the Sierra Pinacate, Sonora, Mexico. *American Antiquity* 41(3): 274-289.

Haynes, C.V. 1984. Stratigraphy and Late Pleistocene Extinction in the United States. In *Quaternary Extinctions: A Prehistoric Revolution,* edited by P.S. Martin and R.G. Klein. University of Arizona Press, Tucson.

Hendricks, D.M. 1985. Arizona Soils. College of Agriculture, University of Arizona Press. Tucson, Arizona. 244 p.

Hendrickson, D.A. and W.L. McKinley. 1984. Cienegas-Vanishing Climax Comunities of the American Southwest. Desert Plants 6(3):131-175.

Hester, T.R. 1973. *Chronological Ordering of Great Basin Prehistory.* Contributions of Archaeological Research Facility 17, University of California, Berkeley.

Hinton, T.B. 1955. A Survey of Archaeological Sites in the Altar Valley, Sonora. *The Kiva* 21(1-2):1-12.

Hoffmeister, D.F. 1986. Mammals of Arizona. The University of Arizona and the Arizona Game and Fish Department. 602 p.

Johnson, A.E. 1960. *The Place of the Trincheras Culture of Northern Sonora in Southwestern Archaeology.* Master's thesis, University of Arizona, Tucson.

Johnson, A.E. 1963. The Trincheras Culture of Northern Sonora. *American Antiquity* 29(2):174-186.

Johnson, A.E., and R. Thompson. 1963. The Ringo Site, Southeastern Arizona. *American Antiquity* 28:465-481.

Jones, J. 1992. The U.S. Outdoor Atlas & Recreation Guide. Houghton Mifflin Company, New York. 191 p.

Kaufman, John E. and J. F. Christensen. 1987. IES Lighting Handbook. Section 19-21 Effects on Plants. Illuminating Engineering Society of North America.

Kidder, A.V., H.S. Cosgrove, and C.B. Cosgrove. 1949. *The Pendleton Ruin, Hidalgo County, New Mexico.* Contributions to American Anthropology and History, 10(50):107-152. Carnegie Institution of Washington, Washington, D.C.

King, T. J., Jr. 1976. *The Archaeological Implications of the Paleobotanical Record from Lucerne Valley Regions, Mohave Desert, California.* Master's thesis, University of California, Los Angeles.

Klein, J., J.C. Lerman, P.E. Damon, and E.K. Ralph. 1982. Calibration of Radiocarbon Dates: Tables Based on the Consensus Data of the Workshop on Calibrating the Radiocarbon Time Scale. *Radiocarbon* 24:103-150.

Krausman, P.R., M.C. Wallace, D.W. DeYoung, M.E. Weisenberger, and C.L. Hayes. 1993. The Effects of Low-altitude Jet Aircraft on Desert Ungulates. International Congress: Noise as a Public Health Problem 6:471-478.

Krausman, P.R., M.C. Wallace, C.L. Hayes, and D.W. DeYoung. 1998. Effects of Jet Aircraft on Mountain Sheep. Journal of Wildlife Management 62:1246-1254.

Kurdeka, J.L. 1985. The Christiansen Border Village. *Cochise Quarterly* 15(13):25-40. Cochise County Historical and Archaeological Society, Douglas.

Lane, J.A. 1988. A Birder's Guide to Southeastern Arizona. L&P Press, Denver, Colorado. 122 p.

LeBlanc, S.A. 1980. The Post-Mogollon Periods in Southwestern New Mexico: the Animas/Black Mountain Phase and the Salado Period. In *An Archaeological Synthesis of South-Central and Southeastern New Mexico,* edited by S.A. LeBlanc and M.E. Whalen. Office of Contract Archaeology, University of New Mexico, Albuquerque.

Lowe, C.H., (eds) 1964. The Vertebrates of Arizona. The University of Arizona Press, Tucson, Arizona. 270 p.

Lowe, C.H. and P.A. Holm. 1992. A Checklist of Amphibians and Reptiles of Chiricahua National Monument. Southwest Parks and Monument Association. Tucson, Arizona. 5 p.

Luce, G.G. 1977. Body Time. Granada Publishing Ltd., Frogmore, St. Albans, Herts, Great Britain.

Martin, P.S., J.B. Rinaldo, and E. Antevs. 1949. Cochise and Mogollon Sites, Pine Lawn Valley, Western New Mexico. *Fieldiana: Anthropology* 38(1). Field Museum of Natural History, Chicago.

Martin, P.S. and J. Schoenwetter. 1960. Arizona's Oldest Cornfield. *Science* 132:33-34.

Martynec, R.S. and D.E. Peter. 1992. *Cultural Resources Monitoring Survey of the Douglas-Naco, Arizona Sector of the U.S.-Mexican Border.* (Draft) Miscellaneous Report of Investigations No. 36. Geo-Marine, Inc, Plano, Texas. Submitted to the U.S. Corps of Engineers, Fort Worth District, Contract No. DACW-63-90-D-0061.

Moratto, M.J. 1984. *California Archaeology.* Academic Press, San Diego.

McGuire, R.H. and M.E. Villalpando. 1991. *Projecto Reconocimiento Arqueologico en el Valle de Altar.*

Mercer, B. Personal Communication. Bisbee Community Development Director. Letter, June 28, 2000.

Naco Community Plan. 1998. Cochise Planning Department.

Natural Resources Planning Team. 1986. Natural Resources Management Plan for Luke Air Force Range. Prepared for the U.S. Air Force-Tactical Air Command, Luke Air Force Base, Arizona. Natural Resources Planning Team, School of Renewable Natural Resources, College of Agriculture, University of Arizona.

Neily, R.B. and R. Beckwith. 1985. *A Cultural Resource Inventory of the San Bernardino U.S. Fish and Wildlife Refuge.* Cultural Resource Management Section, Arizona State Museum, Tucson.

Phillips, A, J. Marshall, and G. Monsen. 1964. The Birds of Arizona. The University of Arizona Press. Tucson, Arizona. 218 p.

Rand McNally. 1997. Road Atlas. 69th Edition. Rand McNally and Company, Chicago, Illinois. 128 p.

Raptor Research Foundation. 1996. Suggested Practices for Raptor Protection on Powerlines. University of Minnesota, St. Paul, Minnesota.

Regional Economic Information System. 1999. Regional Economic Information for Jefferson Parish, Louisiana. Internet Website: http://govinfo.library.orst.edu.

Rogers, M.J. 1939. *Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas.* San Diego Museum Papers, No. 3. San Diego Museum, San Diego.

Rogers, M.J. 1941. *Aboriginal Culture Relations between Southern California and the Southwest.* San Diego Museum Papers 5(3):1-6. San Diego Museum, San Diego.

Rogers, M.J. 1945. An Outline of Yuman Prehistory. *Southwestern Journal of Anthropology* 1(2):167-198.

Rosenthal, E.J., D.R. Brown, M. Severson, and J.B. Clonts. 1978. *The Quijotoa Valley Project.* Cultural Resources Management Division, Western Archeological Conservation Center Library, National Park Service, Tucson.

Sauer, C. and D. Brand. 1930. Pueblo Sites in Southeastern Arizona. In *Geography* 3(6):415-458. University of California Publications, Berkeley.

Sauer, C. and D. Brand. 1931. Prehistoric Settlements of Sonora with Special Reference to Cerro de Trincheras. In *Geography* 5(3):67-148. University of California Publications, University of California Press, Berkeley.

Sayles, E.B. 1945. *The San Simon Branch: Excavations at Cave Creek and in the San Simon Valley.* Medallion Papers, No. 34 and 35. Gila Pueblo, Globe, Arizona.

Sayles, E.B. and E. Antevs. 1941. *The Cochise Culture.* Medallion Papers, No. 29. Gila Pueblo, Globe, Arizona.

Sayles, E.B., E. Antevs, T.L. Smiley, W.W. Wasley, and R.H. Thompson. 1958. *The Cochise Gathering Culture of Southeastern Arizona.* M.S. thesis on file, Arizona State Museum, Tucson.

Schiffer, M.B. 1982. Hohokam Chronology: An Essay on History and Method. Pages 299-344 in *Hohokam and Patayan: Prehistory of Southwestern Arizona,* edited by R. H. McGuire and M. Schiffer. Academic Press, New York.

Schuiling, W. (editor) 1972. *Pleistocene Man at Calico.* San Bernardino County Museum Association Quarterly. Redlands, California.

Spicer, E.H. 1962. *Cycles of Conquest.* University of Arizona Press, Tucson.

Stacy, V.K.P. 1974. *Cerros de Trincheras in the Arizona Papagueria.* Ph.D. dissertation, University of Arizona, Tucson.

Stone, L.M. and J.E. Ayres. 1982. *A Description and Evaluation of Archaeological Resources, San Bernardino Ranch National Historical Landmark, Cochise County, Arizona.* Archaeological Research Services, Tempe.

Sykes, G. 1937. *The Colorado Delta.* Special Publication 19. American Geographical Society, Carnegie Institution of Washington, Washington, D.C.

The Nature Conservancy. 2000. Arizona Chapter: Ramsey Canyon/Upper San Pedro.

Tuthill, C. 1947. *The Tres Alamos Site on the San Pedro River, Southeastern Arizona.* The Amerind Foundation, no. 4. Dragoon, Arizona.

Union Pacific Railroad. 2000. Internet website: http://www.up.com/

U.S. Army. 1994. Programmatic Environmental Impact Statement for JTF-6 Activities Along the U.S./Mexico Border. USACE, Fort Worth District, Fort Worth, Texas.

Unites States Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation.

USACE. 1990. Final Environmental Impact Statement for the Fort Huachuca, Fort Devens, Fort Monmouth Base Realignment, U.S. Army Corps of Engineers, Los Angeles District and New England Division.

USACE. 1996. Final Environmental Assessment for the JTF-6 Road Maintenance and Construction Naco-Douglas, Cochise County, Arizona (JT315-96). U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, Texas.

USACE. 1998a. Final Supplemental Environmental Assessment for the Proposed JTF-6 Light Pole Installation Mission Douglas, Cochise County, Arizona. U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, Texas.

USACE. 1998b. Final Environmental Assessment for the JTF-6 Fence Construction Project Yuma County, Arizona. U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, Texas.

USACE. 1998c. Record of Environmental Consideration for Proposed Surveillance Equipment Installation Yuma County Arizona, and Imperial County, California. U.S. Army Corps of Engineers, Fort Worth District, Fort Worth, Texas.

USACE. 1999. Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities Along the U.S./Mexico Border. U.S. army Corps of Engineers, Fort Worth District, Fort Worth, Texas.

United States Border Patrol (USBP). 1998. Results of enforcement program conducted by Laredo Sector/Carrizo Springs Station. Personal communication between the USBP Station Chief and Mr. Chris Ingram, GSRC, November 4, 1998.

USBP. 2000. National statistics data provided by Robert Montemayor, Assistant Chief, USBP Headquarters, to Chris Ingram, Gulf South Research Corporation, via e-mail dated 6 July 2000.

U.S. Bureau of the Census. 1991. 1990 U.S. Census Data, Database: C90STF1A, Summary Level: State—County, Internet Website : http://venus.census.gov/cdrom/lookup/919440640.

U.S. Bureau of the Census. 1999. Population Estimates Program, Statistical Information Staff, Population Division, U.S. Bureau of the Census, Washington D.C.

United States Department of the Interior (USDOI). 1989. Final San Pedro River Riparian Management Plan and Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Stafford District, Stafford, Arizona.

U.S. Environmental Protection Agency (USEPA). 1972. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Report 550/9-74-004. March.

USEPA. 1992a. Review of U.S.-Mexico Environmental Issues. February 1992.

USEPA. 1992b. Summary-Environmental Plan for the Mexican-U.S. border area, First Stage (1992-1994). U.S. Environmental Protection Agency, Washington, D.C. 34p.

USEPA. 1995. AP-42: Compilation of Air Pollutant Emission Factors. Volume I: Stationary Point and Area Sources. 5th Edition.

USEPA. 2000a. Arizona AIRS Air Pollution Source Ranking Report. Office of Air Quality Planning and Standards. http://www.epa.gov/airsdata/

USEPA. 2000b. Watershed Profile: Whitewater Draw. Updated June 22, 2000. Internet website: www.epa.gov/surf3/hucs/15080301/

USEPA. 2000c. Watershed Profile: Upper San Pedro. Updated June 22, 2000. Website: www.epa.gov/surf3/hucs/15080301

USEPA and Secretaria de Desarrollo y Ecologia [SEDUE] 1992a. Volumes I and II-inventory and analysis and hydrologic summary. Phoenix, AZ. 516pp.

USEPA and SEDUEb. 1992. Integrated Environmental Plan for the Mexican-U.S. Border Area (First Stage 1992-1994). U.S. Environmental Protection Agency and the Mexico Secretaria De Desarrollo Urbano Y Ecologia.

U.S. Fish and Wildlife Service (USFWS). 2000. Southwest Region Ecological Services. Endangered Species List for Cochise County, Arizona.. 26 June 2000. http://ifw2es.fws.gov/EndangeredSpecies/lists/ListSpecies.cfm

Wagoner, J.J. 1975. *Early Arizona: Prehistory to Civil War.* University of Arizona Press, Tucson.

Waters, M.R. 1982. The Lowland Patayan Ceramic Typology. Pages 537-570 in *Hohokam and Patayan: Prehistory of Southwest Arizona,* edited by Randall H. McGuire and Michael B. Schiffer. Academic Press, New York.

Wells, E.W. 1927. *Argonaut Tales.* Grafton Press, New York.

Weisenberger, M.E., P.R. Krausman, M.C. Wallace, D.W. DeYoung, and E.E. Maughan. 1996. Effects of Simulated Jet Aircraft Noise on Heart Rate and Behavior of Desert Ungulates. Journal of Wildlife Management 60:52-61.

Whalen, N.M. 1971. *Cochise Culture Sites in the Central San Pedro Drainage, Arizona.* Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

Whalen, N.M. 1975. Cochise Site Distribution in the San Pedro Valley. *The Kiva* 40(3):203-211.

Wilson, R. Personal Communication. Soil Scientists for the United States Department of Agriculture, Natural Resources Conservation Service. June 23, 2000. www.epa.gov/surf3/hucs/15050202/

Workman, G.W., T.D. Bunch, J.W. Call, R.C. Evans, L.S. Neilson, and E.M. Rawlings. 1992. Sonic Boom/Animal Disturbance Studies on Pronghorn Antelope, Rocky Mountain Elk, and Bighorn Sheep. Utah State University Foundation, Logan. Prepared for U.S. Air Force, Hill AFB, Contract F42650-87-C-0349.

SECTION 8.0
LIST OF PREPARERS

8.0 LIST OF PREPARERS

The following people were primarily responsible for preparing this Environmental Assessment.

NAME	AGENCY/ORGANIZATION	DISCIPLINE/EXPERTISE	EXPERIENCE	ROLE IN PREPARING EA
Eric Verwers	INS A-E Resource Center	Biology	14 years in NEPA and related studies	Program Manager and EA review and coordination
Kevin Feeney	INS Facilities and Engineering Division	Hazardous Materials	20 years HAZMAT and NEPA studies	EA Contract Manager and review
Chris Ingram	Gulf South Research Corporation	Biology/Ecology	22 years NEPA and related studies	Project Manager
Suna Knaus	Gulf South Research Corporation	Forestry and Wildlife	14 years NEPA and related studies	Water resources; unique and sensitive areas
Jerry Bolton	Gulf South Research Corporation	Biology/Ecology	13 years NEPA and related studies	EA Review
Steve Smith	Gulf South Research Corporation	Range Conservation	8 years NEPA and T&E surveys	Wildlife, T&E Species
John Lindemuth	Gulf South Research Corporation	Archaeology/Project Archaeologist	8 years archaeological studies	Cultural resources and socioeconomics
Sharon Newman	Gulf South Research Corporation	GIS/Graphics	7 years GIS analysis	Graphics and GIS
Jay Cline	Gulf South Research Corporation	Biology/Ecology	3 years NEPA studies	Water resources
Tonya Bolton	Gulf South Research Corporation	Biology/Wildlife Management	1 year NEPA and related studies	Wildlife and air quality
Sheyna Wisdom	Gulf South Research Corporation	Biology	4 years natural resources and NEPA studies	Land use, alternative formulation, soils

(This page left intentionally blank)

APPENDIX A
LIST OF PLANT AND WILDLIFE SPECIES

Appendix A

Common Plant and Wildlife Species Occurring in Cochise County

Common Name	Scientific Name
Plants	
Alkali Sacaton	*Sporobolis airoides*
all-thorn	*Koberlinia spinosa*
Arizona cudweed	*Gnaphalium arizonicum*
Arizona desert holly	*Perezia nana*
banana yucca	*Yucca baccata*
Bermuda grass	*Cynodon dactylon*
blue grama	*Bouteloua gracilis*
broom snakeweed	*Gutierrezia sarothrae*
buckwheat	*Eriogonum* sp.
bulrush	*Scirpus* sp.
calabazilla (buffalo gourd)	*Cucurbuta foetidissima*
cane colla	*Opuntia spinosior*
canyon ragweed	*Ambrosia ambrosioides*
common cattail	*Typha latifolia*
common cocklebur	*Xanthium strumarium*
common sunflower	*Helianthus annuus*
creosote bush	*Larrea tridentata*
crowded rayweed (mariola)	*Parthenium confertum*
curly mesquite grass	*Hilaria belangeri*
deergrass	*Muhlenbergia rigens*
desert broom	*Baccharis sarothroides*
desert senna	*Cassia covesii*
desert sumac	*Rhus microphylla*
desert thorn	*Lycium macrodon*
desert willow	*Condalia lycioides*
emory oak	*Quercus emoryi*
Engelmann's prickly pear	*Opuntia phaeacantha* var. *discata*
fairy duster	*Calliandra eriophylla*
four-wing saltbush	*Atriplex canescens*
Fremont cottonwood	*Populus fremontii*
giant ragweed	*Ambrosia trifida*
golden rabbit brush	*Chrysothamnus nauseosus*
goodding willow	*Salix gooddingii*
groundsel	*Senecio* sp.
Johnson grass	*Sorghum halepense*
Lehmann's lovegrass	*Eragrostis lehmanniana*
longleaf ephedra (Mormon tea)	*Ephedra trifurca*
mohave prickly pear	*Opuntia erinacea* var. *erinacea*
netleaf hackberry	*Celtis reticulata*
ocotilla	*Fouquieria slendens*
Palmer's agave	*Agave palmeri*
prairie zinnia	*Zinnia grandiflora*
rabbit-foot grass	*Polypogon monspeliensis*
purple prickly pear	*Opuntia violacea* var. *santa-rita*
Russian thistle	*Salsola iberica*
sacaton	*Sporobolis wrightii*
sacred datura (desert thornapple)	*Datura meteloides*
salt cedar	*Tamarix pentandra*
scrub oak	*Quercus* sp.

Common Plant and Wildlife Species Occurring in Cochise County	
Common Name	**Scientific Name**
side oats grama	*Bouteloua curtipendula*
silverleaf nightshade	*Solanum elaeagnifolium*
soaptree yucca	*Yucca elata*
sotol	*Dasylirion wheeleri*
sprangletop	*Leptochloa* sp.
tarbush	*Flourensia cernua*
thistle	*Cirsium* sp.
three-awn grass	*Aristida* sp.
Thurber's peppergrass	*Lepidium thurberi*
velvet mesquite	*Prosopis velutina*
western honey mesquite	*Prosopis glandulosa*
western pepperweed	*Lepidium montanum*
western soapberry	*Sapindus saponaria* var. *drummondii*
white-thorn acacia	*Acacia constricta*
Birds	
acorn woodpecker	*Melanerpes formicivorus*
American coot	*Fulica americana*
American kestral	*Falco sparverius*
American robin	*Turdus migratorius*
American widgeon	*Anas americana*
Anna's hummingbird	*Calypte anna*
band-tailed pigeon	*Columba fasciata*
barn swallow	*Hirundo rustica*
Bell's vireo	*Vireo bellii*
Bewick's wren	*Thryomanes bewickii*
black-chinned hummingbird	*Archilochus alexandri*
black phoebe	*Sayornis nigricans*
blue-grey gnatcatcher	*Polioptila caerulea*
blue throated hummingbird	*Lampornis clemenciae*
Brewer's blackbird	*Euphagus cyanocephalus*
Brewer's sparrow	*Spizella breweri*
bridled titmouse	*Parus wollweberi*
broad-billed hummingbird	*Cynanthus latirostris*
broad-tailed hummingbird	*Selasphorus platycerus*
brown-crested flycatcher	*Myiarchus tyrannulus*
cactus wren	*Campylorhynchus brunneicapillus*
Cassin's kingbird	*Tyrannus vociferans*
Chihuahuan raven	*Corvus cryptoleucus*
cinnamon teal	*Anus cyanopters*
cliff swallow	*Petrochelidon pyrrhonota*
common poorwill	*Phalaenoptilus nuttallii*
common raven	*Corvus corax*
common snipe	*Capella gallinago*
curve-billed thrasher	*Toxostoma curvirostre*
dusky-capped flycatcher	*Myiarchus tuberculifer*
dusky flycatcher	*Empidonax oberholseri*
eared grebe	*Podiceps nigricollis*
eastern meadowlark	*Sturnella magna*
European starling	*Sturnus vulgaris*
Gila woodpecker	*Melanerpes uropygialis*

Common Plant and Wildlife Species Occurring in Cochise County	
Common Name	**Scientific Name**
greater roadrunner	*Geococcyx californianus*
Hammond's flycatcher	*Empidonax hammondii*
hermit thrush	*Catharus guttatus*
horned lark	*Eremophila alpestris*
house sparrow	*Passer domesticus*
house wren	*Troglodytes aedon*
killdeer	*Charadrius vociferus*
ladder-backed woodpecker	*Dendrocopus nuttallii*
lark bunting	*Calamospiza melanocorys*
lark sparrow	*Chondestes grammacus*
least sandpiper	*Calidris minutilla*
long-billed dowitcher	*Limnodromus scolopaceus*
magnificent hummingbird	*Eugenes fulgens*
northern flicker	*Colaptes auratus*
northern harrier	*Circus cyaneus*
northern mockingbird	*Mimus polyglottos*
northern rough-winged swallow	*Stelgidopteryx ruficollis*
northern shovelor	*Anas clypeata*
painted redstart	*Myioborus pitus*
purple martin	*Progne subis*
pygmy nuthatch	*Sitta pygmaea*
red-tailed hawk	*Buteo jamaicensis*
red-winged blackbird	*Agelaius phoeniceus*
rock wren	*Salpinctes obsoletus*
rock dove	*Columba livia*
ruby-crowned kinglet	*Regulus calendula*
Say's phoebe	*Sayornis saya*
sharp-shinned hawk	*Accipiter striatus*
spotted sandpiper	*Actitis macularia*
Steller's jay	*Cyanocitta stelleri*
Swainson's hawk	*Buteo swainsoni*
tree swallow	*Tachycineta bicolor*
turkey vulture	*Cathartes aura*
vermillion flycatcher	*Pyrocephalus rubinus*
vesper sparrow	*Pooecetus gramineus*
violet-green swallow	*Tachycineta thalassina*
water pipet	*Anthus spinoletta*
western bluebird	*Sialia mexicana*
western flycatcher	*Empidonax difficilis*
western kingbird	*Tyrannus verticalis*
western sandpiper	*Calidris mauri*
western tanager	*Piranga ludoviciana*
western wood-pewee	*Contopus sordidulus*
whip-poor-will	*Caprimulgus vociferus*
white-crowned sparrow	*Zonotrichia leucophrys*
Mammals	
American free-tailed bat	*Tadarida brasiliensis mexicana*
antelope jackrabbit	*Lepus alleni*
Arizona cotton rat	*Sigmodon arizonae cienegae*
badger	*Taxidea taxus berlandieri*

Common Plant and Wildlife Species Occurring in Cochise County	
Common Name	**Scientific Name**
Bailey's pocket mouse	*Perognathus baileyi*
banner-tailed kangaroo rat	*Dipodomys spectabilis spectabilis*
big brown bat	*Eptesicus fuscus*
black-tailed jackrabbit	*Lepus californicus*
bobcat	*Felis rufus*
Botta's pocket gopher	*Thomomys bottae*
brush mouse	*Peromyscus boylii rowleyi*
cactus mouse	*Peromyscus eremicus*
canyon mouse	*Peromyscus eremicus*
California leaf-nosed bat	*Macrotus californicus*
California myotis	*Myotis californicus*
cliff chipmunk	*Eutamias dorsalis dorsalis*
cave myotis	*Myotis velifer velifer*
coyote	*Canis latrans*
deer mouse	*Peromyscus maniculatus sonoriensis*
desert cottontail	*Sylvilagus auduboni minor*
desert pocket mouse	*Perognathus penicillatus*
desert shrew	*Notiosorex crawfordi*
eastern cottontail	*Sylvilagus sfloridanus holzneri*
fringed myotis	*Myotis thysanodes thysanodes*
fulvous cotton rat	*Sigmodon fulviventer minimus*
fulvous harvest mouse	*Reithrodontomys megalotis megalotis*
gray fox	*Urocyon cinereoargenteus*
Gunnison's prairie dog	*Cynomys gunnisoni zuniensis*
hairy-tailed bat	*Lasiurus borealis*
Harris' antelope squirrel	*Ammospermophilus harrisii*
hispid pocket mouse	*Perognathus hispidus conditi*
hoary bat	*Lasiurus cinereus*
hog-nosed skunk	*Conepatus mesoleucus venaticus*
hooded skunk	*Mephitis macroura milleri*
javelina	*Tayassu tajacu sonoriensis*
kit fox	*Vulpes macrotis*
long-legged myotis	*Myotis volans interior*
long-tailed weasel	*Mustela frenata neomexicana*
Merriam's kangaroo rat	*Dipodomys merriami*
Mexican fox squirrel	*Sciurus nayaritensis chiricahuae*
Mexican long-tongued bat	*Choeronycteris mexicana*
mountain lion	*Felis concolor*
mule deer	*Odocoileus hemionus crooki*
northern grasshopper mouse	*Onychomys leucogaster ruidosae*
Ord's kangaroo rat	*Dipodomys ordii*
pallid bat	*Antrozous pallidus*
plains harvest mouse	*Reithrodontomys montanus*
pocketed free-tailed bat	*Tadarida femorosacca*
raccoon	*Procyon lotor pallidus*
ringtail	*Bassaricus astutus*
rock squirrel	*Spermophilus variegatus grammurus*
rock pocket mouse	*Perognathus intermedius*
round-tailed ground squirrel	*Spermophilus tereticaudus*
Sanborn's long-nosed bat	*Leptonycteris sanborni*
silky pocket mouse	*Perognathus flavus flavus*

Common Plant and Wildlife Species Occurring in Cochise County	
Common Name	**Scientific Name**
silver-haired bat	*Lasionycteris noctivigans*
small-footed myotis	*Myotis leibil melanorhinus*
southern grasshopper mouse	*Onychomys torridus torridus*
southern pocket gopher	*Thomomys umbrinus intermedius*
southern yellow bat	*Lasiurus ega xanthiuns*
southwestern myotis	*Myotis auriculus apache*
spotted ground squirrel	*Spermophilus spilosoma*
striped skunk	*Mephitis mephitis*
Townsend's big-eared bat	*Plecotus townsendii*
western harvest mouse	*Reithrodontomys megalotis megalotis*
western pipistrelle	*Pipistrellus hesperus*
western spotted skunk	*Spilogale gracilis leucoparia*
white-footed mouse	*Peromyscus leucopus arizonae*
white-tailed deer	*Odocoileus virginianus couesi*
white-throated wood rat	*Neotoma albigula*
yellow-nosed cotton rat	*Sigmodon ochrognathus*
Yuma myotis	*Myotis yumanensis*
Amphibians	
bullfrog	*Rana catesbeiana*
canyon treefrog	*Hyla arenicolor*
Couch's spadefoot toad	*Scaphiopus couchi*
great basin spadefoot toad	*Scaphiopus intermontanus*
great plains toad	*Bufo cognatus*
leopard frog	*Rana blairi*
tiger salamander	*Ambystoma tigrinum*
western green toad	*Bufo debilis insidior*
western spadefoot toad	*Scaphiopus hammondii*
Reptiles	
Arizona whiptail	*Cnemidophorus inornatus arizonae*
black-tailed rattlesnake	*Crotalus molossus*
bull snake	*Pituophis melanoleucus sayi*
canyon spotted whiptail	*Cnemidophorus burti*
chihuahuan spotted whiptail	*Cnemidophorus exsanguis*
clark spiny lizard	*Sceloporus clarkii*
coachwhip	*Masticophis flagellum*
common kingsnake	*Lampropeltis getulus*
desert box turtle	*Terrapene ornata luteola*
desert-grassland whiptail	*Cnemidophorus uniparens*
glossy snake	*Arizona elegans*
Long-nosed snake	*Rhinocheilus lecontei*
Madrean alligator lizard	*Ilgaria kingii*
Mexican hognose snake	*Heterodon nasicus bennerlyi*
Mojave rattlesnake	*Crotalus scutulatus*
mountain spiny lizard	*Sceloporus jarrovi*
night snake	*Hypsiglena torquata*
rock rattlesnake	*Crotalus lepidus*
side-blotched lizard	*Uta stansburiana*
Sonoran mountain kingsnake	*Lampropeltis pyromelana*
southwestern earless lizard	*Holbrookia texana scitula*

Common Plant and Wildlife Species Occurring in Cochise County

Common Name	Scientific Name
striped plateau lizard	*Sceloporus virgatus*
tree lizard	*Urosaurus ornatus*
western-banded gecko	*Coleonyx variegatus*
western box turtle	*Terrapene ornata*
western diamondback	*Crotalus atrox*
western hooknose snake	*Ficimia cana*
western patch-nosed snake	*Salvadora hexalepis*
western whiptail	*Cnemidophorus tigris*

Sources: Bernard and Brown 1978; Lane 1988; Lowe and Holm 1992; Natural Resources Planning Team 1986; Phillips et al. 1964; U.S. Department of the Interior 1989; U.S. Army Corps of Engineers 1990

APPENDIX B
CORRESPONDENCE

U.S. Department of Justice
Immigration and Naturalization Service
Architect-Engineer Resource Center

Attention: CESWF-PM-INS
819 Taylor Street, Room 3A28
P.O. Box 17300
Fort Worth, TX 76102-0300

June 19, 2000

Regional Supervisor
Arizona Department of Game and Fish
555 North Greasewood Road
Tucson, Arizona 85745

Dear Sir or Madam:

The U.S. Immigration and Naturalization Service (INS) and U. S. Border Patrol (USBP) is currently reassessing past and future construction activities within the border area between Naco and Douglas, Arizona. As a result, INS and USBP have tasked the U.S. Army Corps of Engineers (USACE), Fort Worth District Architect-Engineer Resource Center (AERC) to prepare an interim environmental assessment (EA) that will address the cumulative effects of the past actions (1995-2000) and the actions anticipated over the next five years. This EA will consider the direct, indirect and cumulative effects of such actions as installation and operation of lights, roads, fences, USBP stations, and checkpoints within the project area. The EA is not intended to negate or obviate subsequent NEPA documentation for site-specific projects; rather, the purpose of this EA is to disclose to the public and INS decision-makers the impacts that have occurred and those that are anticipated.

The INS AERC respectfully requests that your agency provide a list and/or description of the sensitive resources (e.g., protected species, state wildlife management areas, state parks, etc.) that you believe may be affected by the USBP activities in this area. We intend to provide your agency with a copy of the Draft EA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft EA.

If you have any questions, please call me. We look forward to hearing from you and receiving your information.

Sincerely,

Eric Verwers, Assistant Director
Immigration and Naturalization Service
A/E Resource Center

U.S. Department of Justice
Immigration and Naturalization Service
Architect-Engineer Resource Center

Attention: CESWF-PM-INS
819 Taylor Street, Room 3A28
P.O. Box 17300
Fort Worth, TX 76102-0300

June 26, 2000

Mr. David Harlow, Field Supervisor
U.S. Fish and Wildlife Service
2321 W. Royal Palm Road, Suite 103
Phoenix, AZ 85021-4951

Dear Mr. Harlow:

The U.S. Immigration and Naturalization Service (INS) and U. S. Border Patrol (USBP) is currently reassessing past and future construction activities within the border area between Naco and Douglas, Arizona. As a result, INS and USBP have tasked the U.S. Army Corps of Engineers (USACE), Fort Worth District Architect-Engineer Resource Center (AERC) to prepare an interim environmental assessment (EA) that will address the cumulative effects of the past actions (1995-2000) and the actions anticipated over the next five years. This EA will consider the direct, indirect and cumulative effects of such actions as installation and operation of lights, roads, fences, USBP stations, and checkpoints within the project area. The EA is not intended to negate or obviate subsequent NEPA documentation for site-specific projects; rather, the purpose of this EA is to disclose to the public and INS decision-makers the impacts that have occurred and those that are anticipated.

The INS AERC respectfully requests that your agency provide a list and/or description of the sensitive resources (e.g., protected species, state wildlife management areas, state parks, etc.) that you believe may be affected by the USBP activities in this area. We intend to provide your agency with a copy of the Draft EA once it is completed. Please inform us if additional copies are needed and/or if someone else within your agency other than you should receive the Draft EA.

If you have any questions, please call me. We look forward to hearing from you and receiving your information.

Sincerely,

Eric Verwers, Assistant Director
Immigration and Naturalization Service
A/E Resource Center

FAX TRANSMISSION FORM

PHONE (602) 789-3618
FAX (602) 789-3928

TO: STEVE SMITH

FROM: HABITAT BRANCH
ARIZONA GAME & FISH DEPARTMENT
SABRA SCHWARTZ

DATE: 6-30-00

SUBJECT: SPECIAL STATUS SPECIES FOR COCHISE COUNTY

COMMENTS:

NUMBER OF PAGES TO FOLLOW: 8

The Arizona Game & Fish Dept. is responsible for managing Arizona's fish and wildlife resources as an enduring public trust. In addition, the Department is charged with promoting safe and responsible use of watercraft and off-highway vehicles. Funding is provided from the sale of licenses and permits; watercraft registration fees; federal excise taxes on firearms, fishing equipment, boats, and other sporting goods; State lottery revenues; donations on State income tax forms; and various contracts and grants. Department policy is set by the Arizona Game & Fish Commission, whose five members are appointed by the Governor.

Scientific Name	Common Name	ESA	*Critical Habitat	USFS	BLM	WSCA	NPL	NESL	Taxonomic Group
COUNTYNAME : APACHE									
SOREX PALUSTRIS	WATER SHREW								
SPERMOPHILUS TRIDECEMLINEATUS MONTICOLA	WHITE MOUNTAINS GROUND SQUIRREL			S		WC			MAMMAL
ZAPUS HUDSONIUS LUTEUS	NEW MEXICAN JUMPING MOUSE	SC		S		WC			MAMMAL
ALLIUM GOODDINGII	GOODDING ONION	SC		S			HS	3	PLANT
ASTRAGALUS NUTRIOSENSIS	NUTRIOSO MILK-VETCH	SC					SR		PLANT
ASTRAGALUS XIPHOIDES	GLADIATOR MILK VETCH	SC					SR		PLANT
CALYPSO BULBOSA	WESTERN FAIRY SLIPPER						SR		PLANT
CAREX SPECUICOLA	NAVAJO SEDGE	LT	Y				HS	3	PLANT
CASTILLEJA MOGOLLONICA	WHITE MOUNTAINS PAINTBRUSH	SC		S			SR		PLANT
CHRYSOTHAMNUS MOLESTUS	TUSAYAN RABBITBRUSH	SC		S					PLANT
CYPRIPEDIUM PARVIFLORUM VAR PUBESCENS	YELLOW LADY'S-SLIPPER						HS		PLANT
DRABA STANDLEYI	STANDLEY WHITLOW-GRASS	SC							PLANT
EREMOCRINUM ALBOMARGINATUM	UTAH SOLITAIRE LILY			S			SR		PLANT
ERIGERON RHIZOMATUS	RHIZOME FLEABANE	LT							PLANT
GOODYERA REPENS	LESSER RATTLESNAKE PLANTAIN						SR		PLANT
IPOMOEA PLUMMERAE VAR CUNEIFOLIA	HUACHUCA MORNING GLORY			S					PLANT
MALAXIS PORPHYREA	PURPLE ADDER'S MOUTH						SR		PLANT
PLATANTHERA HYPERBOREA	BOREAL BOG ORCHID						SR		PLANT
PLATANTHERA PURPURASCENS	SLENDER BOG ORCHID						SR		PLANT
PUCCINELLIA PARISHII	PARISH ALKALI GRASS	SC					HS	2	PLANT
RUMEX ORTHONEURUS	BLUMER'S DOCK	SC					HS		PLANT
SALIX ARIZONICA	ARIZONA WILLOW			S			HS		PLANT
SCLEROCACTUS PARVIFLORUS	GLEN CANYON CACTUS						SR		PLANT
SENECIO QUAERENS	GILA GROUNDSEL	SC		S			SR		PLANT
STREPTOPUS AMPLEXIFOLIUS	WHITE MANDARIN TWISTED STALK						SR		PLANT
TRIFOLIUM NEUROPHYLLUM	WHITE MOUNTAINS CLOVER	SC		S					PLANT
ZIGADENUS VIRESCENS	GREEN DEATH CAMAS						SR		PLANT
THAMNOPHIS EQUES MEGALOPS	MEXICAN GARTER SNAKE	SC		S		WC			REPTILE
THAMNOPHIS RUFIPUNCTATUS	NARROW-HEADED GARTER SNAKE	SC		S		WC			REPTILE
COUNTYNAME : COCHISE									
AMBYSTOMA TIGRINUM STEBBINSI	SONORAN TIGER SALAMANDER	LE				WC			AMPHIBIAN
ELEUTHERODACTYLUS AUGUSTI CACTORUM	WESTERN BARKING FROG			S		WC			AMPHIBIAN
RANA BLAIRI	PLAINS LEOPARD FROG					WC			AMPHIBIAN
RANA CHIRICAHUENSIS	CHIRICAHUA LEOPARD FROG	PT		S		WC			AMPHIBIAN
RANA SUBAQUAVOCALIS	RAMSEY CANYON LEOPARD FROG	SC		S		WC			AMPHIBIAN
RANA YAVAPAIENSIS	LOWLAND LEOPARD FROG	SC		S		WC			AMPHIBIAN
ACCIPITER GENTILIS	NORTHERN GOSHAWK	SC		S		WC		4	BIRD
AMAZILIA BERYLLINA	BERYLLINE HUMMINGBIRD			S					BIRD

Scientific Name	Common Name	ESA	*Critical Habitat	USFS	BLM	WSCA	NPL	NESL	Taxonomic Group
COUNTYNAME : COCHISE									
AMAZILIA VIOLICEPS	VIOLET-CROWNED HUMMINGBIRD			S		WC			BIRD
AMMODRAMUS BAIRDII	BAIRD'S SPARROW	SC				WC			BIRD
ANTHUS SPRAGUEII	SPRAGUE'S PIPIT					WC			BIRD
ASTURINA NITIDA MAXIMA	NORTHERN GRAY HAWK	SC		S	S	WC			BIRD
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK			S		WC			BIRD
COCCYZUS AMERICANUS OCCIDENTALIS	WESTERN YELLOW-BILLED CUCKOO			S		WC		4	BIRD
DENDROCYGNA AUTUMNALIS	BLACK-BELLIED WHISTLING-DUCK					WC			BIRD
EMPIDONAX FULVIFRONS PYGMAEUS	NORTHERN BUFF-BREASTED FLYCATCHER	SC				WC			BIRD
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	LE	Y			WC		2	BIRD
EUPTILOTIS NEOXENUS	EARED TROGON			S					BIRD
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	SC	Y			WC		3	BIRD
ICTINIA MISSISSIPPIENSIS	MISSISSIPPI KITE					WC			BIRD
STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	LT				WC		3	BIRD
TROGON ELEGANS	ELEGANT TROGON					WC			BIRD
TYRANNUS CRASSIROSTRIS	THICK-BILLED KINGBIRD					WC			BIRD
TYRANNUS MELANCHOLICUS	TROPICAL KINGBIRD					WC			BIRD
AGOSIA CHRYSOGASTER	LONGFIN DACE	SC			S				FISH
CAMPOSTOMA ORNATUM	MEXICAN STONEROLLER	SC		S					FISH
CATOSTOMUS CLARKI	DESERT SUCKER	SC			S				FISH
CATOSTOMUS INSIGNIS	SONORA SUCKER	SC			S				FISH
CYPRINELLA FORMOSA	BEAUTIFUL SHINER	LT	Y						FISH
GILA INTERMEDIA	GILA CHUB	C		S		WC			FISH
GILA PURPUREA	YAQUI CHUB	LE	Y			WC			FISH
GILA ROBUSTA	ROUNDTAIL CHUB	SC		S		WC		2	FISH
POECILIOPSIS OCCIDENTALIS SONORIENSIS	YAQUI TOPMINNOW	LE				WC			FISH
RHINICHTHYS OSCULUS	SPECKLED DACE	SC			S				FISH
TIAROGA COBITIS	LOACH MINNOW	LT	Y			WC			FISH
CICINDELA OREGONA MARICOPA	MARICOPA TIGER BEETLE	SC		S	S				INVERTEBRATE
PYRGULOPSIS BERNARDINA	SAN BERNARDINO SPRINGSNAIL	SC		S	S				INVERTEBRATE
PYRGULOPSIS THOMPSONI	HUACHUCA SPRINGSNAIL	C		S	S				INVERTEBRATE
STYGOBROMUS ARIZONENSIS	ARIZONA CAVE AMPHIPOD	SC		S					INVERTEBRATE
CHOERONYCTERIS MEXICANA	MEXICAN LONG-TONGUED BAT	SC			S	WC			MAMMAL
EUMOPS PEROTIS CALIFORNICUS	GREATER WESTERN MASTIFF BAT	SC							MAMMAL
FELIS ONCA	JAGUAR	LE	N			WC			MAMMAL
IDIONYCTERIS PHYLLOTIS	ALLEN'S BIG-EARED BAT	SC			S				MAMMAL
LASIURUS BLOSSEVILLII	WESTERN RED BAT					WC			MAMMAL
LEPTONYCTERIS CURASOAE YERBABUENAE	LESSER LONG-NOSED BAT	LE				WC			MAMMAL
MYOTIS CILIOLABRUM	WESTERN SMALL-FOOTED MYOTIS	SC			S				MAMMAL
MYOTIS THYSANODES	FRINGED MYOTIS	SC			S				MAMMAL
MYOTIS VELIFER	CAVE MYOTIS	SC			S				MAMMAL

COUNTYNAME : COCHISE

Scientific Name	Common Name	ESA	*Critical Habitat	USFS	BLM	WSCA	NPL	NESL	Taxonomic Group
PLECOTUS TOWNSENDII PALLESCENS	PALE TOWNSEND'S BIG-EARED BAT	SC							MAMMAL
SCIURUS NAYARITENSIS CHIRICAHUAE	CHIRICAHUA FOX SQUIRREL	SC		S					MAMMAL
SIGMODON OCHROGNATHUS	YELLOW-NOSED COTTON RAT	SC							MAMMAL
SOREX ARIZONAE	ARIZONA SHREW	SC		S		WC			MAMMAL
ALLIUM PLUMMERAE	PLUMMER ONION						SR		PLANT
ALLIUM RHIZOMATUM	REDFLOWER ONION			S	S		SR		PLANT
AMMOCODON CHENOPODIOIDES	GOOSEFOOT MOONPOD				S				PLANT
APACHERIA CHIRICAHUENSIS	CHIRICAHUA ROCK FLOWER						SR		PLANT
ARABIS TRICORNUTA	CHIRICAHUA ROCK CRESS			S					PLANT
ASCLEPIAS LEMMONII	LEMMON MILKWEED			S					PLANT
ASPLENIUM DALHOUSIAE	DALHOUSE SPLEENWORT				S				PLANT
ASTRAGALUS COBRENSIS VAR MAGUIREI	COPPERMINE MILK-VETCH	SC		S			SR		PLANT
ASTRAGALUS HYPOXYLUS	HUACHUCA MILK-VETCH	SC		S	S		SR		PLANT
CAREX CHIHUAHUENSIS	A SEDGE			S					PLANT
CAREX ULTRA	ARIZONA GIANT SEDGE			S					PLANT
CASTILLEJA NERVATA	TRANS-PECOS INDIAN-PAINTBRUSH			S					PLANT
CLEOME MULTICAULIS	PLAYA SPIDER PLANT			S					PLANT
CORYPHANTHA RECURVATA	SANTA CRUZ BEEHIVE CACTUS	SC					SR		PLANT
CORYPHANTHA ROBBINSORUM	COCHISE PINCUSHION CACTUS	LT		S	S		HS		PLANT
CORYPHANTHA SCHEERI VAR VALIDA	SLENDER NEEDLE CORYCACTUS						HS		PLANT
CORYPHANTHA STROBILIFORMIS	COB CORYCACTUS						SR		PLANT
COURSETIA GLABELLA							SR		PLANT
CROTON FRUTICULOSUS	ENCINILLAS	SC		S					PLANT
DRABA STANDLEYI	STANDLEY WHITLOW-GRASS	SC			S				PLANT
ECHINOCEREUS LEDINGII	PINALENO HEDGEHOG CACTUS								PLANT
ECHINOCEREUS PECTINATUS VAR PECTINATUS	TEXAS RAINBOW CACTUS						SR		PLANT
ECHINOMASTUS ERECTOCENTRUS VAR ERECTOCENTRUS	NEEDLE-SPINED PINEAPPLE CACTUS	SC		S			SR		PLANT
EPITHELANTHA MICROMERIS	BUTTON CACTUS						SR		PLANT
ERIGERON ARISOLIUS				S					PLANT
ERIGERON KUSCHEI	CHIRICAHUA FLEABANE	SC		S			SR		PLANT
ERIGERON LEMMONII	LEMMON FLEABANE	C					HS		PLANT
ERIOGONUM CAPILLARE	SAN CARLOS WILD-BUCKWHEAT	SC					SR		PLANT
EUPHORBIA MACROPUS	WOODLAND SPURGE	SC					SR		PLANT
GENTIANELLA WISLIZENI	WISLIZENI GENTIAN	SC		S			SR		PLANT
GRAPTOPETALUM BARTRAMII	BARTRAM STONECROP	SC		S	S		SR		PLANT
HEDEOMA COSTATUM	CHIRICAHUA MOCK PENNYROYAL			S					PLANT
HEDEOMA DENTATUM	MOCK-PENNYROYAL			S					PLANT
HETEROTHECA RUTTERI	HUACHUCA GOLDEN ASTER	SC		S	S				PLANT
HEUCHERA GLOMERULATA	ARIZONA ALUM ROOT			S					PLANT
HEXALECTRIS SPICATA	CRESTED CORAL ROOT						SR		PLANT

Scientific Name	Common Name	ESA	*Critical Habitat	USFS	BLM	WSCA	NPL	NESL	Taxonomic Group
COUNTYNAME : COCHISE									
HEXALECTRIS WARNOCKII	TEXAS PURPLE SPIKE	SC		S	S		HS		PLANT
HIERACIUM PRINGLEI	PRINGLE HAWKWEED	SC		S					PLANT
HIERACIUM RUSBYI	RUSBY HAWKWEED			S					PLANT
IBERVILLEA TENUISECTA	TEXAS GLOBE BERRY				S				PLANT
IPOMOEA PLUMMERAE VAR CUNEIFOLIA	HUACHUCA MORNING GLORY			S					PLANT
IPOMOEA THURBERI	THURBER'S MORNING-GLORY			S					PLANT
LAENNECIA ERIOPHYLLA	WOOLLY FLEABANE			S					PLANT
LILAEOPSIS SCHAFFNERIANA VAR RECURVA	HUACHUCA WATER UMBEL	LE	Y				HS		PLANT
LILIUM PARRYI	LEMMON LILY	SC		S			SR		PLANT
LITHOSPERMUM VIRIDE	GREEN PUCCOON				S				PLANT
LOBELIA FENESTRALIS	LEAFY LOBELIA						SR		PLANT
LUPINUS HUACHUCANUS	HUACHUCA MOUNTAIN LUPINE			S					PLANT
LUPINUS LEMMONII	LEMMON'S LUPINE			S					PLANT
MACHAERANTHERA RIPARIA	CHIRICAHUA MOUNTAIN TANSY-ASTER				S				PLANT
MALAXIS CORYMBOSA	MADREAN ADDERS MOUTH						SR		PLANT
MALAXIS PORPHYREA	PURPLE ADDER'S MOUTH						SR		PLANT
MALAXIS TENUIS	SLENDER ADDERS MOUTH						SR		PLANT
MAMMILLARIA VIRIDIFLORA	VARIED FISHHOOK CACTUS						SR		PLANT
MAMMILLARIA WRIGHTII VAR WILCOXII	WILCOX FISHHOOK CACTUS						SR		PLANT
METASTELMA MEXICANUM	WIGGINS MILKWEED VINE	SC		S					PLANT
MUHLENBERGIA DUBIOIDES	BOX CANYON MUHLY			S					PLANT
PASPALUM VIRLETII	VIRLET PASPALUM			S					PLANT
PECTIS IMBERBIS	BEARDLESS CHINCH WEED	SC		S					PLANT
PENSTEMON DISCOLOR	CATALINA BEARDTONGUE			S			HS		PLANT
PENSTEMON RAMOSUS	BRANCHING PENSTEMON			S					PLANT
PENSTEMON SUPERBUS	SUPERB BEARDTONGUE			S					PLANT
PERITYLE COCHISENSIS	CHIRICAHUA ROCK DAISY			S			SR		PLANT
PHYSALIS LATIPHYSA	BROAD-LEAF GROUND-CHERRY			S					PLANT
PLATANTHERA LIMOSA	THURBER'S BOG ORCHID						SR		PLANT
POLEMONIUM PAUCIFLORUM SSP HINCKLEYI	HINCKLEY'S LADDER	SC		S					PLANT
PSILACTIS GENTRYI				S					PLANT
RUMEX ORTHONEURUS	BLUMER'S DOCK	SC					HS		PLANT
SALVIA AMISSA	ARAVAIPA SAGE	SC		S	S				PLANT
SAMOLUS VAGANS	CHIRICAHUA MOUNTAIN BROOKWEED			S					PLANT
SCHIEDEELLA PARASITICA	FALLEN LADIES'-TRESSES						SR		PLANT
SENECIO CARLOMASONII	SEEMANN GROUNDSEL			S					PLANT
SENECIO HUACHUCANUS	HUACHUCA GROUNDSEL			S			HS		PLANT
SENECIO NEOMEXICANUS VAR TOUMEYI	TOUMEY GROUNDSEL			S					PLANT
SISYRINCHIUM CERNUUM	NODDING BLUE-EYED GRASS			S					PLANT
SPIRANTHES DELITESCENS	MADREAN LADIES'-TRESSES	LE					HS		PLANT

Scientific Name	Common Name	ESA	*Critical Habitat	USFS	BLM	WSCA	NPL	NESL	Taxonomic Group
COUNTYNAME : COCHISE									
STELLARIA PORSILDII	PORSILD'S STARWORT			S					PLANT
STENORRHYNCHOS MICHUACANUS	MICHOACAN LADIES'-TRESSES						SR		PLANT
TALINUM MARGINATUM	TEPIC FLAME FLOWER	SC		S			SR		PLANT
TEPHROSIA THURBERI	THURBER HOARY PEA			S					PLANT
TRAGIA LACINIATA	SONORAN NOSEBURN			S					PLANT
VAUQUELINIA CALIFORNICA SSP PAUCIFLORA	LIMESTONE ARIZONA ROSEWOOD	SC					SR		PLANT
VIOLA UMBRATICOLA	SHADE VIOLET			S					PLANT
ZIGADENUS VIRESCENS	GREEN DEATH CAMAS						SR		PLANT
CNEMIDOPHORUS BURTI STICTOGRAMMUS	GIANT SPOTTED WHIPTAIL	SC		S	S				REPTILE
CROTALUS WILLARDI OBSCURUS	NEW MEXICO RIDGENOSE RATTLESNAKE	LT	Y						REPTILE
CROTALUS WILLARDI WILLARDI	ARIZONA RIDGENOSE RATTLESNAKE			S		WC			REPTILE
GOPHERUS AGASSIZII (SONORAN POPULATION)	SONORAN DESERT TORTOISE	SC				WC			REPTILE
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	SC			S				REPTILE
SISTRURUS CATENATUS EDWARDSI	DESERT MASSASAUGA			S		WC			REPTILE
THAMNOPHIS EQUES MEGALOPS	MEXICAN GARTER SNAKE	SC		S		WC			REPTILE
COUNTYNAME : COCONINO									
BUFO MICROSCAPHUS MICROSCAPHUS	ARIZONA TOAD	SC		S					AMPHIBIAN
RANA BLAIRI	PLAINS LEOPARD FROG					WC			AMPHIBIAN
RANA CHIRICAHUENSIS	CHIRICAHUA LEOPARD FROG	PT		S		WC			AMPHIBIAN
RANA PIPIENS	NORTHERN LEOPARD FROG			S		WC		3	AMPHIBIAN
RANA YAVAPAIENSIS	LOWLAND LEOPARD FROG	SC		S		WC			AMPHIBIAN
ACCIPITER GENTILIS	NORTHERN GOSHAWK	SC		S		WC		4	BIRD
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK			S		WC			BIRD
CERYLE ALCYON	BELTED KINGFISHER					WC		4	BIRD
EMPIDONAX TRAILLII EXTIMUS	SOUTHWESTERN WILLOW FLYCATCHER	LE	Y			WC		2	BIRD
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	SC	Y			WC		3	BIRD
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT				WC		3	BIRD
PANDION HALIAETUS	OSPREY					WC			BIRD
PINICOLA ENUCLEATOR	PINE GROSBEAK					WC			BIRD
STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	LT				WC		3	BIRD
CATOSTOMUS CLARKI	DESERT SUCKER	SC			S				FISH
CATOSTOMUS INSIGNIS	SONORA SUCKER	SC			S				FISH
CATOSTOMUS LATIPINNIS	FLANNELMOUTH SUCKER	SC		S				4	FISH
CATOSTOMUS SP 3	LITTLE COLORADO SUCKER	SC		S	S	WC			FISH
GILA CYPHA	HUMPBACK CHUB	LE	Y			WC		2	FISH
GILA ROBUSTA	ROUNDTAIL CHUB	SC		S		WC		2	FISH
LEPIDOMEDA VITTATA	LITTLE COLORADO SPINEDACE	LT	Y			WC			FISH
ONCORHYNCHUS APACHE	APACHE (ARIZONA) TROUT	LT				WC			FISH
RHINICHTHYS OSCULUS	SPECKLED DACE	SC			S				FISH

STATUS DEFINITIONS

ARIZONA GAME AND FISH DEPARTMENT (AGFD)
HERITAGE DATA MANAGEMENT SYSTEM (HDMS)

FEDERAL US STATUS

ESA **Endangered Species Act** (1973 as amended)
US Department of Interior, Fish and Wildlife Service

Listed

- **LE** Listed Endangered: imminent jeopardy of extinction.
- **LT** Listed Threatened: imminent jeopardy of becoming Endangered.
- **XN** Experimental Nonessential population.

Proposed for Listing

- **PE** Proposed Endangered.
- **PT** Proposed Threatened.

Candidate (Notice of Review: 1996)

- **C** Candidate. Species for which USFWS has sufficient information on biological vulnerability and threats to support proposals to list as Endangered or Threatened under ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.
- **SC** Species of Concern. The terms "Species of Concern" or "Species at Risk" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the US Fish and Wildlife Service, but neither term has official status (currently all former C2 species).

Critical Habitat (check with state or regional USFWS office for location details)

- **Y** Yes: Critical Habitat has been designated.
- **P** Proposed: Critical Habitat has been proposed.

[\N No Status: certain populations of this taxon do not have designated status (check with state or regional USFWS office for details about which populations have designated status)].

USFS **US Forest Service** (1999 Animals, 1999 Plants)
US Department of Agriculture, Forest Service, Region 3

- **S** Sensitive: those taxa occurring on National Forests in Arizona which are considered sensitive by the Regional Forester.

BLM **US Bureau of Land Management** (2000 Animals, 2000 Plants)
US Department of Interior, Bureau of Land Management, Arizona State Office

- **S** Sensitive: those taxa occurring on BLM Field Office Lands in Arizona which are considered sensitive by the Arizona State Office.
- **P** Population: only those populations of Banded Gila monster (*Heloderma suspectum cinctum*) that occur north and west of the Colorado River, are considered sensitive by the Arizona State Office.

TRIBAL STATUS

NESL Navajo Endangered Species List (1997)
Navajo Nation, Navajo Fish and Wildlife Department

The Navajo Endangered Species List contains taxa with status from the entire Navajo Nation which includes parts of Arizona, Utah, and New Mexico. In this notebook we provide NESL status for only those taxa whose distribution includes part or all of the Arizona portion of the Navajo Nation.

Groups

1 Those species or subspecies that no longer occur on the Navajo Nation.

2 Any species or subspecies which is in danger of being eliminated from all or a significant portion of its range on the Navajo Nation.

3 Any species or subspecies which is likely to become an endangered species, within the foreseeable future, throughout all or a significant portion of its range on the Navajo Nation.

4 Any species or subspecies for which the Navajo Fish and Wildlife Department (NF&WD) does not currently have sufficient information to support their being listed in Group 2 or Group 3 but has reason to consider them. The NF&WD will actively seek information on these species to determine if they warrant inclusion in a different group or removal from the list.

MEXICAN STATUS

MEX Mexican Federal Endangered Species List (May 16, 1994)
Secretaría de Desarollo Social, NORMA Oficial Mexicana NOM-059-ECOL-1994

The Mexican Federal Endangered Species List contains taxa with status from the entire Mexican Republic and waters under its jurisdiction. In this notebook we provide MEX designations for only those taxa occurring in Arizona and also in Mexico.

P En Peligro de Extinción (Determined Endangered in Mexico): in danger of extinction.

A Amenazada (Determined Threatened in Mexico): could become endangered if factors causing habitat deterioration or population decline continue.

R Rara (Determined Rare in Mexico): populations viable but naturally scarce or restricted to an area of reduced distribution or very specific habitats.

Pr Sujeta a Protección Especial (Determined Subject to Special Protection in Mexico): utilization limited due to reduced populations, restricted distribution, or to favor recovery and conservation of the taxon or associated taxa.

[| = One or more subspecies of this species has status in Mexico, but the HDMS does not track it at the subspecies level (most of these subspecies are endemic to Mexico). Please consult the NORMA Oficial Mexicana NOM-059-ECOL-1994 for details.]

STATE STATUS

NPL Arizona Native Plant Law (1993)
Arizona Department of Agriculture

HS Highly Safeguarded: no collection allowed.

SR Salvage Restricted: collection only with permit.
ER Export Restricted: transport out of State prohibited.
SA Salvage Assessed: permits required to remove live trees.
HR Harvest Restricted: permits required to remove plant by-products.

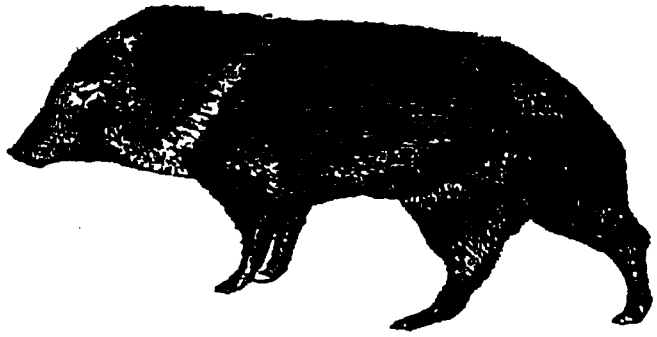
WSCA Wildlife of Special Concern in Arizona (1996 in prep)
Arizona Game and Fish Department

WC Wildlife of Special Concern in Arizona. Species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Arizona Game and Fish Department's listing of Wildlife of Special Concern in Arizona (WSCA, in prep). Species indicated on printouts as WC are currently the same as those in **Threatened Native Wildlife in Arizona** (1988).

THE STATE OF ARIZONA

GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4399 (602) 942-3000
www.gf.state.az.us



FAX TRANSMITTAL FORM
REGION V – TUCSON

DATE: 8-25-00

TO: ~~Keith Fenner~~ Chris Ingram

FROM: Marty Tuegel 520 628-5377 x 139

COMMENTS: ~~Hard Copy in Mail~~ – Response to Draft EA - Naco/Douglas

FAX NUMBER – (520) 628-5080

NUMBER OF PAGES (INCLUDING COVER PAGE) 4

The Arizona Game and Fish Department is responsible for managing Arizona's fish and wildlife resources as an enduring public trust. In addition, the Department is charged with promoting safe and responsible use of watercraft and off-highway vehicles. Funding is provided from the sale of licenses and permits; watercraft registration fees; federal excise taxes on firearms, fishing equipment, boats, and other sporting goods; State lottery revenues; donations on State income tax forms; and various contracts and grants. Department policy is set by the Arizona Game and Fish Commission, whose five members are appointed by the Governor.

MANAGING TODAY FOR WILDLIFE TOMORROW

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
2221 WEST GREENWAY ROAD, PHOENIX, AZ 85023-4399
(602) 942-3000 • WWW.AZGFD.COM

GOVERNOR
JANE DEE HULL
COMMISSIONERS
CHAIRMAN, W. HAYS GILSTRAP, PHOENIX
DENNIS D. MANNING, ALPINE
MICHAEL M. GOLIGHTLY, FLAGSTAFF
JOE CARTER, SAFFORD
WILLIAM BERLAT, TUCSON
DIRECTOR
DUANE L. SHROUFE
DEPUTY DIRECTOR
STEVE K. FERRELL

Tucson Office, 555 N Greasewood Rd, Tucson, AZ 85745

August 25, 2000

Mr. Kevin Feeney
INS Environmental Officer
425 I Street NW, Room 2030
Washington, D.C. 20536

Re: Draft EA for U.S. Immigration and Naturalization Service Infrastructure Activities along the Naco, Douglas Corridor, Arizona

Dear Mr. Kevin Feeney:

The Arizona Game and Fish Department (Department) has reviewed the above-referenced environmental assessment (EA). There are three alternative actions presented in this EA. The No Action Alternative which would stop all current approved projects and place a five year moratorium on new projects. The Current Action Alternative would allow all currently approved project to be completed and would provide for the normal maintenance and operations associated with these projects. The Future Infrastructure Alternative is identified as the preferred. This alternative would cover the activities in the other alternatives and those anticipated to be completed in the foreseeable future. The Alternatives presented address the number and scope of activities rather than alternative types of activity.

The Department recommends that a section be added to address how the U.S. Immigration and Naturalization Service (INS) will comply with Executive Order 13112 Invasive Species (64 Federal Register 6183, February 8, 1999). The ground disturbing construction and maintenance activities proposed within the Naco-Douglas Corridor has the potential of promoting the establishment and spread of invasive species. The Department is concerned with the potential of exotic invasive species becoming established and spreading to surrounding habitats not directly impacted by the proposed alternatives in the EA. The Department recommends that disturbance be minimized during construction and operations. An invasive species monitoring and control effort is also recommended. While most of the project areas are located within areas described as previously disturbed, the Department does not consider this justification to avoid mitigation for long-term and cumulative impacts related to invasive species.

In the Environmental Consequences section on wildlife, there are several statements of no significant impacts on wildlife populations, including the number of animals and the species

composition in and around the sites of the completed and proposed actions. This is attributed to linear nature of the projects and the previously disturbed nature of the majority of the project sites. Outside of the impacts of artificial lighting, no documentation is included to support these observations. The Department is concerned that the analysis of these impacts is incomplete.

The Department is concerned with the direct and long-term impacts of the border road. There is a growing body of literature concerning the impact roads have on wildlife and wildlife habitat[1]. Impacts from roads include mortality from construction, collisions with vehicles, modification of animal behavior, disruption of the physical environment, alteration of chemical environment and the spread of exotic species. The literature covers an array of roadway types from 3 m wide dirt roads to multi-lane highways. Road kill studies at Saguaro National Park have quantified mortality from vehicle collision ranging from 20,000 to 25,000 individuals annually on the 50 miles of road associated with both units of the park (Natasha Kline, pers. comm.). Preliminary data from this study also shows indirect impacts to amphibian population demographics. Populations near roads that are opened to travel at night show a loss of the larger size classes, the oldest individuals. In long lived species that rely on unpredictable resourses, this may have long term impacts on local populations. She further hypothesized that roads may actually attract toads due to pooling of water on and near roadways.

The Department agrees that the Environmental Design Features included in the EA under Biological Resources and Unique and Sensitive Areas would reduce the impacts of the preferred and other alternatives. However, the Department recommends that revegetation of all disturbed areas and the use of culverts and wildlife underpasses actually be implemented as part of the mitigation for the proposed activities. Further, the Department recommends that road improvements be engineered to drain water off roadways and these design features be maintained during normal maintenance activities. Roadway widths should be minimized and then maintained at that width while in use. In addition, turnarounds and access routes should be established and designated for maintenance and operational use. Any off road travel should be strongly discouraged, but when it happens it should be documented and restoration efforts should begin immediately. This will reduce any creeping expansion of impacts from operations and maintenance. Further, the key to limiting unnecessary impacts will be education of all agents and employees working in the Naco - Douglas Corridor on the unique environmental resources of this area and the duty of Border Patrol and INS in protecting those resources.

Please contact me at (520) 628-5672, extension 139, if you have any questions regarding the HDMS information provided in this letter or have further questions concerning potential impacts to wildlife resources associated with the proposed project.

---

[1] Trombulak, Stephen C. and Christopher A. Frissell. 2000. Review of the Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology. 14(1):18-30.

Sincerely,

Martin Tuegel
Habitat Specialist
Tucson, AZ

MAT:mt

cc: John Kennedy, Project Evaluation Program Supervisor, Habitat Branch
Sherry Barrett, Assistant Field Supervisor, U.S. Fish and Wildlife Service
Gabe Paz, Wildlife Manager, GMU 30A
Brad Fulk, Wildlife Manager, GMU 30B
John Millican, Wildlife Manager, GMU 35A
Joan Scott, Habitat Program Manager, Region V

AGFD# 08-01-00(05)

(This page left intentionally blank)

Comments on Draft EA and Responses

State of Arizona Game and Fish Department

Specific Comments:

Agency: The Department recommends that a section be added to address how INS will comply with Executive Order 13112 Invasive Species (64 Federal Register 6183, February 8, 1999). The ground disturbing construction and maintenance activities proposed within the Naco-Douglas Corridor has the potential of promoting the establishment and spread of invasive species.

Response: Thank you for your comment. A section has been added in Section 5.1, 2nd paragraph addressing this comment.

Agency: In the Environmental Consequences section on wildlife, there are several statements of no significant impacts on wildlife populations, including the number of animals and the species composition in and around the sties of the completed and proposed actions. Outside of the artificial lighting, no documentation is included to support these observations. The Department is concerned that the analysis of these impacts is incomplete.

Response: Impact analysis was based on previous environmental documents prepared for similar activities within the project area (i.e., USACE 1996; USACE 1999). Potential impacts were determined by calculating the maximum loss of each habitat type using the Geographic Information System (GIS). This system geographically compared proposed projects and their locations to existing environmental data (i.e., soils, vegetation types, environmentally sensitive areas). Therefore, the latest information possible was utilized specific to the project area in determining potential impacts.

Agency: The Department is concerned with the direct and long-term impacts of the border road. Impacts from roads include mortality from construction, collisions with vehicles, modification of animal behavior, disruption of the physical environment, alteration of the chemical environment, and the spread of exotic species.

Response: This comment was previously addressed in the fourth paragraph in Section 5.1.

Agency: The Department agrees that the Environmental Design Features included in the EA under Biological Resources and Unique and Sensitive Areas would reduce the impacts of the preferred and other alternatives. However, the Department recommends that revegetation of all disturbed areas and the use of culverts and wildlife underpasses actually be implemented as part of the mitigation for the proposed activities.
Response: Thank you for your comment. This comment was previously addressed in the last paragraph of Section 5.1.

Agency: The Department recommends that road improvements be engineered to drain water off roadways and these design features be maintained during normal maintenance activities. Roadway widths should be minimized and then maintained at that width while in use. In addition, turnarounds and access routes should be established and designated for maintenance and operational use. Any off road travel should be strongly discouraged, but when it happens it should be documented and restoration efforts should begin immediately. This will reduce any creeping expansion of impacts from operations and maintenance.
Response: Thank you for your comment. This comment has been addressed in the last paragraph of Section 5.1.

APPENDIX C
SITE SURVEYS FOR PLANNED RVS SITES IN DOUGLAS CORRIDOR

Appendix C

Site Surveys for Planned RVS Sites in Douglas Corridor

A Class III archaeological inventory and biological evaluation were completed on five proposed surveillance tower locations in southeast Arizona on July 11, 2000 under Arizona BLM permit AZ-000202. The UTM locations of the towers are included on the attached maps (Figures C1-C5) and are listed in Table C-1.

Table C 1
Camera Tower Sites Due to be Completed in September 2000

Site	Name	Lat. (N)	Long. (W)	Elev. (Ft)
A	SE of D Hill	31 20 02.66	109 28 01.28	4420
B	New BP Station	31 20 59.89	109 37 50.65	3903
C	Central & the Line	31 20 03.23	109 41 47.82	4163
D	SE San Jose Ranch	31 20 02.90	109 44 11.34	4315
E	SE Christiansen	31 20 06.07	109 46 33.90	4450

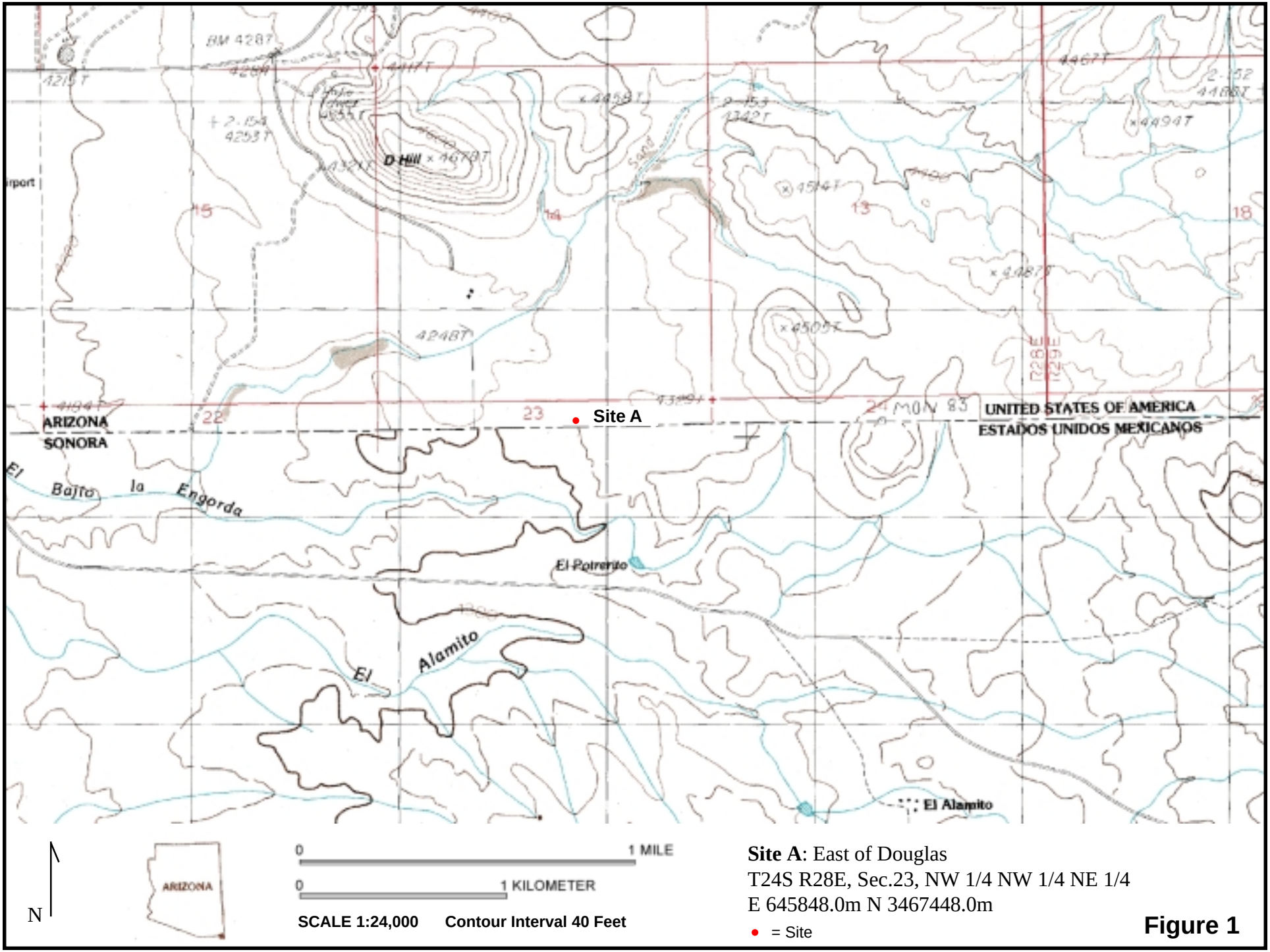
Prior to beginning the fieldwork, a review of the project and Archaeological site records was completed at the BLM field offices at Safford and Tucson, Arizona. A single project from the area was on record at the Safford Office (Project number BLM- AZ-045-93-15). This project covered an area of 30 acres and no archaeological resources were found.

Each of the above plots were surveyed for 23 Federally listed threatened and endangered plant and animal species and 147 state monitored plant and animal species known to occur in Cochise County. Bird species were surveyed utilizing audio and visual identification techniques, while all other species were surveyed using visual observation. Many plant species were eliminated from consideration on the basis of lack of suitable habitat on the small plots. The small size of the plots and sparse vegetative cover allowed for 100% complete coverage of the survey areas. All plots were relatively level in nature and showed varying degrees of previous disturbance by man. All are accessible by currently existing road systems, although Site E may require modification of the dated current road in the future.

Each tower footprint, including associated solar panels for power and surrounding fence covers an area measuring 10m x 10m (100 sq m). An area measuring 20m x 20m (400 sq m) was surveyed at each proposed location to ensure adequate room for construction. All of the proposed locations are adjacent to existing access roads and no new roads are proposed. A single isolated artifact was found within tower Site C. This isolate is a microcrystalline limestone flake exhibiting retouching or use-wear along one edge. The flake is a tertiary flake (20% cortex) and has a platform. No other archaeological resources were found within the survey areas. The appropriate BLM project records have been submitted to the BLM Tucson field office.

No historic properties (i.e., cultural resources eligible for inclusion to the National Register of Historic Places) were found during the archaeological inventory of the five proposed tower locations. Therefore, it is recommended that no further archaeological

(This page left intentionally blank)

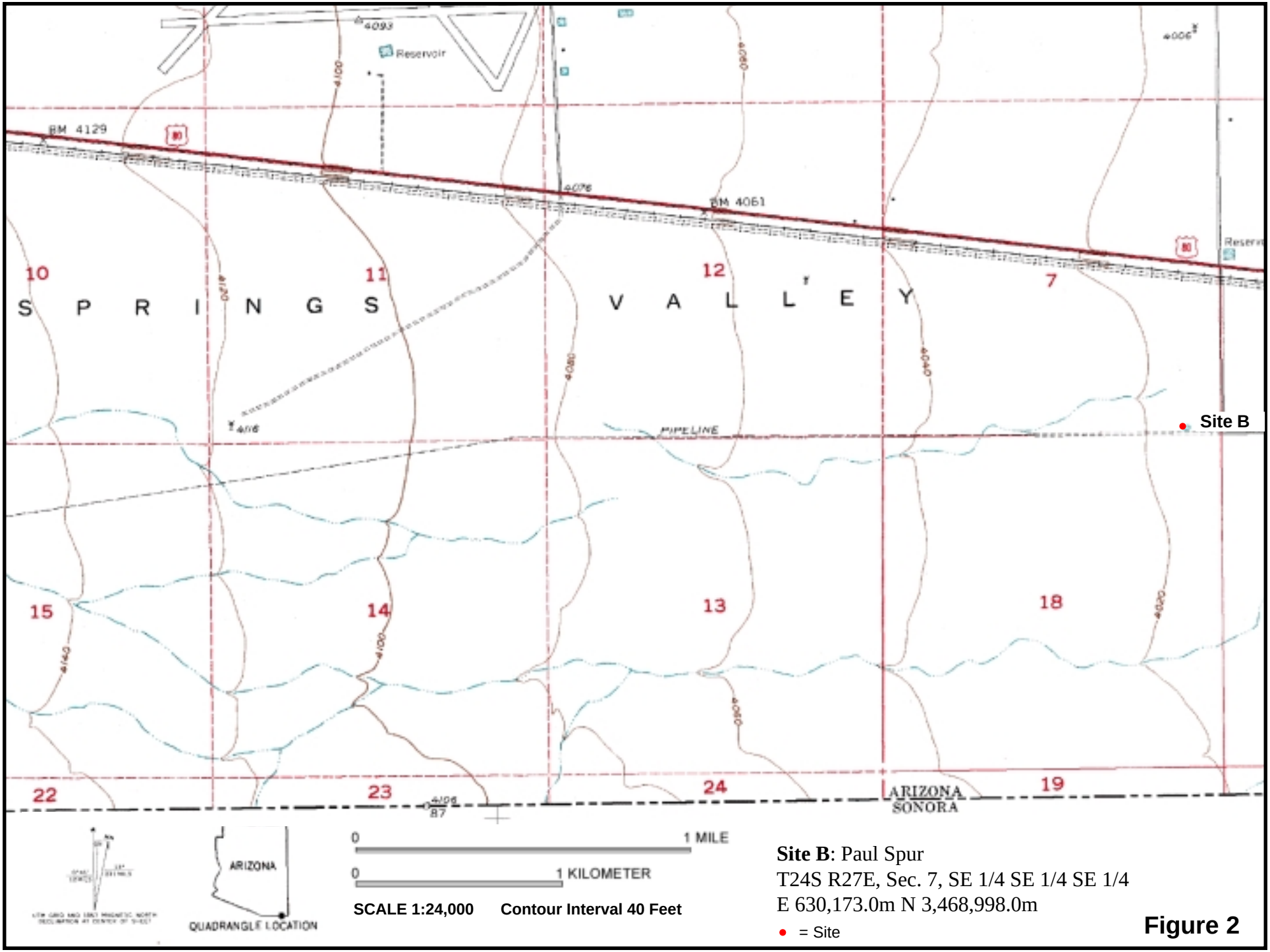


Site A: East of Douglas
T24S R28E, Sec.23, NW 1/4 NW 1/4 NE 1/4
E 645848.0m N 3467448.0m

• = Site

Figure 1

(This page left intentionally blank)

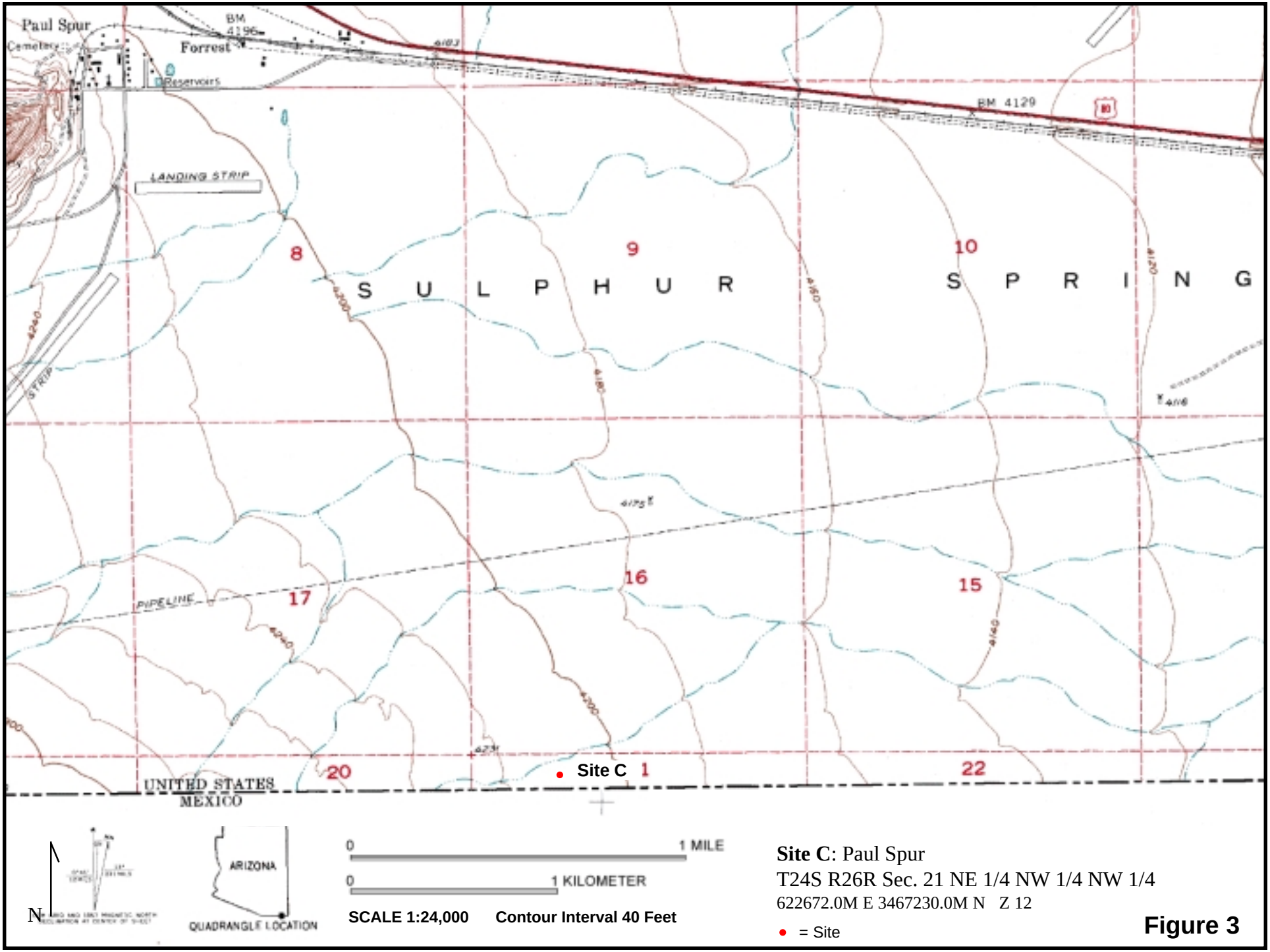


Site B: Paul Spur
T24S R27E, Sec. 7, SE 1/4 SE 1/4 SE 1/4
E 630,173.0m N 3,468,998.0m

• = Site

Figure 2

(This page left intentionally blank)

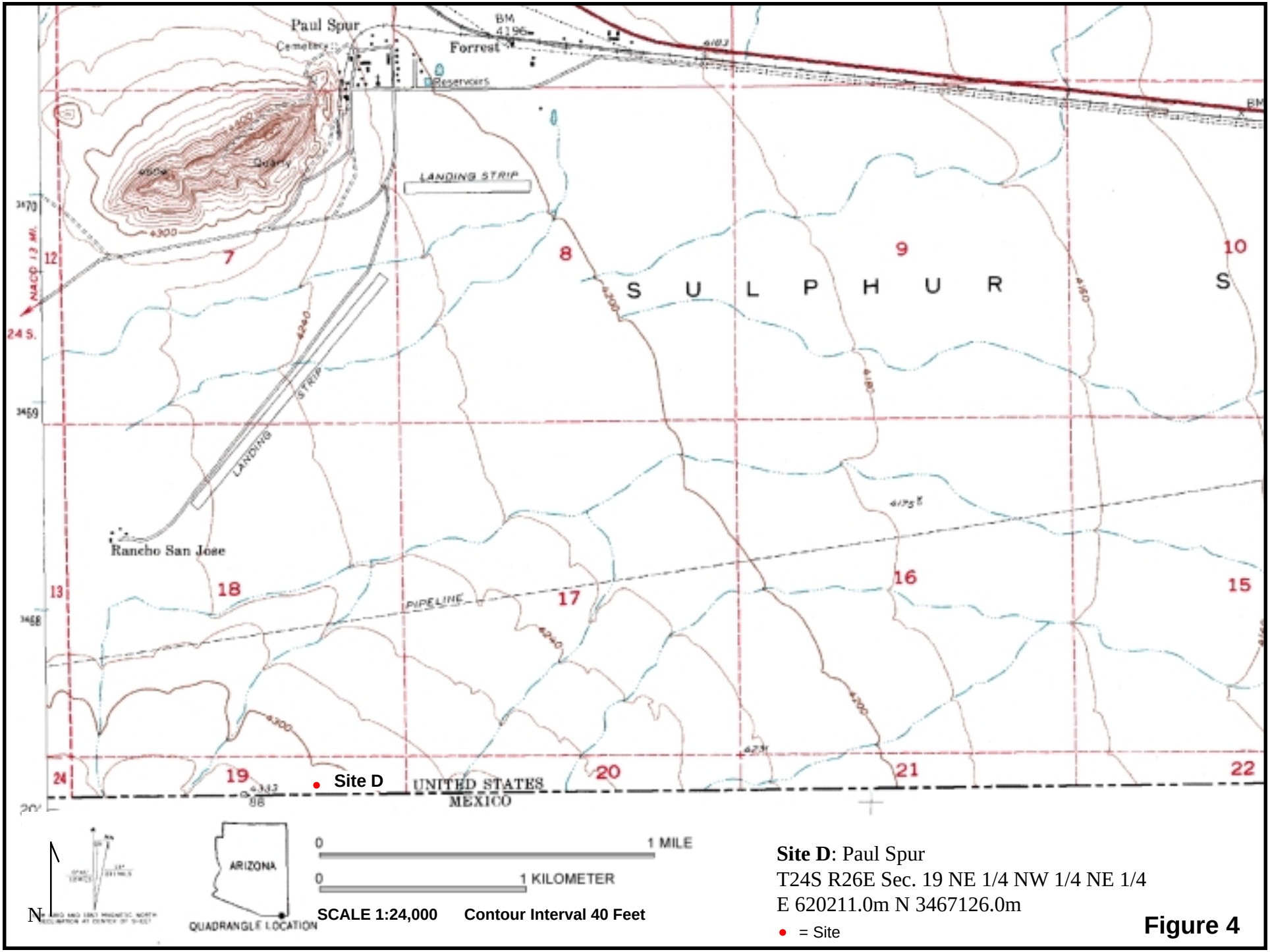


Site C: Paul Spur
T24S R26R Sec. 21 NE 1/4 NW 1/4 NW 1/4
622672.0M E 3467230.0M N Z 12

• = Site

Figure 3

(This page left intentionally blank)

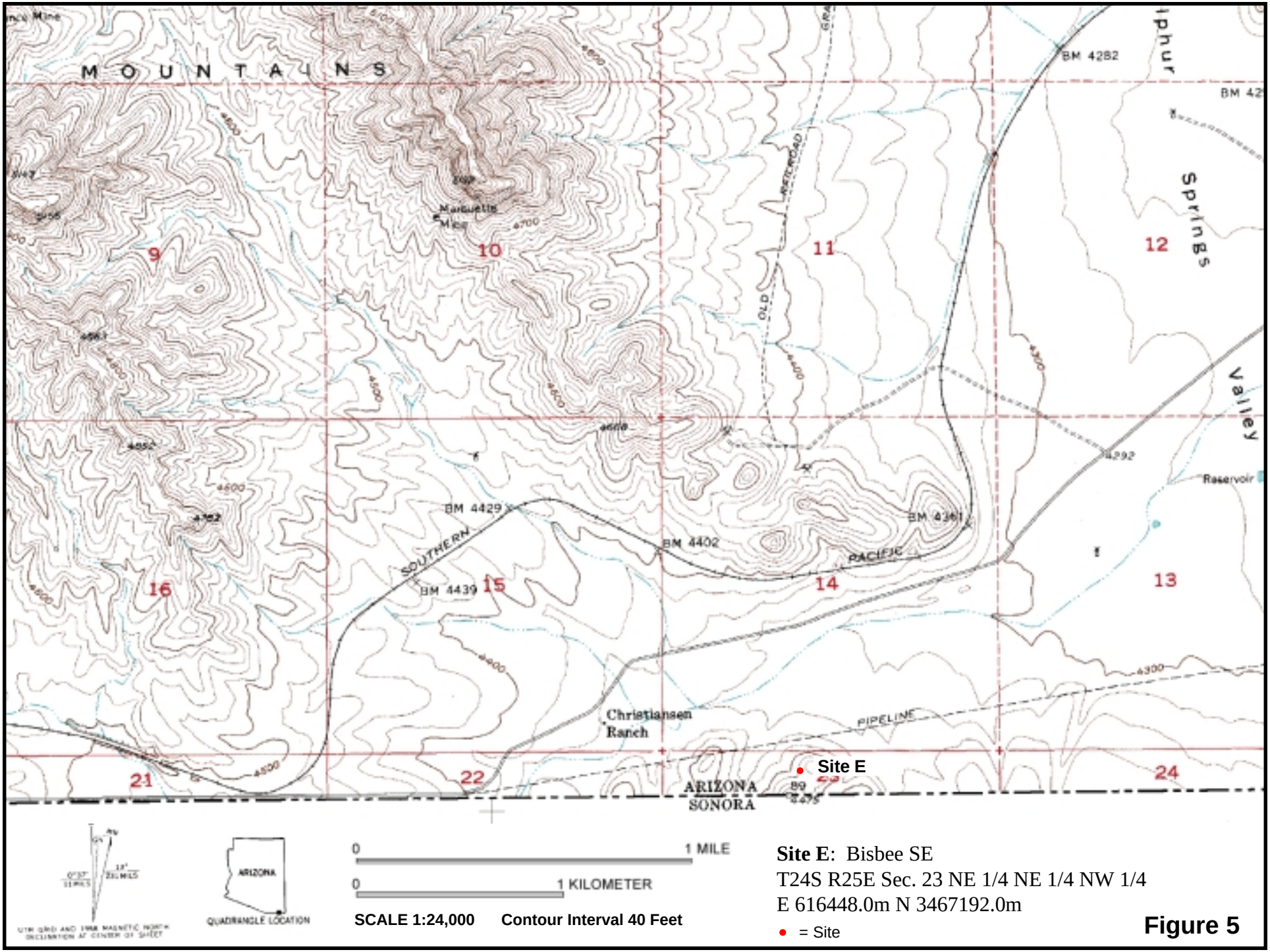


Site D: Paul Spur
T24S R26E Sec. 19 NE 1/4 NW 1/4 NE 1/4
E 620211.0m N 3467126.0m

• = Site

Figure 4

(This page left intentionally blank)



Site E: Bisbee SE
T24S R25E Sec. 23 NE 1/4 NE 1/4 NW 1/4
E 616448.0m N 3467192.0m

• = Site

Figure 5

(This page left intentionally blank)

investigations are required for the proposed undertaking. If, however, the proposed tower locations are changed, or additional tower locations are proposed, it is recommended that these locations be surveyed by a qualified archaeologist.

Results and Recommendations

Site A: SE of D Hill

This plot is characterized as a desert scrub brush community consisting primarily of mesquite (*Prosopis* sp.), *Acacia* sp. and tarbush (an indicator of previous disturbance). No listed species were observed on this site, however, single specimens of pencil cholla (*Cylindropuntia kleinia*) and ocotillo (*Fouqueria splendens*) were located within the survey area. Both species are protected under laws involving Arizona's native desert plants. This office recommends that the Border Patrol consult with Arizona Department of Agriculture to confirm the effects of this law on their agency and following the consultation that the specimens be relocated with the blessings of that agency. Both species are easily transplanted. The center of this plot was moved approximately 10 meters west of its original layout to avoid two soaptree yucca (*Yucca elata*) specimens, a species not easily relocated.

Site B: New BP Station

This plot is on an old ranch site adjacent to a concrete slab marking the last remains of an old dairy barn. Little native vegetation exists. Most current vegetation consists of escaped ground covers from old garden areas nearby. No listed species were found during the survey and this office recommends the use of this plot with no biological restrictions.

Site C: Central & the Line

This plot is vegetated by a different desert scrub brush community as Site A. This site is characterized by mesquite and tarbush predominately with an incursion of greasewood (*Sarcobatus vermiculatus*), indicating previously disturbed and increasingly alkaline soils. Evidence also exists of a relatively recent fire (probably lightening caused because it provided enough heat to pop nearby rocks) on the plot. No listed species were located on the site and this site should be able to be used with no biological restrictions.

Site D: SE San Jose Ranch

This site, greatly disturbed in the past, is characterized by a preponderance of greasewood, with, to lesser extent, *Acacia* sp. and Mormon tea. No listed species were located on the site and this site should be able to be used with no biological restrictions.

Site E: SE Christiansen

The vicinity of this site, atop a limestone littered hilltop, is a wonderful example of Sonoran Desert flora. While no listed species were found on the site, the center was moved to avoid the numerous specimens of plants protected under laws involving Arizona's native desert plants. While it appears that within a new restricted area these

numerous specimens may not be effected by this action, this office again recommends that the Border Patrol consult with Arizona Department of Agriculture to confirm the effects of this law on their agency and following the consultation that the specimens determined by that agency to be effected be relocated with the blessings of that agency. Species involved include ocotillo, Palmer's agave (*Agave palmerii*) and several species of pincushion (*Mammalaria* sp.*)* and beehive (*Coryphantha* sp.) cactus.

Wetlands

All five plots were also surveyed for potentially jurisdictional wetlands. While Sites A, C and D are susceptible to sheet flooding and erosional runoff during intensive rain events, no potentially jurisdictional wetlands were located on any of the plots.

Figure 6: Photograph of Proposed RVS Site

Figure 7: Photograph of Proposed RVS Site

(This page left intentionally blank)

Figure 8: Photograph of Proposed RVS Site

Figure 9: Photograph of Proposed RVS Site

(This page left intentionally blank)

Figure 10: Photograph of Proposed RVS Site

Figure 11: Photograph of Proposed RVS Site

(This page left intentionally blank)

Figure 12: Photograph of Proposed RVS Site

Figure 13: Photograph of Proposed RVS Site

(This page left intentionally blank)

Figure 14: Photograph of Proposed RVS Site

Figure 15: Photograph of Proposed RVS Site

(This page left intentionally blank)

APPENDIX D
ARIZONA SHPO FILES

Table D1: State Inventory Files and Projects Within the Vicinity of the Project Area.

SHPO Inventory Number	Name
005A-I	Bisbee Historic District (NR)
005B-I	Lavender Pit Mine
006-I	Camp John A Rucker
007-I	Cima Cabin
012-I	Coronado National Monument (NR)
014-I	Courtland
016-I	Double Adobe Site (NR)
017B-I	Douglas Munincipal Airport
017C-I	Gadsen Hotel (NR)
017D-I	Grand Theatre (NR)
018-I	Dragoon Springs Stage Station Site (NR)
021A-I	Old Fort Huachuca
021B-I	Fort Huachuca, World War II Mobilization Building
021C-I	Garden Canyon Archaeological Site (NR)
021D-I	Garden Canyon Petrogylphs (NR)
023-I	Garces House
024-I	Kinjockity Ranch
030-I	Lehner Mammoth Kill Site (NR)
033-I	Montezuma School
034-I	Naco-Mammoth Kill Site
046-I	Corando NM Cochise Culture Archaeological District (NR)
053-I	Fry Homestead
060-I	Bisbee Women's Club House
061-I	El Paso and SW Railroad Passenger Depot (NR)
062-I	El Paso and SW YMCA (NR)
066-I	Camp Newell
075-I	Douglas "G" Avenue Historic District (NR)
082-I	Black House
085-I	184 Quality Hill
091-I	AZEE:7:22 (ASM)
095-I	San Rafael Project (no file at SHPO's office)
098-I	Coronado National Memorial - small YACC Projects Survey
103-I	Douglas Historic Resource Survey (1984 City of Douglas Intensive Survey)
104-I	Douglas Historic Resource Survey (1982 Texas Tech Reconnaisance Survey)
113-I	Hereford Bridge (San Pedro River Bridge)
128-I	Fort Huachuca Gunnery Range (See also 3629-R)

Table D1: State Inventory Files and Projects Within the Vicinity of the Project Area.

SHPO Inventory Number	Name
129-I	Fort Huachuca, Three BRAC-Related Construction Sites (see also 4105-R)
130-I	Tombstone, Casa Loma Triangle Housing
134-I	Four Mile Segements of S.R. 92 near Sierra Vista (see also 3822-R)
138-I	Little Boquilla Ranch
143-I	Hubbard Field: Army Eelctronic Proving Ground, DOD-Army, Fort Huachuca
144-I	Fort Huachuca - Three Additional Locations for Short Range Tests, DOD-Army
145-I	Fort Huachuca - Three Additional Locations for Short Range Tests, DOD-Army
146-I	Fort Huachuca - Three Additional Locations for Short Range Tests, DOD-Army
148-I	Douglas Survey of Portions of Sulphur Springs and San Burnadino Valley (ASLD# 29-98250 and REA)
149-I	Cultural Rsources Inventory of 246.6 Acres for a Proposed Solid Waste Disposal Facility (ASDL# 53-99589/16-99590)
151-I	Sierra Vista, Charleston Highway Project (see also 4106-R)
167-I	Survey of U.S. West Buried Cable Line along Cowans RD, near Tombstone, Arizona
172-I	Survey of 24 Miles of S.R. 90 Right-Of-Way Between I-10 and Huachuca City
174-I	Bisbee, Highway 80 Improvements (See also 4232-R)
177-I	Guilio Cesare Road Project, Sierra Vista (#16-5288 ASLD)
178-I	Proposed Communication Tower and Acess Road near Wilcox
181-I	Survey near Gleeson (ASLD# 29-52958)
185-I	Divestiture of Federal Land in Cochise County
187-I	A 10,200 Acre Cultural Resources Survey of the M-1Training Areas of Fort Huachuca, Arizona
188-I	A Cultural Resources Survey of Approximately 1,350 Acres near Green Bush Draw (See also 4644-R)
192-I	80 Acre Parcel in the Mule Mountains (See also 4707-R)
196-I	Survey of Approximately 4.25 Acres East of High Lonesome Road (See also 4777-R)
200-I	Cultural Resources Survey of a 10-Acre Parcel of State Land Department Property for Proposed Materials Source 6809 Located Southwest of Bisbee, Cochies County, Arizona
212-I	Divestiture of 85 Acres, USFWS
214-I	Cultural Resources Survey and Monitoring of the Douglas-Naco, Arizona Sector of the U.S.-Mexico Border
223-I	Irigation Pipeline, Carl Miller, SCS
241-I	Extension of Arizona Trail
245-I	St. Patricks Roman Catholic Church (NR)
248-I	A Cultural Resources Survey of Five Exisiting Vehicula Bridge Locations along U.S. 80 West of the Vicinity of Paul Spur and Douglas, Cochise County, Arizona
249-I	Fiesta Canning, Irrigation and Land Levelling, SCS

Table D1: State Inventory Files and Projects Within the Vicinity of the Project Area.

SHPO Inventory Number	Name
252-I	Cultural Resources Survey for Mineral Explorations Southwest of Tombstone, AZ
254-I	Cultural Resources Survey for the Douglas Power Line Project
255-I	The Naco Highway Realignment Project: A Class II non-collection Survey Report and Testing Plan (See also 5303-R)
259-I	Archaeological Survey along Campobello Avenue in Sierra Vista, Arizona, for Cochise County Highway and Floodplain Department
265-I	An Archaeological Assesment for a US West Communications Buried Cable Easement along Keller Rd., near Fairbank, Cochise County, Arizona
267-I	Munn Jr. High School
270-I	A Cultural Resources Survey of a Proposed Realignment Corridor for a Segment of Chino Road in Douglas. South Central Cochies County, Arizona (See also 5426-R)
275-I	Archaeological Survey for Section 34 (28) Bore Holes

Source: Arizona SHPO Files

Table D2: NRHP Properties on File at Arizona SHPO's Office

Property Name
Bisbee Women's Club
Coronado National Memorial
Douglas Residential Historic District
Douglas Post Office
Dragoon Springs Stage Station
El Paso and Southwestern Railroad Passenger Depot
El Paso and Southwestern Railroad YMCA
Faraway Ranch
Old Fort Huachuca
Garden Canyon Archaeological Site
Gadsen Hotel
Geronimo Surrender Site
Grand Theatre - Douglas
Kinjockity Ranch
Lehner Mammoth Kill Site
Muheim House - Bisbee
Naco-Border Station
Naco Mammoth Kill Site
Rucker Canyon Archaeological District
Douglas Historic District
Douglas Sonoran Historic District
Bisbee Historic District
Double Adobe Site
Douglas Underpass
Phelps Dodge General Office Building
Rucker Canyon Ranch
St. Patricks Roman Catholic Church
San Bernardino Ranch
John Treu House - Bisbee

Source: Arizona SHPO Files and NRIS

Table D-3: Reports on File with the Arizona SHPO Office for the Proposed Project Area

SHPO Report Number	Report Title
0308-R	A Supplementary Survey of the Southern Arizona Auxilary Airfield, Fort Huachuca, Arizona (Wilson 1982)
0757-R	A Cultural Resources Survey of a Proposed Aggregrate Materials Source Pit (pit 8144) on Mexican Canyon Wash, near Bisbee, Cochise County, Arizona (Stone 1985)
0830-R	A Cultural Resources Assesment of the Sierra Vista Project, an Archaeological Survey of Two Transmission lines (Wirth and Associates 1981)
0957-R	The Naco Highway Realignment Project: A Class III Noncollection Survey Report and Testing Plan (Ezzo 1995)
0959-R	An Archaeological Clearance Survey of a Proposed Housing Development in Sierra Vista, Arizona (Straud and Brew 1984)
1033-R	Archaeological Clearance Investigation: Report on Lines in South Sierra Vista, Arizona (Larson nd)
1034-R	Archaeological Survey of the Proposed Webb Tie in Line in Efrieda, Arizona (OCRM #80-267) (Larson 1980)
1264-R	The San Rafael Project: Cultural Resources Inventory of the Alternate Transmissions Corridors (Dosh et al. 1987)
1277-R	Archaeological Clearance Surveyof Proposed Sanitation Facility, Bisbee, Arizona (Burton 1977)
1278-R	Huachuca City Industrial Center Survey, OCRM 86-353 (Williams n.d.)
1279-R	A Cultural Resources Survey for a proposed Widening and Improvement Project on State Route 92 near Sierra Vista, Cochise County, Arizona (Stone 1986)
1281-R	A Cultural Resources Survey of a Proposed Intersection Reconstruction Project at State Routes 82 and 90, Cochise County, Arizona (Stone 1986)
1288-R	Sierra Vista Archaeological Clearance Survey (Collins and Associates Job No. 1366) (Seba 1979)
1289-R	Archaeological Survey of Exapnded Sewage Facilities in Huachuca City, Arizona (Henry 1980)
1290-R	A Cultural Resources Survey of a Proposed Materials Souce Pit (pit 8146) and Haul Road on Mule Canyon Wash near Bisbee, Cochise County, Arizona (Stone 1985)
1292-R	Archaeological Survey of a Land Parcel for the Douglas Industrial Development Authority (McGuire and Maypro 1977)
1296-R	A Series of Small YACC Projects, Coronado National Memorial, Arizona (Yvonne and Purves 1975)
3629-R	Archaeological Resources Assesment for the Proposed Tank Range Construction Project, Fort Huachuca, Arizona (Thompson 1990)
3630-R	Archaeological Resources Survey Completed for 600 +/- Acres located north of Contonement Area and South of Libby Army Airfield at Fort Huachuca, Cochise County, Arizona (Cottrell 1989)
3631-R	Casa Loma Triangle Housing Limitted Partnership (Douglas 1990).
3822-R	A Cultural Resources Survey of a Four Mile Long Segement of State Route 92 Right-Of-Way near Sierra Vista, Cochise County, Arizona (Stone 1989)

Table D-3: Reports on File with the Arizona SHPO Office for the Proposed Project Area

SHPO Report Number	Report Title
4035-R	Cultural Resources Survey of the Douglas-Naco Sector of the U.S.-Mexico Border (Peter 1992).
4058-R	Inventory of Portions of Sulphur Springs Valley and San Bernardino Valley (Heuett and Maldonado 1990)
4105-R	Cultural Resources Survey for ca. 4.67 Mile Segment of Cochise County Right-Of-Way for Charleston Highway near Sierra Vista, Cochise County, Arizona (Stone 1992)
4232-R	A Cultural Resources Survey of 1.1 Miles of U.S. Highway 80 Right-Of-Way Approximately 3 Miles Northwest of Bisbee, Cochise County, Arizona (Wright 1992)
4296-R	A Cultural Resources Survey of 24 Miles of State Route 90 Right-Of-Way Between Interstate 10 and Huachuca City in Cochise County, Arizona (Wright 1992)
4634-R	A 10,200 Acre Cultural Resources Survey of 3 Proposed M-1 Tank Training Areas on Fort Huachuca, Arizona (Vanderpot 1994)
4644-R	Prehistoric Cultural Dynamics in the Midden San Pedro Valley: A Cultural Resources Survey of Approximately 1,350 Acres near Green Bush Draw, Cochise County, Arizona (Towner and Atschul 1983)
4707-R	Archaeological Survey of an 80 Acre Parcel in Mule Mountains, Southeast Arizona (Wick 1993)
4777-R	Survey of Approximately 4.25 Acres East of High Lonesome Road (Kennedy 1983)
5151-R	EA: Extension of the Arizona Trail, National Park Service 1994
5426-R	Cultural Resources Survey of a Proposed Realignment Corridor for a Segment of Chino Road in Douglas Arizona, South Central Cochise County (Stone 1995).

Source: Arizona SHPO Files